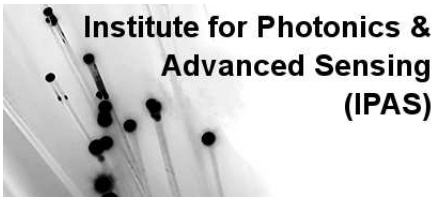
The Astronomical
Society of Australia

Astronomical Society of Australia Annual Scientific Meeting

University of Adelaide (4 – 8 July 2011)



Supported and sponsored by the University of Adelaide, Astronomical Society of Australia, Institute for Photonics and Advanced Sensing, Astronomy Australia Ltd. and CSIRO (CASS).

Welcome to Adelaide

Dear ASA2011 Delegate,

On behalf of the School of Chemistry and Physics at the University of Adelaide, I would like to welcome you to Adelaide for the 2011 ASA Annual Scientific Meeting. The meeting will be held on the campus of The University of Adelaide on North Terrace (City map ref. E6). As many of you will have seen, this year we have extended the ASM to 4.5 days due to the ever increasing activity in the Australian astronomical community. Evidence of this is the fact that just over 200 (talk+poster) abstracts were submitted, and about 230 delegates have registered to the meeting. Several sessions are also devoted to 'Future Issues' on a number of topics which it's hoped will stimulate discussion on the wide range of new astronomical facilities coming online or under discussion. Related to these are 'New Surveys' sessions which group together talks highlighting recent results and plans for the large number of exciting large-scale surveys being carried out.
Finally, if you have any questions during the meeting, don't hesitate to ask one of our friendly local organising committee members (their name badges will be suitably identified).

Gavin Rowell

LOC Chair

Welcome Reception - Sunday 3 July 6:15pm:
The welcome reception will be held in the Eclipse Room, Union House (Campus map ref. F8). The Eclipse Room is on Level 4 of the Union building, which is actually the level first encountered when approaching the Union Building from the University's front entrance on North Terrace. We recommend that you enter the University from Gate 20 on North Terrace (Campus map ref. P9) and head northwards towards Union House following the ASA2011 signs. Access along this route has a few stairs, with a parallel ramp for those wishing to avoid stairs.

Talks Sessions:
Talks sessions begin Monday 4 July 8:45am (with registration from 8:15am) in the Scott Theatre (Campus map reference G5). This is also best reached by entering the University at Gate 20 on North Terrace (Campus map ref. P9) then making a left turn at map reference H8 and walking along the front of the Physics Building to the Scott Theatre (on the ground floor of the multi-story Schulz Building).

Poster Sessions and Morning/Afternoon Coffee:
Eclipse (level 4) and Rumours (level 6) rooms, Union House (Campus map ref. F8). The Eclipse Room is the venue of the Welcome Reception, and the Rumours Room is two floors above, accessible by stairs or a lift.

Lunches:
A light lunch is provided on Monday (12:35-13:10 Eclipse Room, Union House) before the Gemini Town Hall meeting; on Tuesday (12:30-13:10, Eclipse Room) before the Speed Meet a Mentor session; and on Thursday (12:30-13:10, Eclipse Room) before the ANITA Town Hall meeting.
On-campus venues for student food include Backstage Cafe (next to the Scott Theatre conference venue), and the Mayo Refectory (level 1, Union Building, University map ref E7). Off campus, and within easy walking distance, are the restaurants and cafes of Rundle Street (City map ref. F7, east of Pulteney St) and the food courts of Rundle Mall (City map ref. E7, west of Pulteney St) e.g. those in the basements of David Jones and Myer, and that on the ground floor of the City Cross Arcade.
Only open for lunch, two recommended vegetarian restaurants are on Bent Street (turn south off Rundle Street, east of Frome St): Zenhouse Vegetarian Yum Cha (Vegan-friendly, Lacto, Ovo, Asian, Western, Fast food, Take-out) 17-19 Bent St. 08-8223-2058, and Joy Discovery-Clearlight Cafe (Vegan-friendly, Lacto, Ovo, Juice bar, International, Western) 13 Bent St. 08-8223-5994.

Harley Wood Public Lecture:
Scott Theatre, 8:00-9:30pm Tuesday. Fred Watson (AAO) *How Green is the Universe*. Please arrive before 8:00pm to ensure you are seated before the lecture commences.

Conference Dinner:
Thursday 7 July, 19:00-22:30 Adelaide Oval, Members Dining Room, Level 3 of th enew Western Stand (City map ref. C5 and see Adelaide Oval Map). The best access is from King William Rd, and then War Memorial Drive. Enter via

the 'Phil Ridings Gates' on War Memorial Drive. Upon arrival, please wear your nametag to assist staff in identifying meeting delegates.

Instructions for Speakers:
Speakers should provide their talks to the scientific secretaries in the Scott Theatre well in advance of their talks. The secretaries will be present at the venue 30 minutes prior to every session. PDF documents are strongly preferred. The venue is equipped with Windows and Mac computers. We strongly discourage use of speakers' own laptops to avoid delays. Please check the program and adjust your talk to the allotted time. Contributed talks are assigned 12 minutes plus 3 minutes question time, with Invited talks being assigned 25 minutes plus 5 minutes question time.

Instructions for Poster Presenters:
The poster areas will be open from 8am on Monday for you to attach your posters. You may also use the first morning coffee break (Monday at 10:30am) for poster set-up. Posters are split according to their assigned PXXX number. The venues are the Eclipse (level 4) and Rumours (level 6) rooms of Union House (Campus map ref. F8). Velcro tabs will be available for you to attach your poster to the boards. Posters should be designed to an A0 (841mm x 1189mm) portrait format.

Poster Sparklers:
All poster presenters are allocated a 30sec highlight (ONE slide in PDF format). Please email your sparkler slide with PXXX number and Surname identified (PXXX-Surname.pdf) to `asa2011@physics.adelaide.edu.au` or pass it on via USB stick to one of the LOC members. Note the assignment of posters to sparkler sessions in the programme.

Security:
Unfortunately we cannot guarantee the safety of your personal items during coffee and lunch breaks, so please do not leave valuables in the Scott Theatre. Please wear your conference name tags during all sessions, to assist us in identifying unwelcome visitors.

Internet Access:
The EDUROAM system is available at the University of Adelaide, you may already be familiar with its operation as it is setup at your home institution.

Alternatively, we have setup a special conference access point:

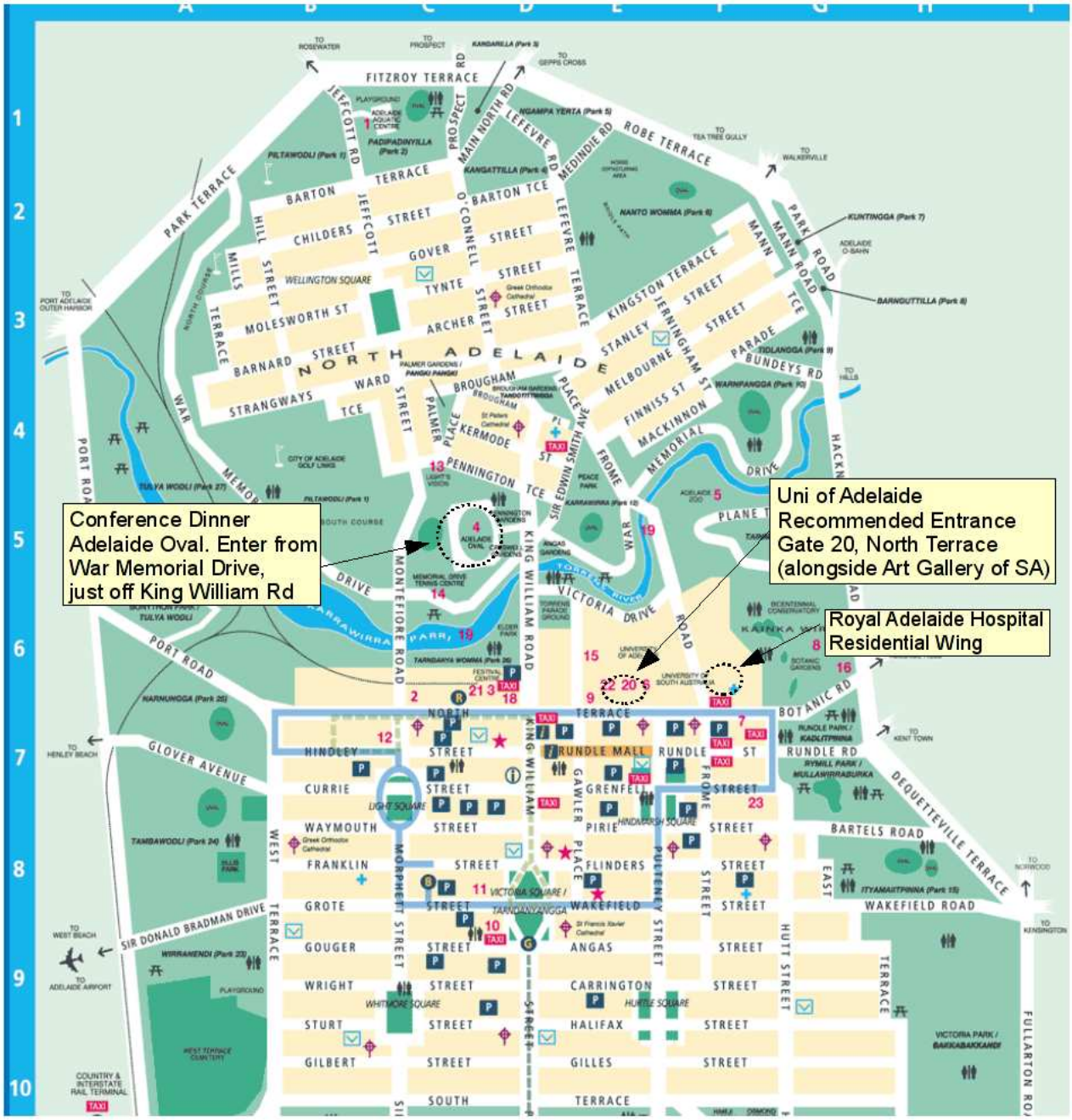
Network ESSID: `asa2011`
Password: `45asa2011#44`

Restaurants for Dinner/Lunch:
The popular restaurant areas are Rundle Street (City map ref. F7), Gouger Street (particularly for Asian, seafood, City map ref. D9), Hutt Street (City map ref. G9), and in North Adelaide, O'Connell Street (City map ref. D3) and Melbourne Street (City map ref. E4).

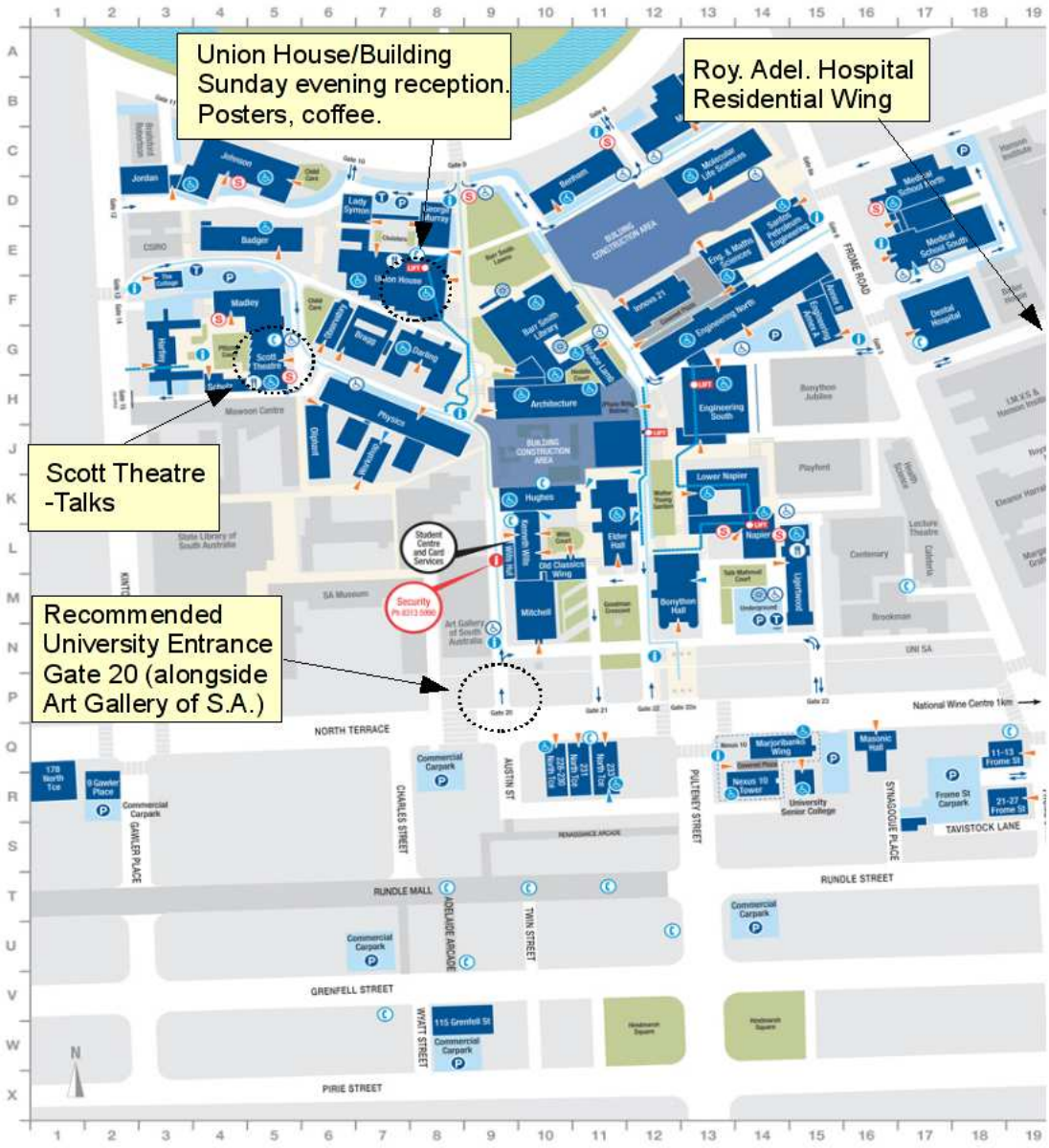
Scientific Organising Committee
Hayley Bignall (Curtin)
Joss Bland-Hawthorn (Uni. Sydney)
Michael Burton (Uni. NSW)
Roger Clay (Uni. Adelaide)
Bruce Dawson (Uni. Adelaide)
Lisa Harvey-Smith (CASS, CSIRO)
Helmut Jerjen (ANU)
Sarah Maddison (Swinburne)
Kevin Pimbblet (Monash)
Gavin Rowell (Uni. Adelaide) – Chair

Local Organising Committee
Cheryl Au
Jose Bellido
Roger Clay
Bruce Dawson
Phoebe de Wilt
Brent Nicholas
Gavin Rowell – Chair
Greg Thornton

City of Adelaide

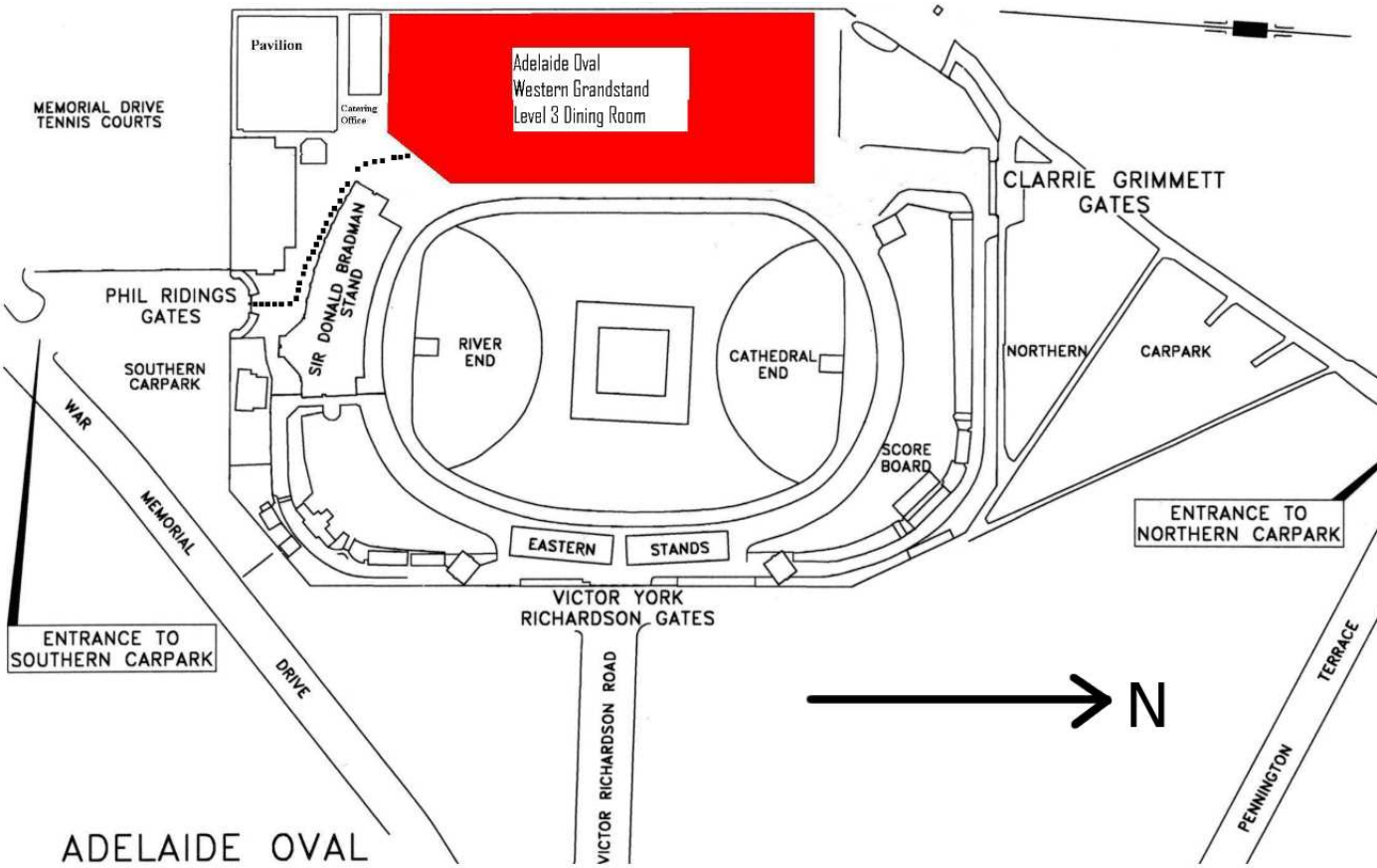


THE UNIVERSITY of ADELAIDE



Conference Dinner

The conference dinner will be held in the Members Dining Room, Level 3 in the New Western Stand at Adelaide Oval. The oval is just north of the King William Rd bridge across the river. Access is via the southern entrance ('Phil Ridings Gates' on War Memorial Drive) (see map below).



ASA ASM TALKS PROGRAMME

Invited Talks: 25min + 5 min questions
Contributed Talks: 12min + 3 min questions

NOTE: The preferred format for talks is PDF displayed on a common Windows PC but a MAC laptop will also be available. We strongly discourage use of speakers' own laptops to avoid delays.

Student presenters are identified with an '(S)' symbol.

SUNDAY 3 July

13:00 - 18:00 ASA Council Meeting (Physics-G30)
18:15 - 20:30 Welcome reception & registration: Uni. Adelaide Eclipse Room (Union Building)

MONDAY 4 July

MON1 === Opening === (chair - Gavin Rowell)

08:45 - 08:50 Welcome (Lister Staveley-Smith, President ASA)
08:50 - 09:00 Opening (SA Chief Scientist - Prof. Don Bursill)
09:00 - 09:05 Welcome & Local Info (Gavin Rowell)
09:05 - 09:10 Ellery Lecturer introduction (TBD)
09:10 – 10:00 Ellery Lecture – Russell Cannon (AAO) **Astronomer's Luck Revisited** (Invited)
10:00 – 10:30 Lister Staveley-Smith (ICRAR/UWA) **CAASTRO** (Invited)

— Morning Tea 10:30 – 11:00 —

MON2 === New Surveys (Optical/IR) === (chair - Phil Edwards)

11:00 – 11:30 Brian Schmidt (AAO) **Skymapper** (Invited)
11:30 – 11:45 Jason Spyromilio (European Southern Observatory/AAO)
The European Extremely Large Telescope instrumentation programme.
11:45 – 12:00 Rob Sharp (RSAA, ANU) **Wide field surveys at high spatial resolution**
12:00 – 12:15 Peter McGregor (ANU)
Progress on the GMT Integral-Field Spectrograph (GMTIFS)
12:15 – 12:30 Andrew Hopkins (ANU) **GAMA: The low-redshift star formation history**

— Lunch 12:30 – 14:00 incl 12:30 – 12:35 Tanya Monro **IPAS Adelaide** TBC

12:35 – 13:10 Catered Food break (Eclipse Room; Union Building)
13:15 – 14:00 Gemini Observatory Town Hall Meeting (Scott Theatre)
[hosts: Stuart Ryder, Andy Adamson, Eric Tollestrup]

MON3 === New Surveys (Optical/IR) === (chair - Kate Brooks)

14:00 – 14:15 Dennis Crabtree (NRC-HIA) **ngCFHT: A 10-m Wide-Field Spectroscopic Facility**

=== Galaxies, Cosmology, Dark Matter, Dark Energy ===

14:15 – 14:45 Dr Amanda E Bauer (AAO) **Galaxy Evolution** (Invited)
14:45 – 15:00 Charlene Heisler Prize - Max Spolaor (Swinburne)
Radial gradients in elliptical galaxies (Invited)
15:00 – 15:15 Lee Kelvin (UWA) **GAMA-SIGMA: Exploring Galaxy Structure Through Modelling**
15:15 – 15:30 Matthew Nichols (S) (University of Sydney)
Gas Depletion in Local Group Dwarfs:Stripping Assisted by Early Internal Heating

— Afternoon Tea 15:30 - 16:00 —

MON4 === Galaxies, Cosmology, Dark Matter, Dark Energy === (chair - Kevin Pimbblet)

16:00 – 16:15 Stefan Keller (ANU)
The Globular Cluster System of the Milky Way: accretion in a cosmological context

16:15 – 16:30 David Palamara (S) (Monash University)
The Clustering of Extremely Red Objects (EROs) in Boötes

16:30 – 16:45 Morag Scrimgeour (S) (ICRAR, UWA)
Large-scale cosmic homogeneity in the WiggleZ survey

16:45 - 17:55 Future Issues Discussion (Optical/IR Astronony)
+ Matthew Colless (AAO) **A Forward Look for the AAO**
+ Jeremy Mould (Swinburne) **ESO Membership**
+ Brian Schmidt (ANU) **GMT**

18:00 - 19:30 Decadal Plan Mid-Term Review launch (Eclipse Room Union Building)

TUESDAY 5 July

TUE1 === Galaxies, Cosmology, Dark Matter, Dark Energy === (chair - Tara Murphy)

09:00 – 09:30 Chris Blake (Swinburne University) **Review talk: dark energy and dark matter** (Invited)

09:30 – 09:45 B.E. Tucker (S) (Mt. Stromlo Observatory) **Galactic Control of Type Ia Supernova**

09:45 – 10.00 Melissa Ness (S) (ANU)
Understanding the formation of the galactic bulge of the Milky Way

10:00 – 10:15 Loren Bruns Jr (S) (University of Melbourne)
Clustering of Lyα emitters around luminous quasars at z = 2–3: an alternative probe of reionization on galaxy formation

=== Astronomy Demographics ===

10:15 – 10:30 Sarah Brough (AAO) **Are you biased?**

— Morning Tea 10:30 - 11:00 —

TUE2 === AGM ===

11:00 - 12:30 ASA Annual General Meeting (Scott Theatre)

— Lunch 12:30 - 14:00 —

12:30 - 13:10 Catered Food break (Eclipse Room; Union Building)

13:15 - 14:00 **Speed Meet a Mentor** (organised by the ASA-WIA chapter) (Scott Theatre)

TUE3 === New Surveys (Radio Astronomy) === (chair - Roger Clay)

14:00 – 14:30 Ilana Feain (CSIRO Astronomy & Space Science) (Invited)
Using ASKAP to explore the low power radio galaxy population through radio SEDs.

14:30 – 15:00 Tara Murphy (University of Sydney) (Invited)
Extreme events: exploring the radio transient sky.

15:00 – 15:15 Chris Power (ICRAR)
Testing Galaxy Formation Models with Next Generation HI Surveys

15:15 – 15:30 poster sparklers x 30 (P1-P30)

— Afternoon Tea 15:30 - 16:00 —

TUE4 === New Surveys (Radio Astronomy) === (chair - Simon Driver)

16:00 – 16:15 Greg Madsen (University of Sydney) **New Surveys with the SKA Molonglo Pathfinder**

16:15 – 16:30 Jacinta Delhaize (S) (ICRAR-UWA)
Neutral Hydrogen Spectral Stacking with Parkes

16:30 - 17:30 Future Issues Discussion (Radio Astronomy)
+ SKA status: Elaine Sadler, Lister Staveley-Smith
+ ALMA Proposals Report - Cycle 0: Kate Brooks, Jill Rathborne
+ ATNF current science, technical and operational capabilities: Phil Edwards

20:00 – 21:30 Harley-Wood Public Lecture – Fred Watson (AAO) (Scott Theatre)
How Green is the Universe?

WEDNESDAY 6 July

WED1 === Planets, exoplanets, astrobiology === (chair - Michael Burton)

09:00 – 09:30 Dr. Jonathan Horner (UNSW) **Exoplanets, Exo-Earths and Habitability** (Invited)

09:30 – 09:45 Michele Bannister (S) (Mt Stromlo Observatory)
A Search for Dwarf Planets in the Southern Hemisphere Sky

09:45 – 10:00 Hayden Rampadarath (S) (ICRAR)
First Very Long Baseline Interferometric SETI Observations of Gliese 581

10:00 – 10:15 Francesco Pignatale (S) (Swinburne University)
The key role of water vapour in the composition of protoplanetary dust

10:15 – 10:30 poster sparklers x 30 (P31-P60)

— Morning Tea 10:30 - 11:30 — (extended poster viewing +30min)

WED2 === Planets, exoplanets, astrobiology === (chair - Sarah Brough)

11:30 – 11:45 Simon Murphy (S) (MSO,ANU) **AP Col: The closest young star to the Sun**

=== History, Education, Outreach ===

11:45 – 12:00 Andrew Jacob (Sydney Observatory) **Harley Wood - Life and Legacy**

=== Star Formation, ISM, Astrochemistry ===

12:00 – 12:30 Yasuo Fukui (Nagoya Uni.) **Molecular Clouds and High Energy Gamma Rays** (Invited)

— Lunch 12:30 - 14:00 — (Not catered)

Heads of Departments Meeting (Physics-121 Seminar Room)

WED3 === Star Formation, ISM, Astrochemistry === (chair - Michael Ireland)

14:00 – 14:15 Joanne Dawson (University of Tasmania)
Supershells and Molecular Cloud Production in the Evolving ISM

14:15 – 14:30 Jill Rathborne (CSIRO Astronomy and Space Science) **Brewing science with MALT90**

14:30 – 14:45 Nigel Maxted (S) (University of Adelaide) **Investigating molecular cores towards the young, gamma-ray-bright supernova remnant RX J1713.7-3946.**

14:45 – 15:00 Tracey Hill (Service d'Astrophysique, CEA/Saclay)
Herschel and HOBYS view of star formation in the Galaxy

15:00 – 15:15 James Green (CSIRO Astronomy and Space Science)
New insights into the structure of the Milky Way

15:15 – 15:30 poster sparklers x 30 (P61-P90)

— Afternoon Tea 15:30 – 16:45 (extended poster viewing +45min)

WED4 === Antarctic Astronomy === (chair - Andrew Walsh)

16:45 – 17:00 Michael Ashley (UNSW) **The PLATO project: enabling astronomy from Antarctica**

17:00 – 17:30 Future Issues Discussion (Antarctic Astro)
+ Summary of SCAR meeting (10min + 20 Q&A?) Michael Burton

18:30 – 20:30 NCA Meeting (Physics-G30)

THURSDAY 7 July

THU1 === Particles (electrons, cosmic-rays, neutrinos) === (chair - Peter McGregor)

09:00 – 09:30 Gary Hill (University of Wisconsin, Madison)
High energy neutrino astronomy in Antarctica (Invited)

09:30 – 09:45 Signe Riemer-Sørensen (University of Queensland) **The largest scales and the smallest particles - constraining neutrino mass from galaxy surveys**

09:45 – 10:00 Katie Auchettl (S) (Monash University)
Extracting the Size of the Cosmic Electron-Positron Anomaly

10:00 – 10:15 Jose Bellido (University of Adelaide)
What are the highest energy particles in Nature made of?

10:15 – 10:30 poster sparklers x 30 (P91-P120)

— Morning Tea 10:30 – 11:00 —

THU2 === Particles (electrons, cosmic-rays, neutrinos) === (chair - Gayandhi De Silva)

11:00 – 11:15 Muazzam Ali (S) (Sydney Institute for Astronomy, University of Sydney)
The Influence of Stellar and Galactic Evolution on Positron Production

11:15 – 11:30 Ben Whelan (S) (University of Adelaide)
Searching for Sources at the Highest Cosmic Ray Energies.

11:30 – 11:45 Justin Bray (S) (University of Adelaide)
Searching for ultra-high energy neutrinos with the Lunaska project

=== Magnetic Fields, MHD, Particle Hydro ===

11:45 – 12:15 Daniel Price (Monash Centre for Astrophysics) **Particle Hydrodynamics and Magnetohydrodynamics: Simulating the formation of stars** (Invited)

12:15 – 12:30 Tim Robishaw (The University of Sydney)
Direct Imaging of Magnetized Turbulence in the Interstellar Medium

— Lunch 12:30 – 14:00 —

12:30 – 13:10 Catered Food break (Eclipse Room; Union Building)

13:15 – 14:00 ANITA Chapter Town Hall Meeting (Scott Theatre)
+ includes some discussion within the theme **Future Issues for Theoretical Astrophysics**

THU3 === Magnetic Fields, MHD, Particle Hydro === (chair - Jill Rathborne)

14:00 – 14:15 Ms. Alison Hammond (S) (University of Sydney)
Revealing the Faraday Rotation Universe

14:15 – 14:30 Simon Mutch (S) (Swinburne University of Technology)
The mid-life crisis of the Milky Way and M31

=== Astronomy Funding Mangement ===

14:30 – 14:45 Warrick Couch (Swinburne University of Technology/Astronomy Australia)
Astronomy Australia Limited: accomplishments and future directions

14:45 – 15:00 poster sparklers x 30 (P121-P127 + extras P49b, P77b, P87b, P93b, P94b, P110b)

— Afternoon Tea 15:00 – 16:00 (extended poster viewing +30min)

THU4 === Stars, Stellar Life & Death (SNRs, neut. stars, pulsars, black holes) === (chair - Tracey Hill)

16:00 – 16:15 Bok Prize – Mr. Barnaby Norris (S) (Sydney Institute for Astronomy, U. of Sydney)
Unveiling the curious dust around AGB stars (Invited)

16:15 – 16:30 Timothy Atta (S) (Monash Centre for Astrophysics)
Variations in the apparent neutron star radius during the decay of thermonuclear (type-I) bursts from the LMXB 4U 1636-53

16:30 – 16:45 Aaron Rizzuto (S) (Macquarie University) **SUSI Multiplicity Survey of Sco-Cen.**

16:45 – 17:00 Devika Kamath (S) (RSAA, ANU) **Constraining low-mass stellar evolution and nucleosynthesis models with observations**

17:00 – 17:15 Sean Farrell (University of Sydney)
Do Intermediate Mass Black Holes Exist? The Case of ESO 243-49 HLX-1

17:15 – 17:30 Orsola De Marco (Macquarie University)
How common envelope binary interactions change the lives of stars and planets

17:30 – 17:45 R. N. Manchester (CSIRO Astronomy and Space Science)
Pulsar Timing and the Detection of Gravitational Waves

19:00 – 22:30 Dinner (Adelaide Oval - Members Dining Room.)

FRIDAY 8 July

FRI1 === Stars, Stellar Life & Death (SNRs, neut. stars, pulsars, black holes) === (chair - Bruce Dawson)

09:00 – 09:30 Louise Webster Prize – Gayandhi De Silva (AAO)
Chemically Tagging Disk fossils: the case of the Hyades Supercluster (Invited)

09:30 – 09:45 Stephen Marsden (James Cook University) **Magnetic evolution and differential rotation of two pre-main sequence solar-type stars**

09:45 – 10:00 Simon O'Toole (Australian Astronomical Observatory) **Asteroseismology with Kepler**

=== Gravitational Waves ===

10:00 – 10:30 Kip Thorne (California Institute of Technology) **Gravitational Waves** (Invited)

— Morning Tea 10:30 – 11:00 —

FRI2 === Gravitational Waves === (chair - Hayley Bignall)

11:00 – 11:15 David Ottaway (The University of Adelaide) **The Status of Advanced LIGO**

11:15 – 11:30 David Coward (University of Western Australia) **The first coordinated optical follow-up of gravitational wave candidates in the LIGO S6 and Virgo VSR2-3 science run**

11:30 – 12:00 Future Issues Discussion (Gravitational Waves)
+ LIGO & Australia update: Jesper Munch (Adelaide) - (ACIGA representative) TBC

=== Jets, accretion, outflows: small & large-scale (AGN, quasars, X-ray binaries) ===

12:00 – 12:15 R. Soria (Curtin Institute of Radio Astronomy) **Discovery of a transient ULX in M83**

12:15 – 12:30 Hermine Landt (University of Melbourne)
The spectral energy distributions of BL Lacertae objects

12:30 – 13:45 Raquel Salmeron (ANU) **Jets and Accretion in Protostellar Disks**

12:45 – 13:10 wrap up and close

— Lunch 13:10 – 14:00 — (Not catered)

FRI3 === 14:00 onwards - Extra Sessions (x3 parallel) if needed. Contact LOC chair Gavin Rowell ===

16:10 – 17:00 Physics Seminar by Kip Thorne (Scott Theatre)

FUTURE ISSUES SESSIONS (Scott Theatre)

A number of 30 to 70min sessions are devoted to discussing future issues of importance to several sectors of the Australian astronomical community and also facilities status updates. These sessions will comprise short talks or summaries, followed by open Q&A discussion (about 10-20 min). Agenda for the various sessions are given below:

MONDAY 16:45 - 17:55 Future Issues Discussion **(Optical/IR Astronony)**

+ Matthew Colless (AAO) *A Forward Look for the AAO*
+ Jeremy Mould (Swinburne) *ESO Membership*
+ Brian Schmidt (ANU) *GMT*

TUESDAY 16:30 - 17:30 Future Issues Discussion **(Radio Astronomy)**

+ Lister Staveley-Smith (ICRAR/UWA), Elaine Sadler (Uni. Sydney) *SKA Status*
+ Kate Brooks, Jill Rathborne (CSIRO/CASS) *ALMA Proposals Report: Cycle 0*
+ Phil Edwards (CSIRO/CASS) *ATNF: current science, technical and operational capabilities*

WEDNESDAY 17:00 - 17:30 Future Issues Discussion **(Antarctic Astronomy)**

+ Michael Burton (UNSW) *Summary of SCAR Meeting in Sydney*

THURSDAY 13:10 - 14:00 ANITA Town Hall Meeting **(Theoretical Astrophysics)**

+ Some time will be devoted to future issues in theoretical astrophysics

FRIDAY 11:30 - 12:00 Future Issues Discussion **(Gravitational Wave Astronomy)**

+ Jesper Munch (Uni. Adelaide) *LIGO and Australia update*

LUNCHTIME & EVENING MEETINGS

Mon 13:15 – 14:00

Gemini Observatory Town Hall Meeting (Scott Theatre)

hosted by Stuart Ryder, Andy Adamson and Eric Tollestrup

This town-hall session will provide an update on the status of the Gemini Observatory, including recent changes in management and a review of developments in the ”transition plan” for the observatory as we move into the final year of UK membership. The instrument development program will also be reviewed, including projects approaching completion, the recent commencement of a project to provide a high-resolution optical spectroscopy capability, and the results of the most recent discussion of instrument priorities by the Gemini Science Committee. Recent progress on the GeMS (multiconjugate AO) system including the RSAA-built Gemini South Adaptive Optics Imager will be described. There will be time for a Q&A session afterwards.

Mon 18:00 – 19:30

Decadal Plan Mid-Term Review Launch (Eclipse Room, Level 4, Union House)

hosted by Dr. Paul Willis (Royal Institution of Australia Director)
and Prof. Elaine Sadler (National Committee for Astronomy Chair)

You are invited to the launch of the Astronomy Decadal Plan Mid-Term Review. The Mid-Term Review will form a basis for guiding the broad directions of Australian Astronomy into the next five years. Refreshments will be served.

Tue 13:15 – 14:00

Speed Meet a Mentor (Scott Theatre)

Everyone is invited to participate in this ”speed dating” version of a mentoring session. We’ll pair people up to have a quick chat before moving on to the next person. For mentorees it’s your opportunity to broaden your networks and explore possibilities, while for mentors it’s a chance to meet those who are keen to learn from your experience and knowledge.

We can all have moments of feeling a bit lost in the world of astronomy - just think about it, our science is all about discovering how insignificant we are in cosmic terms. But this special lunchtime session intends to change this by turning our focus inwards for a moment and making the most out of the ASA’s strong professional network.

Speed Meet a Mentor is open to all and is being organised by the Women in Astronomy Chapter of the ASA. For more information or to take part speak to Tanya Hill or Gavin Rowell.

Thu 13:15 – 14:00

ANITA Chapter Town Hall Meeting (Scott Theatre)

This years ANITA Town Hall meeting will include a discussion on future issues and opportunities in theoretical and numerical astrophysics, the annual ANITA report, funding opportunities and upcoming theory meetings in Australia.

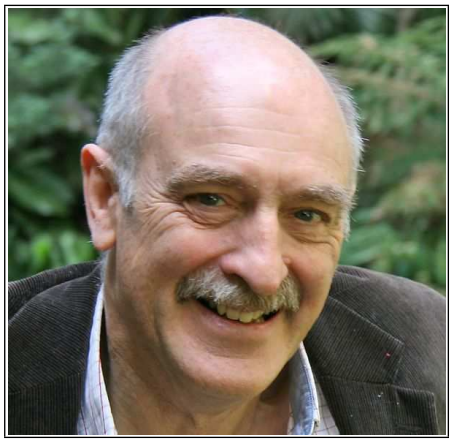
PRIZE TALKS AND PUBLIC HARLEY WOOD LECTURE

The ASA awards a number of prizes each year for outstanding achievements by ASA members in varying stages of their careers. The ASA congratulates this year's award winners, whose biographies and talk times appear below.

Ellery Lecture: Prof. Russell Cannon Monday 9:00 - 10:00
(The Ellery Lectureship recognises outstanding contributions in astronomy or related fields.)

Following a degree in mathematics, I did my PhD in Cambridge and at the Royal Greenwich Observatory while it was in Sussex, studying star clusters and the newly discovered quasars with Donald Lynden-Bell. My first postdoc job was at Mount Stromlo Observatory, where I learned about photometry with Ben Gascoigne, made models of red giant clump stars with Don Faulkner and did some radio source IDs at Parkes with John Bolton and Jasper Wall. In 1973 I joined Vincent Reddish's UK Schmidt Telescope Unit, based in Edinburgh but involving frequent visits to Siding Spring, and spent a decade working on the photographic Southern Sky Surveys. I also studied chemical abundances in globular clusters, using the AAO and CTIO 4m telescopes with Jim Hesser and others. I then came back to Australia as Director of the AAO (1986-96) and enjoyed the excitement of working on SN1987A and the challenge of building 2dF. I took part in the big galaxy redshift surveys with 2dF and AAOmega, and also use the fibre systems for spectroscopy of stars in the Magellanic Clouds and globular clusters.

Public Harley Wood Lecture: Prof. Fred Watson Tuesday 20:00 - 21:00
(A public lecture in honour of the first President of the ASA.)



Professor Fred Watson, AM, has been Astronomer-in-Charge of the Australian Astronomical Observatory since 1995. He holds adjunct positions at the University of Southern Queensland, the Queensland University of Technology, and James Cook University. In addition to his academic career, Fred has helped to popularise astronomy and space science through broadcasts, talks and other outreach programmes, winning the 2006 Australian Government Eureka Prize for Promoting Understanding of Science. He has written a number of award-winning books, including "Why is Uranus upside down?" and "Stargazer, The Life and Times of the Telescope". A life-long passion for music led in 2008 to both a lighthearted CD ("An Alien Like You") and the APRA Award for Choral Work of the Year for "Star Chant", which he wrote with Australian composer Ross Edwards. Fred was made a Member of the Order of Australia in 2010. He has an asteroid named after him (5691 Fredwatson), but says that if it hits the Earth, it won't be his fault.

Louise Webster Prize: Dr. Gayandhi De Silva Friday 9:00 - 9:30
(For outstanding research by a scientist early in their post-doctoral career.)

Gayandhi De Silva is a Research Astronomer at the AAO. Gayandhi completed her undergraduate studies at Monash University, and obtained her PhD in Astronomy and Astrophysics from the Australian National University. The aim of her PhD thesis was to test the viability of the 'Chemical tagging' technique, which aims to reconstruct dispersed groups of stars in the Galaxy by looking for common chemical signatures. In 2006, immediately after submitting her thesis, Gayandhi relocated to Chile to take up an ESO fellowship, where she supported the VLT science operations at Paranal observatory. In 2008 she transferred her fellowship to the ESO headquarters in Germany, working for the User Support Department. Gayandhi's research is primarily focused on elemental abundances in open clusters as tracers of the Galactic disk formation history. This involved studying high resolution stellar spectra in order to measure precise abundance patterns. She is also on the hunt for fossil stellar substructures such as moving group and supercluster. At the AAO Gayandhi is the Project Scientist for the upcoming HERMES instrument, and part of the team leading a million star Galactic Archaeology survey.

Charlene Heisler Prize: Dr. Max Spolaor Monday 14:45 - 15:00
(For the most outstanding PhD thesis in Astronomy or a closely related field.)

Dr Max Spolaor is an AAO Research Fellow and the Instrument Scientist for 2dF/AAOmega and Spiral at the Australian Astronomical Observatory. Max obtained a PhD in Astrophysics in February 2010 from the Swinburne University of Technology in Melbourne with a thesis on stellar populations and chemo-dynamical properties at large galactocentric radii of early-type galaxies. Max's thesis work, entitled 'Radial Gradients in Elliptical Galaxies', features the discovery of a new relationship between galaxy mass and the metallicity gradient of a galaxy's stellar population, which are interpreted as the fossil record of a galaxy's merging history. Max's interest in Astronomy began in high school when he joined the CCAF cultural club for Astronomy. This led him to study Physics at the University of Trieste in Italy, where he obtained a Bachelor of Science in 2006. Max's scientific research at the AAO focuses on extending the understanding of star formation, chemical enrichment, and merging history of galaxies at intermediate and high-redshift by deriving ages and chemical abundance ratios of their stellar populations. Max is also leading the upgrades of the 2dF/AAOmega and Spiral instruments, which will deliver new, improved cutting-edge facilities for multi-object and integral field unit spectroscopy at the Anglo Australian Telescope.

Bok Prize: Mr. Barnaby Norris Thursday 16:00 - 16:15
(For outstanding research in astronomy by an Honours student.)

Barnaby Norris is a PhD student at the Sydney Institute for Astronomy, at the University of Sydney. Barnaby primarily works in optical interferometry, using techniques such as aperture masking for extremely high angular resolution imaging. Current work involves polarimetric interferometry studies of mass loss shells around AGB stars and exoplanet detection. He is also working on the development of a new interferometry instrument using a photonic chip pupil remapper.

TALK ABSTRACTS

Mon 09:10 – 10:00

Astronomer's Luck Revisited

Russell Cannon
AAO

In a seminal 1972 paper, W H McCrea pointed out how much the development of astronomy had depended on chance circumstances, such as the proximity of the Crab Supernova (in both space and time), and on the timing of technological advances. I propose to explore how such effects have continued to influence astronomy, even into the current era of huge all-sky surveys and ever more powerful telescopes.

Presenter: Russell Cannon INVITED TALK: Ellery Lecture

Mon 10:00 – 10:30

CAASTRO

L. Staveley-Smith[1,2], B. Gaensler[2,3]
[1] *ICRAR/UWA*
[2] *CAASTRO*
[3] *University of Sydney*

The ARC Centre of Excellence in All-sky Astrophysics (CAASTRO) is the first such centre to be awarded for astronomical research in Australia. It has been specifically set up to use the new optical, radio and computational infrastructure currently being constructed or commissioned around the country. In this talk, I will describe the principal research themes of CAASTRO, highlighting the fundamental advances that are expected to result from this investment. Now that operations have officially begun, I will also describe forthcoming activities, and ways in which the community can contribute to and benefit from CAASTRO.

Presenter: Lister Staveley-Smith INVITED TALK

Mon 11:00 – 11:30

Skymapper

Brian Schmidt
ANU

SkyMapper is a new 1.3m telescope featuring an ultra wide 5-6 sq-degree field of view coupled to a 268 million-pixel CDD camera. SkyMapper's mission is to robotically create the first comprehensive digital survey of the entire southern sky in a 6-colour, 6-epoch survey of the southern celestial hemisphere known as the Southern Sky Survey. I will outline further details of the Skymapper telescope, and these exciting observation plans.

Presenter: Brian Schmidt INVITED TALK

Mon 11:30 – 11:45

The European Extremely Large Telescope instrumentation programme.

Jason Spyromilio
European Southern Observatory/AAO

The E-ELT has recently concluded the phase B design phase for the telescope. The instrumentation design studies have developed concepts for a variety of instruments including multi conjugate adaptive optics fed diffraction limited infrared cameras, planet imagers, multi-object optical spectrographs etc etc. The capabilities of the instruments shall be presented and the concepts for the long term development of the instrumentation complement of the E-ELT facility discussed.

Presenter: Jason Spyromilio

Mon 11:45 – 12:00

Wide field surveys at high spatial resolution

R. Sharp[1,2], P. McGregor[1]
[1] *RSAA, ANU*
[2] *rgs@mso.anu.edu.au*

The Gemini South Adaptive Optics Imager (GSAOI) was successfully commissioned at Gemini South in the Autumn of 2011. Through the use of Multi-Conjugate Adaptive Optics (MCAO), combing a laser guide star constellation with natural guide stars in the field, GSAOI provides adaptive optics correction over a field of view 80 arcseconds in diameter. This represents an exceedingly wide-field at high redshift. The 8meter Gemini South telescope will deliver AO corrected images x3-4 sharper than possible with the Hubble Space Telescope at near-IR wavelengths. I will present our upcoming wide-field survey program, which combines HST rest frame UV images with GSAOI rest fame optical images at the same intrinsic resolution, to determine the underlying physics which drive the formation mechanisms of galaxies across the Epoch of Star Formation (z=1-3).
Presenter: Rob Sharp

Mon 12:00 – 12:15

Progress on the GMT Integral-Field Spectrograph (GMTIFS)

P. McGregor[1]
[1] *The Australian National University*

The GMT Integral-Field Spectrograph (GMTIFS) is a potential first-light instrument for the 25-m diameter Giant Magellan Telescope that is currently being designed at ANU. GMTIFS will be the work-horse adaptive optics instrument on GMT. It will address a wide range of science from epoch of reionization studies using Gamma-Ray Bursts, to forming galaxies at high redshifts, to star and planet formation in our Galaxy, and studies of Solar-system objects. I will review these science cases and describe recent evolution of the instrument design and its capabilities as we head towards the Conceptual Design Review in September 2011. I will also report on the commissioning of the Gemini South Adaptive Optics Imager with the CANOPUS Multi-Conjugate Adaptive Optics system on Gemini South in Chile.
Presenter: Peter McGregor

Mon 12:15 – 12:30

GAMA: The low-redshift star formation history

Andrew Hopkins[1], Madusha Gunawardhana[1,2], and the GAMA team
[1] *Australian Astronomical Observatory*
[2] *The University of Sydney*

The star formation history of the universe has been robustly measured over the past decade and more, using star formation rate indicators at a variety of wavelengths. We present the Halpha luminosity function from the Galaxy And Mass Assembly (GAMA) survey, and its evolution out to $z\sim0.3$. We also show the joint Halpha/M_r luminosity function, and demonstrate a systematic selection effect in Halpha luminosity density estimates. As a consequence of this effect, many Halpha-derived SFR density measurements may be systematically underestimated.
Presenter: Andrew Hopkins

Mon 13:15 – 14:00

Gemini Observatory Town Hall Meeting

hosted by Stuart Ryder, Andy Adamson and Eric Tollestrup

This town-hall session will provide an update on the status of the Gemini Observatory, including recent changes in management and a review of developments in the ”transition plan” for the observatory as we move into the final year of UK membership. The instrument development program will also be reviewed, including projects approaching completion, the recent commencement of a project to provide a high-resolution optical spectroscopy capability, and the results of the most recent discussion of instrument priorities by the Gemini Science Committee. Recent progress on the GeMS (multiconjugate AO) system including the RSAA-built Gemini South Adaptive Optics Imager will be described. There will be time for a Q&A session afterwards.

Mon 14:00 – 14:15

ngCFHT: A 10-m Wide-Field Spectroscopic Facility

D. Crabtree[1], P. Cote[1], A. McConnachie[1], D. Crampton [1], K. Venn[2]
[1]*NRC-HIA*
[2]*Univ. of Victoria*

The scientific case for a wide-field, highly multiplexed, multi-object fibre spectrograph (WFMOS) on an 8-m class telescope was convincingly made in the KAOS Purple Book in 2003. Today, the scientific case for this capability is even more compelling. In this talk, I will describe our vision for replacing the current CFHT 3.6-m telescope with a 10-m segmented mirror telescope (utilizing the existing pier) dedicated to WFMOS science. WFMOS, with a 1.5-deg FOV and more than 3000 fibres, would address two key scientific questions of the coming years; the measurement of the equation of state of the universe and the reconstruction of the formation history of the Milky Way. It would also be able to address a wide range of other exciting science. Our vision includes expanding the current CFHT partnership to four or more partners. Australia, with its long history of leadership in optical wide-field spectroscopy would be a welcome partner.
Presenter: D. Crabtree

Mon 14:15 – 14:45

Galaxy Evolution

A.E. Bauer[1], GAMA Collaboration
[1]*AAO*

As surveys of galaxy populations at high redshifts progress, it becomes increasingly urgent to understand how observed galaxies at high redshift map into those at lower redshift. In this talk, I give an overview of how and where galaxies build up mass over cosmic time by showing recent studies of the changing star forming properties of galaxies as a function of stellar mass and environment from high redshift to the local universe.
Presenter: Dr Amanda E Bauer INVITED TALK

Mon 14:45 – 15:00

Radial gradients in elliptical galaxies

Max Spolaor

AAO

I shall present recent results on stellar population gradients at large galactocentric radii for a sample of early-type galaxies covering a broad mass range, i.e. from Fornax and Virgo cluster dwarf ellipticals to brightest cluster/group galaxies. Focusing on the newly discovered correlation between metallicity gradients and galaxy mass, I shall examine how the interplay between dissipational processes and feedback mechanisms has driven the chemical evolutionary history of these early-type galaxies. The analysis of spatially resolved stellar population radial profiles of age, metallicity and alpha-elements abundance ratio at galactocentric radii as large as 3 times the galaxy effective radius, allows us to investigate the history of almost 60% of a galaxy total stellar mass and to examine the effects of local and global mechanisms of galaxy formation. The results are interpreted in comparison with competing chemodynamical model predictions.

Presenter: Max Spolaor INVITED TALK: Charlene Heisler Prize

Mon 15:00 – 15:15

GAMA-SIGMA: Exploring Galaxy Structure Through Modelling

L.S. Kelvin[1,2], S.P. Driver[1,2], A.S.G. Robotham[1,2]

[1] *International Centre for Radio Astronomy Research (ICRAR), University of Western Australia*

[2] *School of Physics and Astronomy, University of St Andrews*

The Galaxy And Mass Assembly project (GAMA) is a joint Anglo-Australian collaboration combining data from 5 ground-based telescopes, 3 space missions and 2 radio telescopes, ultimately using these data to explore galaxy formation and evolution on scales of 1kpc to 1Mpc. SIGMA (Structural Investigation of Galaxies via Model Analysis) is the structural analysis pipeline within GAMA with the ability to fit a 2D single-Sérsic component to a catalogue of galaxies across multiple bands in a fully-automated and high-fidelity fashion, providing a measurement of the Sérsic index, magnitude, half-light radius, position angle and ellipticity for every input galaxy. We present SIGMA results for $\sim$150,000 GAMA main-survey galaxies modelled independently in optical-to-near-IR imaging data from the SDSS (ugriz) and UKIDSS-LAS (YJHK), and examine how their measured physical properties vary with wavelength, colour, morphology, environment and stellar content.

Presenter: Lee Kelvin

Mon 15:15 – 15:30

Gas Depletion in Local Group Dwarfs:Stripping Assisted by Early Internal Heating

Matthew Nichols and Joss Bland-Hawthorn

Sydney Institute for Astronomy, School of Physics, University of Sydney

A recent survey of the Galaxy and M31 reveals that more than 90% of dwarf galaxies within 270 kpc of their host galaxy are deficient in HI. At such an extreme radius, the density of coronal halo gas is an order of magnitude too low to remove HI gas through ram pressure stripping for any reasonable orbit distribution. However, all dwarfs are known to have ancient stellar populations ($>$ 10 Gyr) from early epochs of vigorous star formation which, through heating and subsequently puffing up the HI, could allow the hot halo to remove this gas. Our model looks at the evolution of these dwarf galaxies analytically as the hot halo and Galaxy builds up over cosmic time. We show the results from this model are able to explain the radial distribution of dwarf galaxies around the Galaxy and M31 consistent with an infall at high redshift (z = 3–10).

Presenter: Matthew Nichols (S)

Mon 16:00 – 16:15

The Globular Cluster System of the Milky Way: accretion in a cosmological context

Stefan Keller[1], Dougal A. Mackey[1], and Gary Da Costa[1]
[1] *Research School of Astronomy and Astrophysics, Australian National University*

We demonstrate that the young halo population of globular clusters is spatially confined to a plane and that this plane is indistinguishable from that defined by the satellite galaxies of the Milky Way. The common plane of satellites is aligned along an axis bridging major mass distributions in the local universe. We therefore propose our results are a direct observational evidence for the accreted origin of the young halo globular cluster population.

Presenter: Stefan Keller

Mon 16:15 – 16:30

The Clustering of Extremely Red Objects (EROs) in Boötes

David P. Palamara[1], Michael J. I. Brown[1], Kevin A. Pimbblet[1], Daniel Stern[2], Buell T. Jannuzi[3], Arjun Dey[3] and M. L. N. Ashby[4]
[1] *School of Physics, Monash University, Clayton, Victoria 3800, Australia*
[2] *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA*
[3] *National Optical Astronomy Observatory, 950 N. Cherry Ave., Tucson, AZ 85719, USA*
[4] *Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138, USA*

Extremely red objects (EROs), defined by their very red optical to infrared colour (e.g., (R-K)Vega$>$5.0), come in two flavours; dust obscured starburst and red & dead galaxies at $z \approx 1.3$. We present the most accurate and robust clustering measurement of EROs to date using 24,596 EROs in 8.53 deg2 of the NDWFS Boötes field. We find star forming and red & dead EROs have very different clustering properties, with r0 = 5.49 $\pm$ 0.90 h^{-1} Mpc and r0 = 9.92 $\pm$ 0.91 h^{-1} Mpc respectively. These measurements show that the two ERO sub-populations occupy very different mass dark matter halos, and consequently are the progenitors of different local Universe galaxy populations. Through analysis of the separated ERO populations, we show that the progenitors of massive $\geq$ 4L* local ellipticals had stopped forming stars by $\geq$ 1.3, whilst the progenitors of 1-2L* local ellipticals were still undergoing significant star formation at this epoch.

Presenter: David Palamara (S)

Mon 16:30 – 16:45

Large-scale cosmic homogeneity in the WiggleZ survey

M. Scrimgeour[1], C. Blake[2], T. Davis[3], The WiggleZ Team
[1] *International Centre for Radio Astronomy Research, The University of Western Australia*
[2] *Swinburne University of Technology*
[3] *University of Queensland*

The most fundamental assumption of the standard cosmological model (LambdaCDM) is that the universe is homogeneous on large scales. This is not true on small scales, and some studies suggest that galaxies follow a fractal distribution up to very large scales ($\sim$200 h^{-1} Mpc or more), whereas ΛCDM predicts homogeneity at $\sim$100 h^{-1} Mpc. The Friedmann-Robertson-Walker metric is only valid for a homogeneous distribution, so any large inhomogeneities could affect our distance measurements and distort our measurements of cosmology. It is therefore critical to quantify the scale of homogeneity. We have made a measurement of homogeneity using the WiggleZ Dark Energy Survey, a UV-selected spectroscopic survey of $\sim$200,000 luminous blue galaxies up to z = 1, with the Anglo-Australian Telescope. The large volume and depth of WiggleZ allows us to probe the transition of the galaxy distribution to homogeneity on large scales, and see if this is consistent with a ΛCDM prediction.

Presenter: Morag Scrimgeour (S)

Tue 09:00 – 09:30

Review talk: dark energy and dark matter

C.Blake[1]
[1] *Swinburne University*

Almost all astronomers agree that around 96% of today's Universe is composed of mysterious components known as dark matter and dark energy, whose physical nature we do not yet understand. I will discuss our current measurements of the properties of the "dark sector", and the prospects for understanding its physical nature. I will focus on current and future Australian galaxy surveys addressing these questions such as The WiggleZ Survey, Skymapper and the Australian Square Kilometre Array Pathfinder, and place these projects in the context of worldwide efforts.

Presenter: Chris Blake INVITED TALK

Tue 09:30 – 09:45

Galactic Control of Type Ia Supernova

B.E. Tucker[1], B.P. Schmidt[1], P.M. Garnavich[2], G.S. Narayan[3,4], R.P. Kirshner[4], P. Challis[4]
[1] *RSAA, ANU*
[2] *CANDU, Notre Dame*
[3] *Physics, Harvard*
[4] *CfA, Harvard*

Previous investigations have shown a connection between the properties of SN Ia and their host galaxies. We refine these studies using UV through Mid IR observations of both nearby and distant SN Ia hosts. These observations are based on ultraviolet (GALEX), optical (ESSENCE and CfA3/4), near-IR (PAIRITEL and 2MASS), and mid-IR (WISE) photometry along with optical spectra. We will present new results showing that that the properties of SN Ia, both intrinsic, and with respect to their use as distance indicators, appear to depend on a combination of metallicity, and star-formation rate of the host. We suggest that the stellar population age and location of the supernova progenitor all can play a roll in using SN Ia as precision distance indicators. Correcting for these affects have improved measurements of Dark Energy by 7%.

Presenter: B.E. Tucker (S)

Tue 09:45 – 10.00

Understanding the formation of the galactic bulge of the Milky Way

M. Ness[1], K. Freeman[1], J.Bland-Hawthorn[2] and E. Wylie-de-Boer[1]
[1] *ANU*
[2] *Uni. Syd*

I will present the results to date of our medium resolution spectroscopic survey of the galactic bulge of the Milky Way. We aim to understand the formation of the bulge. Our observations are of about 28,000 stars in fields in the bulge and out into the thin and thick disks, and we are measuring radial velocities and chemical abundances. From analysis of our stars observed, we have determined the rotation curve for the bulge from radial velocities and the [Fe/H] and [alpha/Fe] for each star. All stellar parameters (Teff, logg, [Fe/H], [alpha/Fe]) have been obtained and from this, the true bulge candidates have been identified. I report on individual components in [Fe/H] which we have identified in the bulge and the metallicity gradients. I will show the relationship we find between rotation velocity and metallicity, and present evidence for a slowly rotating metal poor component in the inner bulge.

Presenter: Melissa Ness (S)

Tue 10:00 – 10:15

Clustering of Lyα emitters around luminous quasars at z = 2–3: an alternative probe of reionization on galaxy formation

Loren Bruns Jr[1], Stuart Wyithe[1], Joss Bland-Hawthorn[2], Mark Dijkstra[3]
[1] *University of Melbourne*
[2] *University of Sydney*
[3] *Max-Planck-Institut für Astrophysik*

Narrowband observations have detected no Lyα emitters within $\sim$ 3 pMpc of the very luminous z = 2.2 quasar PKS 0424-131. Similar surveys of the mean universe indicate that tens of sources should be visible in this volume, suggesting that the quasar's environment has a significant influence on the observed density of Lyα emitters. Using a semi-analytic model we find that the null detection around PKS 0424-131 implies that the minimum Lyα emitter host halo virial mass in this volume is $\sim 10^{12}$ $M_{\odot}$. This suggests that the intense UV emission of the quasar is suppressing the star formation in nearby galaxies. Forthcoming observations of z = 2–3 quasar environments will provide a proxy environment for studying the radiative suppression of galaxy formation during the epoch of reionization.
Presenter: Loren Bruns Jr (S)

Tue 10:15 – 10:30

Are you biased?

S. Brough
AAO

Unconscious bias is an issue faced by many people in astronomy. Within a small community, committees and boards are frequently made up of senior members of the community who then select people like themselves to appear at conferences, work with them and replace them in their influential position on boards. This is unconscious bias. Unconscious bias is a problem because it leads to homogenization of the community and, in an already gender-imbalanced community does not seek to redress that imbalance. This is just one of the issues raised at the Women in Astronomy workshop held in May. I will summarise some of the solutions proposed to address unconscious bias in our community, as well as the other issues and solutions that came out of this workshop all of which are relevant to the wider astronomical community.
Presenter: Sarah Brough

Tue 13:15 – 14:00

Speed Meet a Mentor

Everyone is invited to participate in this "speed dating" version of a mentoring session. We'll pair people up to have a quick chat before moving on to the next person. For mentorees it's your opportunity to broaden your networks and explore possibilities, while for mentors it's a chance to meet those who are keen to learn from your experience and knowledge.

We can all have moments of feeling a bit lost in the world of astronomy - just think about it, our science is all about discovering how insignificant we are in cosmic terms. But this special lunchtime session intends to change this by turning our focus inwards for a moment and making the most out of the ASA's strong professional network.

Speed Meet a Mentor is open to all and is being organised by the Women in Astronomy Chapter of the ASA. For more information or to take part speak to Tanya Hill or Gavin Rowell.

Tue 14:00 – 14:30

Using ASKAP to explore the low power radio galaxy population through radio SEDs.

Ilana Feain

CSIRO Astronomy & Space Science

The radio spectral energy distributions of complete samples of low power radio galaxies can tell us about the evolution of this population across cosmic time. I will discuss how we can exploit ASKAP's superb radio continuum sensitivity and survey speed to ultimately measure the radio SEDs of this population as a function of source parameter and environment. These observations will probe the physics of radio galaxies in a way not possible beforehand. I will also provide a status update on ASKAP.

Presenter: Ilana Feain INVITED TALK

Tue 14:30 – 15:00

Extreme events: exploring the radio transient sky.

Tara Murphy[1] and Shami Chatterjee[2]

[1] *The University of Sydney*

[2] *Cornell University*

The Australian Square Kilometre Array Pathfinder will give us an unprecedented opportunity to investigate the transient sky at radio wavelengths. Its wide-field survey capabilities will enable the discovery and investigation of variable and transient phenomena from the local to the cosmological, including flare stars, intermittent pulsars, X-ray binaries, magnetars, extreme scattering events, intra-day variables, radio supernovae and orphan afterglows of gamma ray bursts. In addition, it will allow us to probe unexplored regions of phase space where new classes of transient sources may be detected. I will discuss VAST: "An ASKAP Survey for Variables and Slow Transients" and its capability for detecting radio supernovae and gamma-ray bursts.

Presenter: Tara Murphy INVITED TALK

Tue 15:00 – 15:15

Testing Galaxy Formation Models with Next Generation HI Surveys

Chris Power[1], Carlton Baugh[2], Cedric Lacey[2], Claudia Lagos[2], Hansik Kim[3]

[1] *ICRAR/UWA*

[2] *ICC Durham*

[3] *Melbourne*

Neutral hydrogen is the fundamental building block from which galaxies are made, yet remarkably little is known about how the neutral hydrogen content of galaxies evolves over cosmic time. This will change dramatically with the advent of facilities such as the Atacama Large Millimeter/Submillimeter Array (ALMA), the Australian and South African Square Kilometre Array pathfinders (ASKAP and MeerKAT), and ultimately the Square Kilometre Array itself. I will describe what current state-of-the-art galaxy formation models predict for the neutral hydrogen content of galaxies over cosmic time, and how extragalactic HI/H2 surveys on ASKAP, MeerKAT and ALMA over the coming years will provide important insights into how galaxies form.

Presenter: Chris Power

Tue 16:00 – 16:15

New Surveys with the SKA Molonglo Pathfinder

G. Madsen[1], A. Green[1], R. Hunstead[1], D. Campbell-Wilson[1], D. Thakkar[1], J. Banyer[1], and the SKAMP Team

[1] *The University of Sydney*

Almost 50 years ago, the late radio astronomy pioneer Bernie Mills led the design and construction of a unique synthesis telescope in the Molonglo valley near Canberra. His legacy lives on today through the SKA Molonglo Pathfinder (SKAMP), an ongoing digital upgrade to his original ”One-Mile Cross”. Through the integration of existing infrastructure with new filter banks, receivers, and a digital correlator, SKAMP will operate as a wide-bandwidth (100 MHz), low-frequency (850 MHz) telescope with spectral line and full polarisation capabilities. We will discuss the current status of the project which is due to commence regular science observations in early 2012. We will review the key science goals of SKAMP that take advantage of its large collecting area (1% of SKA) and its large field of view (5 sq. deg). The goals include a search for radio transients and variables, the measurement of mass assembly of galaxies at high redshift, and an interstellar survey of radio recombination lines.

Presenter: Greg Madsen

Tue 16:15 – 16:30

Neutral Hydrogen Spectral Stacking with Parkes

Jacinta Delhaize[1], Lister Staveley-Smith[1], Martin Meyer[1]

[1] *International Centre for Radio Astronomy Research - University of Western Australia*

How many telescopes does it take to detect the faint whispers of hydrogen in galaxies 2 billion light years away? One! She may be 50 this year, but the Parkes 64m radio dish still has life in her yet! Neutral hydrogen gas (HI) is a fundamental ingredient in galaxy evolution. Unfortunately, due to the limits of current radio telescopes, the HI universe beyond z=0 will largely remain elusive until ASKAP and the SKA become available. However, spectral stacking is a promising technique for pushing the redshift boundary of 21cm HI detections. As a precursor to ASKAP experiments, I will present a stacking analysis of Parkes observations combined with data from the 2dFGRS and GAMAz surveys. By combining the HI signal of over 6000 galaxies, we can estimate the cosmic HI density of the universe out to z=0.14 and investigate the variation of HI mass in galaxies with colour, environment etc.

Presenter: Jacinta Delhaize (S)

Tue 20:00 – 21:30

How Green is the Universe?

Fred Watson

Australian Astronomical Observatory

’Space junk reaches new levels.’ ’Endangered squirrels under threat from observatory.’ ’Nuclear reactor sent into space.’ ’Toxic rocket fuel found down-range of launch site.’ With headlines like these, you might be forgiven for thinking astronomy and space exploration are pretty hard on the environment. Not so, argues astronomer Fred Watson in this provocative and entertaining talk. When the big picture is taken into account, the credentials of these high-tech sciences are greener than you might imagine. At least, as far as life on planet Earth is concerned...

Presenter: Fred Watson INVITED TALK: Harley Wood Lecture

Wed 09:00 – 09:30

Exoplanets, Exo-Earths and Habitability

J. Horner[1]
[1] *University of New South Wales*

Since the detection of the first planet around a Sun-like star, in 1995, the search for exoplanets has advanced in leaps and bounds, with Australian research taking a leading role. In the coming years, the first truly Earth-like planets will be found, and the race will be on to search for signs of life upon them. However, we will quickly move from a scenario where no exo-Earths are known to one where there are many awaiting study ? how will we decide which to focus on in the search for biomarkers? In this talk, I will review the various techniques used to search for exoplanets, before highlighting the need for the development of a 'Primer for Potential Habitability', through which the first exo-Earths can be compared in order to best focus the search for life elsewhere.

Presenter: Dr. Jonathan Horner INVITED TALK

Wed 09:30 – 09:45

A Search for Dwarf Planets in the Southern Hemisphere Sky

M. T. Bannister[1], M. E. Brown[2], B. P. Schmidt[1], R. McNaught[3], G. Garrad[3], S. Larson[4] and E. Beshore[4].
[1] *Mt Stromlo Observatory, ANU*
[2] *GPS, Caltech*
[3] *Siding Spring Observatory, ANU*
[4] *University of Arizona*

The population of icy objects in the distant outer regions of the Solar System beyond Neptune offer insight into the early history and evolution of the Solar System. Extensive surveys of this population have previously focussed on the Northern Hemisphere sky. We present our analysis of 9,500 square degrees of sky south of the ecliptic that have more than thirty nights of observation over five years, with an approximate limiting flux of $m(clear) \sim 19.5$. This is the largest spatial coverage of any existing southern survey for trans-Neptunian objects (TNOs). We generated this survey through an innovative analysis of the more than 500,000 images of the Siding Spring Survey, an ongoing survey for near-Earth asteroids that has been operating at the 0.5 m Uppsala telescope at Siding Spring Observatory since 2004. We discuss the limits that our results place on the dwarf planet-sized end of the TNO population distribution.

Presenter: Michele Bannister (S)

Wed 09:45 – 10:00

First Very Long Baseline Interferometric SETI Observations of Gliese 581

H. Rampadarath, S.J. Tingay, J. Morgan
ICRAR

We present the first VLBI SETI observations. Our target is the planetary system, Gliese 581, which contains two possible planets within the habitable zone. Gliese 581, was observed in 2007 for 8 hours, with a 3-station LBA. The observation was done continuously from 1230 - 1544 MHz, with frequency resolution of 2 kHz. Using interferometric principles, we determine that there are no Extra-Terrestrial Intelligence (ETI) signals at these frequencies, within the sensitivity of our observations, from Gliese 581 However, our data places an upper limit on the luminosity expected from ETI signals from Gliese 581, at these frequencies. This experiment presents a new method for targeted SETI, and aims to set the foundation for future VLBI targeted SETI projects, including with the SKA.

Presenter: Hayden Rampadarath (S)

Wed 10:00 – 10:15

The key role of water vapour in the composition of protoplanetary dust

Francesco Pignatale[1], Sarah Maddison[1], Geoff Brooks[2], Kurt Liffman[3]
[1] *CAS, Swinburne University*
[2] *FEIS, Swinburne University*
[3] *CSIRO/MSE*

Grains in protoplanetary disk constitute the building blocks of meteorites, comets and planets, and their formation and composition is strictly related to the chemistry of gas and dust in the disk. In this presentation I will demonstrate the vital role that water vapour plays in determining the resulting grain composition. We utilise a chemical equilibrium code to study the effect of initial composition on the condensation of the first solids in protoplanetary disks. The resulting water vapour distribution is very complex due to its role in the chemistry that forms grains of different compositions in the different regions of the disk. In extreme environments that exist around some exoplanetary systems and planets forming disks, a high C/O ratio lead to the depletion of water vapour. In these ”drought” ridden systems we find that silicates are replaced by carbon compounds, which will lead to carbon-rich terrestrial planets that are very different from our Solar System’s silicate-rich terrestrials.

Presenter: Francesco Pignatale (S)

Wed 11:30 – 11:45

AP Col: The closest young star to the Sun

S. Murphy[1], A. Riedel[2], C. Melis[3]
[1] *Australian National University*
[2] *Georgia State University*
[3] *University of California, San Diego*

We present the results of a multi-technique analysis of the known M4.5 flare star AP Col, which we have uncovered as the coolest, nearest (8.4 pc) young star to the Sun, with an estimated age of 40-50 Myr. In support of this claim we present astrometric, photometric, and spectroscopic data, including proper motion and trigonometric parallax data from the Cerro Tololo Inter-American Observatory Parallax Investigation, photometry and photometric variability from CTIOPI and radial velocities, lithium, Hα and gravity measurements from the WiFeS, Lick Hamilton and HIRES spectrographs. These observations demonstrate that AP Col is the closest of only two known sub 100 Myr systems within 10 pc of the Sun, and possibly the closest and coolest pre-main sequence member of the recently proposed Argus/IC2391 association. The proximity, age and low mass of AP Col make it an exciting benchmark object for investigating planet formation, especially using adaptive optics! coronagraphic imaging.

Presenter: Simon Murphy (S)

Wed 11:45 – 12:00

Harley Wood - Life and Legacy

Andrew Jacob, Nicholas Lomb, Toner Stevenson
Sydney Observatory

The centenary of Harley Weston Woodś birth on Sunday 31 July 2011 provides an opportunity to reconsider his life and achievements. He was Director of Sydney Observatory for 31 years (1943-1974) and was a key figure in the formation of the Astronomical Society of Australia (ASA). His many achievements include being Foundation President of the ASA, taking a leading role in selecting Siding Spring for a national observatory, prominence in astronomy education (tertiary, general public & school) & authorship of three popular astronomy books. In addition, under his leadership Sydney Observatory completed the Sydney & Melbourne sections of the mammoth Astrographic Catalogue project (the first-epoch photographic catalogue of the whole sky). Why did Harley Wood become an astronomer? What were his many achievements? What is his legacy?

Presenter: Andrew Jacob

Wed 12:00 – 12:30

Molecular Clouds and High Energy Gamma Rays

Yasuo Fukui
Nagoya University

I present recent results on the relationship between interstellar molecular clouds and high energy gamma rays. Interactions of cosmic ray protons with interstellar gas produce gamma rays via neutral pion decay. Mm and sub-mm observations of the interstellar molecular clouds allow us to study such interactions quantitatively. I discuss a few super nova remnants and the Galactic centre as the most outstanding cases.
Presenter: Yasuo Fukui INVITED TALK

Wed 14:00 – 14:15

Supershells and Molecular Cloud Production in the Evolving ISM

J. Dawson[1]
[1] *University of Tasmania*

The compression, cooling and fragmentation of the atomic medium in large-scale colliding flows drives the formation of turbulent, star-forming molecular gas. I will examine the role of supershells as drivers of this process, and more generally as agents of ISM structure formation and evolution. I will report the results of CO(J=1-0) and HI 21cm line observations of two Galactic supershells at parsec resolutions, a key result of which is the measurement of an enhanced level of molecularisation over the volumes of both objects. This result provides quantitative observational evidence of increased molecular cloud production due to the influence of supershells, and paves the way for future expanded studies. However, our observations also highlight the fact that supershells may be destructive to molecular gas on local scales, driving the atomic-molecular transition in the opposite direction in pre-existing clouds disrupted by a shell's passage.
Presenter: Joanne Dawson

Wed 14:15 – 14:30

Brewing science with MALT90

J Rathborne[1] on behalf of the MALT90 collaboration
[1] *CSIRO Astronomy and Space Science*

The Millimetre Astronomy Legacy Team 90 GHz (MALT90) survey is a new, international project aimed at characterizing the physical and chemical evolution of high-mass star-forming cores. Exploiting the unique broad frequency range and fast-mapping capabilities of the Mopra Telescope, MALT90 will obtain $3' \times 3'$ maps toward $\sim$3000 point sources identified in the ATLASGAL 870 μm galactic plane survey. Because we can map 16 lines simultaneously with excellent spatial ($38''$) and spectral (0.11km s^{-1}) resolution, the data reveal a wealth of information about source morphologies, chemistry, and kinematics. With our first observing season complete we will showcase some early results from the survey and discuss some exciting follow-up projects that we have planned for ALMA.
Presenter: Jill Rathborne

Wed 14:30 – 14:45

Investigating molecular cores towards the young, gamma-ray-bright supernova remnant RX J1713.7-3946.

N. Maxted[1], G. Rowell[1], B. Dawson[1], B. Nicholas[1], M. Burton[2], Y. Fukui[3], A. Walsh[4], A. Kawamura[3], H. Horachi[3]

[1] *University of Adelaide*

[2] *University of New South Wales*

[3] *Nagoya University*

[4] *James Cook University*

The supernova remnant RX J1713.7−3946 is one of the biggest, brightest TeV (10^{12} eV) source in the sky and one of few objects to have a shell-type structure resolved at gamma-ray energies making it a perfect target for the study of the origin of cosmic-rays through diffusive shock acceleration. X-ray studies reveal a menagerie of spikes and filaments that suggest a dual-shock structure probably produced by physical shock interactions with gas and star-forming cores. Currently there is much discussion in literature concerning the nature of the high energy particle population producing the gamma-ray emission (electrons and/or protons). A novel way to understand this is to probe the ISM, which could contain dense clumps that are hotspots for gamma-ray emission unique to high energy proton interactions. To investigate density inhomogeneities towards RX J1713.7−3946 we mapped dense gas tracers observable with Mopra . This will contribute to our understanding of high energy particle diffusion and gamma-ray production in this region.

Presenter: Nigel Maxted (S)

Wed 14:45 – 15:00

Herschel and HOBYS view of star formation in the Galaxy

T. Hill[1], F. Motte[1], S. Bontemps[2,1], V. Minier[1] and the HOBYS consortium

[1] *CEA/Saclay*

[2] *Observatoire de Bordeaux*

With its unprecedented spatial resolution and high sensitivity, Herschel is revolutionising our understanding of high mass star formation in the far-infrared to submillimetre regime. The Herschel imaging survey of OB Young Stellar objects (HOBYS) key program (see Motte, Zavagno, Bontemps et al: see http://www.herschel.fr/cea/hobys/en/index.php) specifically targets nearby burgeoning young stellar objects. HOBYS aims to discover and characterise the earliest evolutionary stages of intermediate to high-mass stars and assess the importance of triggering in these regions. Through multi-wavelength PACS (70 & 160um) and SPIRE (250, 350, 500um) images, I will introduce some of the regions in the HOBYS key program including, The Rosette Nebula, Vela C, M16 and NGC 7538. These high spatial resolution Herschel data reveal a wealth of sources spanning a large mass range covering high, intermediate and low mass star formation, at different evolutionary stages. For the first time, Herschel allows us to make a census of star formation in the Galactic Plane. I will present some of the first results from the HOBYS program. In the Rosette, Herschel has revealed a clear temperature gradient running from the HII region interface into the cloud (Schneider et al., 2011), as well as rich protoclusters which house a large number of class-0 protostars (Hennemann et al, 2011), in addition to three massive prestellar dense cores detected by Motte et al. (2011). In Vela C, structural analysis indicates that the ridge of filaments in which the HII region RCW 36 is embedded, is the most massive and dense component of the Vela C molecular complex, and is likely to support further star formation. The southern part of the complex is, in contrast, made up of a large number of filaments which appear to have formed in a turbulent manner. The temperature map suggests that there is evacuation of material perpendicular to the column density at or near RCW 36 (Hill et al., 2011). I will also present a comparison between Herschel, Spitzer, NIR and molecular line data toward the RCW 36 HII region (Minier et al., 2011) which reveals a very unique view into this very active site of star formation. I will also briefly present some of the early results from M16 - home to the Pillars of Creation - and NGC 7538.

Presenter: Tracey Hill

Wed 15:00 – 15:15

New insights into the structure of the Milky Way

J.A. Green[1], N.M. McClure-Griffiths[1], J.L. Caswell[1] and the MMB and MAGMO teams[2]
[1] *CSIRO Astronomy and Space Science, ATNF*
[2] *Various*

We explore the longitude-velocity distribution of 6.7-GHz methanol masers from a recent unbiased survey in the context of Milky Way structure. We analyse the correlation in velocities within this distribution and identify density enhancements indicating large-scale regions of enhanced star formation. These are interpreted as the starting points of the spiral arms and the interaction of the Galactic bar with the 3-kpc arms. The methanol masers support the presence of a long thin bar. Signatures of the full 3-kpc arm structure are seen, including a prominent tangent at approximately -22 degrees Galactic longitude. The 3-kpc arm structure appears likely to correspond to the radius of corotation resonance of the bar, with the bar on its inner surface and the starting points of the spiral arms on its outer surface. Finally, we detail plans to determine the magnetic fields present in the star forming regions and test the Galactic scale coherence.
Presenter: James Green

Wed 16:45 – 17:00

The PLATO project: enabling astronomy from Antarctica

M.C.B. Ashley[1], J.W.V. Storey[1], M.G. Burton[1], J.S. Lawrence[2]
[1] *University of New South Wales*
[2] *Australian Astronomical Observatory*

PLATO stands for “Plateau Observatory” and is a autonomous platform for astronomical experiments in Antarctica. PLATOs have been successfully deployed at Dome A and Dome Fuji for site-testing and for small-scale optical, infrared, and terahertz instruments. Measurements of the atmospheric boundary layer at both sites have verified the potential for exceptional astronomical seeing. A new PLATO will be deployed this summer at Ridge A to map the Galaxy in a number of terahertz emission lines using a 0.6m telescope. Ridge A is 800km from the South Pole, and likely to have the driest atmosphere of any location on the surface of the earth—a crucial factor for terahertz observations. A fourth PLATO is being proposed as a prototype power source for the Askarian Radio Array at the South Pole. This experiment is designed to detect neutrinos produced when Ultra High Energy Cosmic Rays interact with the Cosmic Microwave Background.
Presenter: Michael Ashley

Thu 09:00 – 09:30

High energy neutrino astronomy in Antarctica

G.C. Hill
University of Wisconsin, Madison

The completion of the kilometre-scale IceCube detector at the South Pole in late 2010 marks an important milestone in the search for high energy neutrinos from distant objects such as gamma-ray bursts and active galaxies. The observation of neutrinos from such sources would yield much information on their central accelerators and could solve the mystery of the origin of the cosmic rays. An overview of the history of the field, the diverse range of Antarctic detectors, present and planned, and latest results, will be presented.
Presenter: Gary Hill INVITED TALK

Thu 09:30 – 09:45

The largest scales and the smallest particles - constraining neutrino mass from galaxy surveys

S. Riemer-Sørensen

University of Queensland

Despite being the smallest experimentally observed particles, the neutrinos provide one of the greatest challenges for modern physics. The Standard Model of particle physics describes them as being exactly mass-less. Nonetheless, neutrino oscillation experiments provides precise measurements of their mass differences, but not the overall mass scale. Massive neutrinos have a significant effect on the structure formation history of the Universe. The neutrinos are relativistic in the early Universe where they free stream out of overdensities, thus spreading out the gravitational potential and damping the growth of structure. The observable effect is a damping of the power spectrum at small scales, which can be measured from galaxy surveys. I will present new results on the neutrino mass derived from the WiggleZ galaxy survey.

Presenter: Signe Riemer-Sørensen

Thu 09:45 – 10:00

Extracting the Size of the Cosmic Electron-Positron Anomaly

Katie Auchettl[1], Dr. Csaba Balazs[1,2]

[1] *Monash Center for Astrophysics, Monash University, Victoria, Australia, 3800*

[2] *ARC Center of Excellence for Particle Physics at the Terascale, Monash University, Victoria, Australia 3800*

Using a Bayesian likelihood analysis, we isolate the anomalous contribution of the cosmic electron-positron flux. A significant tension was found between the electron positron related data and non-electron-positron cosmic ray fluxes. Using 219 recent cosmic ray datum, we extracted the preferred values of the selected cosmic ray propagation parameters from the non-electron-positron related measurements. Based on these parameter values we calculated background predictions with uncertainties for PAMELA and Fermi-LAT. We found a deviation between the PAMELA and Fermi-LAT data and the predicted background even when uncertainties, including systematics, were taken into account. Interpreting this as a hint of new physics, we subtracted the background from the data extracting the size, shape and uncertainty of the anomalous contribution in a model independent fashion. We briefly compared the extracted signal to some theoretical results predicting such an anomaly.

Presenter: Katie Auchettl (S)

Thu 10:00 – 10:15

What are the highest energy particles in Nature made of?

J.A. Bellido[1]

[1] *University of Adelaide*

The Pierre Auger Observatory is a 3000 square kilometre cosmic ray detector in western Argentina. Its aim is collect a large sample of the highest energy cosmic rays to study their energy spectrum, arrival directions and their mass composition. We believe that a comprehensive study of these observations will lead to a better understanding of the origin of these mysterious particles. In this presentation I will focus on our measurements of the mass composition of the highest energy cosmic rays and their astrophysical implications.

Presenter: Jose Bellido

Thu 11:00 – 11:15

The Influence of Stellar and Galactic Evolution on Positron Production

Muazzam Ali[1], Simon Ellis[1,2], Joss Bland-Hawthorn[1], Sanjib Sharma[1]
[1] *Sydney Institute for Astronomy, School of Physics, University of Sydney, NSW 2006, Australia.*
[2] *Australian Astronomical Observatory, P.O. Box 296, Epping, NSW 1710, Australia.*

An enduring mystery is the source of Galactic positron annihilation emission. There have been attempts to unify the the observed Galactic positron annihilation morphology to many stellar phenomena that produce positrons, however this has been difficult due to the intrinsically low resolution of gamma ray observations. This presentation compares direct observations to the 511 keV positron annihilation emission and grounds the problem in the context of Galactic evolution and the distributions of distinct stellar populations. Using the GALAXIA Milky Way simulation code we find a relationship between stellar age and the Galactic positron morphology, coupling this with expected stellar positron production rates, we produce a model for Galactic positron distribution. Finally, we introduce a new probe of positron production in the Galaxy in the form of an OH suppression experiment EXPOSÉ, the Explorer for Positronium Emission which will allow arc second resolution of this high energy phenomena.

Presenter: Muazzam Ali (S)

Thu 11:15 – 11:30

Searching for Sources at the Highest Cosmic Ray Energies.

Benjamin Whelan[1], Roger Clay[1], Bruce Dawson[1]
[1] *University of Adelaide*

The Pierre Auger Observatory is building a substantial database of cosmic ray properties and arrival directions at energies above the 'GZK' cut-off at $10^{19.6}$ eV. The GZK effect ensures that those particles come from sources within 200 Mpc, opening the possibility of developing directional astronomy for studying cosmic ray sources, despite major unknowns in the galactic and extra-galactic magnetic fields. The properties of the Pierre Auger Observatory catalog will be discussed, together with programs to exploit it for cosmic ray directional studies.

Presenter: Ben Whelan

Thu 11:30 – 11:45

Searching for ultra-high energy neutrinos with the Lunaska project

J.D. Bray[1,2], R.D. Ekers[2], C.W. James[3], R.J. Protheroe[1], P. Roberts[2], J.E. Reynolds[2], C.J. Phillips[2], A. Brown[2], R.A. McFadden[4], M. Aartsen[1]
[1] *University of Adelaide*
[2] *CSIRO Astronomy & Space Science*
[3] *Radboud University, Nijmegen*
[4] *ASTRON*

The detection of cosmogenic ultra-high energy neutrinos would greatly improve our understanding of the high-energy end of the cosmic ray spectrum, but due to the low flux of these particles this detection has not yet been achieved. In the lunar Cherenkov technique, the Moon is employed as a detector, with radio telescopes searching for the pulse of Cherenkov radiation expected from a neutrino-induced particle cascade in its upper layers. The Lunaska project has developed the experimental and theoretical aspects of this technique, and employed it in recent observations with the Parkes radio telescope to limit the cosmogenic neutrino flux.

Presenter: Justin Bray (S)

Thu 11:45 – 12:15

Particle Hydrodynamics and Magnetohydrodynamics: Simulating the formation of stars

Daniel J. Price[1]

[1] *Monash University*

I will give an overview of our attempts to simulate the formation of stars in local molecular clouds using particle hydrodynamics and magnetohydrodynamics techniques. In particular I will show the remarkable realism and complexity that can unfold even with relatively simple physics incorporated (e.g. gas and gravity) when simulated over the large range of length and timescales appropriate to the star formation process. I will also give an status report on our attempts to incorporate more detailed physical treatments of various aspects of the physics, including magnetic fields, radiation, dust, turbulence and the resistive diffusion of magnetic fields.

Presenter: Daniel Price INVITED TALK

Thu 12:15 – 12:30

Direct Imaging of Magnetized Turbulence in the Interstellar Medium

T. Robishaw[1], B. Gaensler[1], M. Haverkorn[2], K. Newton-McGee[1], R. Ekers[3], N. McClure-Griffiths[3], J. Dickey[4], A. Green[1], A. Lazarian[5], B. Burkhart[5]

[1] *The University of Sydney*

[2] *Leiden University*

[3] *Australia Telescope National Facility*

[4] *University of Tasmania*

[5] *University of Wisconsin, Madison*

We present a new method for processing images of linearly polarized radio emission in the interstellar medium of the Milky Way. Previous observations have lacked both the sensitivity and spatial resolution to directly image the small-scale structure associated with turbulent motions in the diffuse ISM of our Galaxy. However, Faraday rotation of linearly polarized radio signals acts as an extremely sensitive probe of fluctuations in magnetic field and ionized gas density. By obtaining the gradient of the Stokes parameters Q and U in a region of the ATCA Southern Galactic Plane Survey, we present the first direct image of supersonic turbulence in the ISM. We have also combined multichannel ATCA polarization data from this region with single-dish Parkes polarization data in order to recover polarized structure at all spatial scales. We apply the new technique of rotation measure synthesis to these data and present the resulting image of the magnetoionic medium at arcminute resolution.

Presenter: Tim Robishaw

Thu 14:00 – 14:15

Revealing the Faraday Rotation Universe

A. Hammond[1], T. Robishaw[1], B. Gaensler[1]

[1] *University of Sydney*

Though magnetism is ubiquitous in the universe, we lack a good understanding of how the fields originated, or how they have evolved. Physicists can measure the magnitude of magnetic fields of polarised galaxies using Faraday rotation. Taking rotation measure data from Taylor (2009) we have made correlations with a range of existing surveys and databases to associate redshifts with galaxies. We present a new catalogue which contains rotations measures and redshifts for more than 4000 galaxies, including over 1500 galaxies at $z>1$. The initial data analysis, including foreground subtraction, suggests that neither the magnitude, nor the spread of rotation measures notably changes with redshift as has previously been claimed. There does appear, however, to be a subtle but statistically significant change in the distribution of rotation measures as redshift increases. This data about the evolution of cosmic magnetism will potentially help construct robust models of galaxy formation and aging.

Presenter: Ms. Alison Hammond (S)

Thu 14:15 – 14:30

The mid-life crisis of the Milky Way and M31

S. Mutch, D. Croton, G. Poole
Swinburne University of Technology

Upcoming next generation galactic surveys, such as HERMES and GAIA, will deliver unprecedented detail about the structure and make-up of our Galaxy, the Milky Way, and promise to radically improve our understanding of it. However, to benefit our broader knowledge of galaxy formation and evolution we first need to quantify how typical the Galaxy is with respect to other galaxies of its type. Through modeling and comparison with a large sample of galaxies drawn from the Sloan Digital Sky Survey and Galaxy Zoo, I provide tentative yet tantalizing evidence to show that both the Milky Way and nearby M31 are undergoing a critical transformation of their global properties. Both appear to possess attributes that are consistent with galaxies midway between the distinct blue and red bimodal color populations. In extragalactic surveys, such 'green valley' galaxies are transition objects whose star formation typically will have all but extinguished in less than 5 Gyrs. This! finding reveals the possible future of our own galactic home, and opens a new window of opportunity to study such galactic transformations up close.

Presenter: Simon Mutch (S)

Thu 14:30 – 14:45

Astronomy Australia Limited: accomplishments and future directions

W. Couch[1]
[1] *Astronomy Australia Limited*

This ASA meeting happens to coincide with the expiration of the National Collaborative Research Infrastructure Strategy (NCRIS) program which has run for the last 5 years and has provided many tens of millions of dollars for Australian astronomical infrastructure. Since Astronomy Australia Limited (AAL) was created in order to manage the NCRIS funds, it is fitting to review what it has accomplished over the life of the NCRIS program. This talk will do just that, as well as focus on AAL's future in the post-NCRIS era and the challenges and priorities that lie ahead.

Presenter: Warrick Couch

Thu 16:00 – 16:15

Unveiling the curious dust around AGB stars

B. Norris[1], P. Tuthill[1], M. Ireland[23], S. Lacour[4], P. Stewart[1], T. Evans[1]
[1] *Sydney Institute for Astronomy, School of Physics, University of Sydney*
[2] *Centre for Astronomy, Astrophysics and Astrophotonics, Dpt. of Physics and Astronomy, Macquarie University*
[3] *Australian Astronomical Observatory*
[4] *Observatoire de Paris, Meudon*

The way in which mass is elevated and accelerated into space by evolved asymptotic giant branch (AGB) stars remains one of the outstanding problems in stellar physics. Although this process accounts for 75% of enrichment in the Galaxy, the wind-launch region has proven extremely difficult to study due to the proximity of the luminous red giant star. We have commissioned a powerful new technique which combines the strengths of optical interferometry and differential polarimetry to deliver the first images capable of isolating and studying the dusty circumstellar wind-base. Our findings reveal a new population of dust characterised by large (300nm) grains inside 2 stellar radii, challenging earlier models in which dust first nucleates at much greater distances. Implications for the chemistry and physics AGB mass loss, and the possible role of scattering in wind-driving, will be discussed.

Presenter: Mr. Barnaby Norris (S) INVITED TALK: Bok Prize

Thu 16:15 – 16:30

Variations in the apparent neutron star radius during the decay of thermonuclear (type-I) bursts from the LMXB 4U 1636-53

T. Atta[1], D. K. Galloway[1], J. Madej[2]
[1] *Monash University*
[2] *Warsaw University Observatory*

Thermonuclear (type I) X-ray bursts, caused by ignition of accumulated layers of hydrogen and helium on the surface of neutron stars, can be used to constrain the interior structure via measurements of their apparent radii. These bursts can be separated into two groups, long and short bursts, characteristic of the fuel composition - mixed H/He or pure He, respectively. We compared the apparent radii of long and short bursts observed from 4U 1636-536 with the Rossi X-ray Timing Explorer, and find that the short bursts have a systematically larger radius during the burst decay. We suggest that the composition of the neutron star atmosphere could give rise to the measured difference between the two classes of bursts. We test an atmosphere model with varying composition and find that only at the highest temperatures could these compositional effects explain the normalisation offset.

Presenter: Timothy Atta (S)

Thu 16:30 – 16:45

SUSI Multiplicity Survey of Sco-Cen.

A.C. Rizzuto[1,2], M.J. Ireland[1,2], J.G. Robertson[1], P. Tuthill[1], W.J. Tango[1], B. Warrington[1,2], B. Norris[1], A. Cheetham[1].
[1] *The University of Sydney*
[2] *Macquarie University*

Multiplicity properties of recently formed stars can provide valuable insight into the understanding of star formation mechanisms. For more than a decade it has been widely accepted that at least half of all stars form in binary pairs, though their role in, for example, the redistribution of angular momentum during star formation, is still poorly understood. The Sco-Cen OB Association is the nearest region to the sun with recent massive star formation. We have used the Sydney University Stellar Interferometer to undertake the first multiplicity dedicated long-baseline interferometric survey. We observed 69 stars brighter than 5th visual magnitude and bluer that B-V = 0.6 in the Sco-Cen region of sky. Our survey was capable of detecting binary companions with separations ranging from 7 to 200 mas and contrasts smaller than 3.6 magnitudes. We found companions to be associated with 20 of the targets, five of these were previously undetected companions.

Presenter: Aaron Rizzuto (S)

Thu 16:45 – 17:00

Constraining low-mass stellar evolution and nucleosynthesis models with observations

D. Kamath[1], A.I. Karakas[1], P.R. Wood[1]
[1] *Research School of Astronomy & Astrophysics, ANU*

The Magellanic Clouds are excellent laboratories to study and test theories of the late stages of stellar evolution. For the asymptotic giant branch (AGB) stars in the Magellanic Cloud clusters NGC1978, NGC1846 and NGC419, we construct new stellar evolution sequences that match the observed effective temperatures of the giant branches, the oxygen-rich to carbon-rich transitions, and the AGB-tip luminosities. These evolutionary sequences are then used as input to the calculation of detailed nucleosynthesis, the results of which are compared to the observationally-derived abundances of C, O and F for the AGB stars in these clusters. I will present details on the new evolution models and discuss how we deal with the major uncertainties such as mass loss, convection and non-convective mixing process. I will also present the nucleosynthesis results for the C, O and F abundances and their comparison to the observationally derived abundances.

Presenter: Devika Kamath (S)

Thu 17:00 – 17:15

Do Intermediate Mass Black Holes Exist? The Case of ESO 243-49 HLX-1

S. Farrell[1]

[1] *The University of Sydney*

The debate about the existence of intermediate mass black holes with masses between ∼100 - 100,000 Solar masses has raged for some time now, with no convincing evidence confirming their existence provided until recently. The current front-runner is the brightest ultra-luminous X-ray source HLX-1 in the galaxy ESO 243-49 with a record breaking maximum luminosity of 1E42 erg/s. HLX-1 is ∼400 times brighter than the Eddington limit of a 20 Solar mass black hole, and ∼10 times brighter than the second brightest ultra-luminous X-ray source. I will present recent results of multi-wavelength studies of HLX-1 from radio to gamma ray wavelengths. These results continue to suggest that HLX-1 contains a black hole with a mass between ∼3,000 - 100,000 Solar masses, and we investigate the possibility that HLX-1 is the remnant of a dwarf galaxy that was accreted by ESO 243-49.

Presenter: Sean Farrell

Thu 17:15 – 17:30

How common envelope binary interactions change the lives of stars and planets

O. De Marco[1], J.-C. Passy[2,3], F. Herwig[2], M.-M. Mac Low[3], C. L. Fryer[4], J.S. Oishi[5,6]

[1] *Macquarie University, Sydney, Australia*

[2] *University of Victoria, Canada*

[3] *American Museum of Natural History, New York, NY, USA*

[4] *Los Alamos National Laboratory, Los Alamos, NM, USA*

[5] *Stanford University, Stanford, CA, USA*

[6] *Kavli Institute for Particle Astrophysics and Cosmology, SLAC, Menlo Park, CA, USA*

An expanding giant star may engulf a nearby stellar or substellar companion. The common envelope phase that follows, fundamentally alters the evolution of both stars in the system by reducing the orbital separation and leading to a merger (such as V838 Mon or V1309 Sco), or a compact binary (e.g., novae, type Ia supernova progenitors, X-ray binaries). Frequencies and physical properties of all compact, evolved binaries depend sensitively on the poorly understood common envelope phase. We have developed 3-dimensional, hydrodynamic common envelope simulations between a red giant branch star and a range of companions. Comparing the modelled ejected masses and final separations with observations, we revisit our understanding of the common envelope efficiency, a parameter on which predictions such as supernova type Ia rates sensitively rest. Finally, we bring our results to bear on the surprising result that some planets can survive a common envelope phase with their mother star.

Presenter: Orsola De Marco

Thu 17:30 – 17:45

Pulsar Timing and the Detection of Gravitational Waves

R. N. Manchester

CSIRO Astronomy and Space Science

Epping NSW

Millisecond pulsars (MSPs) have a period stability that rivals that of the best atomic clocks, at least over long time intervals. Observations of an ensemble of MSPs spread across the sky - a so-called Pulsar Timing Array (PTA) - can be used to investigate global phenomena that affect the periods of all pulsars. One of the primary objectives of PTA projects is the direct detection of gravitational waves (GWs). The Parkes Pulsar Timing Array (PPTA) project commenced in 2004 and is making regular timing observations of 20 millisecond pulsars using the Parkes 64-m radio telescope at three frequencies. The PPTA data set is now approaching the level where detection of predicted GW signals from astrophysical sources is possible. Similar PTAs have been established in North America and in Europe and data from all three projects are being combined to form an International Pulsar Timing Array, helping us to reach our goals.

Presenter: R. N. Manchester

Fri 09:00 – 09:30

Chemically Tagging Disk fossils: the case of the Hyades Supercluster

G.M. De Silva[1], K.C. Freeman[2], J. Bland-Hawthorn[3], M. Asplund[4]
[1]*AAO*
[2]*RSAA, ANU*
[3]*U. Sydney*
[4]*MPA, Germany*

The Hyades supercluster is a kinematically defined group of stars, which are located across the Galactic disk. Advocated by Eggen in the 1970's as part of the Hyades open cluster, recent simulations suggest the Hyades supercluster is a dynamical stream caused by spiral density waves. We present high resolution elemental abundances of probable supercluster members. We recover supercluster stars that share a similar chemical signature as the Hyades open cluster. Our results support the Hyades supercluster being atleast partly the debris of an originally large star-forming event. We discuss the prospects of finding similar stellar fossils in upcoming Galactic Archaeology surveys such as the planned HERMES survey.

Presenter: Gayandhi De Silva INVITED TALK: Louise Webster Prize

Fri 09:30 – 09:45

Magnetic evolution and differential rotation of two pre-main sequence solar-type stars

Stephen Marsden[1], Brad Carter[2] and Ian Waite[2].
[1]*James Cook University*
[2]*University of Southern Queensland*

The dynamo generation of magnetic fields is an important but poorly understood process affecting the behaviour and rotational evolution of young solar-type stars. Although the dynamo is hidden, we can monitor its surface effects over time using the star's global magnetic topology and differential rotation to infer how the dynamo operates. Here we present the results of multiple-epoch high-resolution spectropolarimetry of two pre-main sequence solar-type stars (HD 141943 and HR 1817). We have used the technique of Zeeman Doppler imaging to record temporal evolution in the global magnetic topologies and differential rotation of these stars.

Presenter: Stephen Marsden

Fri 09:45 – 10:00

Asteroseismology with Kepler

S. J. O'Toole[1], T. R. Bedding[2], T. White[2], D. Stello [2], D. Huber[2], M. D. Reed[3], A. S. Baran[4], R. Østensen[5], and the Kepler Asteroseismic Science Consortium
[1]*Australian Astronomical Observatory*
[2]*University of Sydney*
[3]*Missouri State University*
[4]*Iowa State University*
[5]*University of Leuven*

The Kepler satellite has already had tremendous success detecting weird and wonderful exoplanetary systems. A part of the mission that has received less attention though, is its contribution to our understanding of stars through the study of their oscillations, known as asteroseismology. In this talk, I will present some of the highlights, ranging from solar-like oscillations in Main Sequence and Red Giant stars to White-Dwarf-like pulsations in Extreme Horizontal Branch stars.

Presenter: Simon O'Toole

Fri 10:00 – 10:30

Gravitational Waves

Kip S. Thorne[1]

[1] *California Institute of Technology*

Gravitational waves are a new window onto the universe that will bring major new insights into black holes and neutron stars and their roles in the universe, and into the universe's earliest moments. Because gravitational waves are so radically different from electromagnetic waves, they will almost certainly bring huge surprises. Gravitational wave astronomy will become a reality in this decade, thanks to a new world wide network of Advanced Gravitational Wave Interferometers and also to an International Pulsar Timing Array. Joint gravitational / electromagnetic observations will greatly enhance the science output, as also would a gravitational wave interferometer in the Southern Hemisphere - ideally Australia.

Presenter: Kip Thorne INVITED TALK

Fri 11:00 – 11:15

The Status of Advanced LIGO

D. Ottaway[1] for the LIGO Scientific Collaboration

[1] *University of Adelaide*

Advanced LIGO is the first of the second generation long baseline terrestrial gravitational wave detectors to begin construction. This detector offers the promise of a sensitivity increase of a factor of 10 and a reduction of 4 in the low frequency limit compared with the Initial LIGO gravitational wave detectors. The combination of these improvements will enable the rate of likely gravitational wave detections to be increased by a factor of 1000 compared with that expected for Initial LIGO. In this presentation I will discuss the Advanced LIGO detector, its planned implementation and its current status. In addition I will discuss the benefits to gravitational wave astrophysics of the proposed citing of a LIGO gravitational wave detector in Australia.

Presenter: David Ottaway

Fri 11:15 – 11:30

The first coordinated optical follow-up of gravitational wave candidates in the LIGO S6 and Virgo VSR2-3 science run

David Coward[1] for the LIGO Scientific Collaboration, and the Virgo Collaboration

[1] *School of Physics, University of Western Australia*

Pan-spectral astronomy is entering a new frontier with the first coordinated searches for coincident electromagnetic and gravitational radiation sources. With advanced interferometric gravitational wave detectors (LIGO, Virgo, LCGT) we will have the opportunity to probe sources of gravitational-waves that are also expected to be observable via electromagnetic (gamma rays, X-rays, optical, radio) and/or neutrino emission. Coincident observation of electromagnetic and/or neutrino emission could be important evidence in the first direct detection of gravitational radiation. Optical observations will enable localization of the gravitational wave source, and provide powerful new insights into the physics of compact binary coalescence. We summarize the status of pan-spectral detection efforts and describe the participation of Australia in the first optical follow-up campaign of gravitational wave candidate events in the LIGO S6 and Virgo VSR2-3 science run.

Presenter: David Coward

Fri 12:00 – 12:15

Discovery of a transient ULX in M83

R. Soria[1], K.S. Long[2], W.P. Blair[3], K.D. Kuntz[3], P.P. Plucinsky[4], F. Winkler[5], A. Moin[1], L. Bianchi[3], P. Ghavamian[2], C. Stockdale[6]
[1] *Curtin University*
[2] *STScI*
[3] *Johns Hopkins University*
[4] *Harvard CfA*
[5] *Middlebury College*
[6] *Marquette University*

We are studying the grand-design spiral galaxy M83 as an ideal target for modelling the cycle of star formation, stellar death, supernova remnants, multi-temperature gas phases and accreting compact objects. Here we present the first results of our deep 2010-2011 Chandra X-ray study, with a preview of what we will achieve when the high-energy data are matched to the optical (ongoing HST, Magellan, Gemini observations) and radio (ATCA, VLA) images. We discovered a new ultraluminous X-ray source that was not present (at least 1000 times fainter) in the 2000 Chandra data. We identified its optical counterpart, which is consistent with a strongly-irradiated low-mass giant star. We suggest that this transient ULX is an example of LMXB ULX: its duty cycle properties may be different from those of younger, persistent ULXs fed by OB stars.

Presenter: R. Soria

Fri 12:15 – 12:30

The spectral energy distributions of BL Lacertae objects

H. Landt[1], A.C. Donea[2], K.C. Steenbrugge[3]
[1] *University of Melbourne*
[2] *Monash University*
[3] *Universidad Catolica del Norte*

We can now sample large portions of the spectral energy distributions (SEDs) of astrophysical sources with relative ease. Several multi-frequency observatories, such as, e.g., Planck, WISE, GALEX, Sloan, Swift and Fermi, make large volumes of data readily available for the average user. I will discuss how the different emission components in radio-loud active galactic nuclei can be studied and which new science can be learned. In particular I will focus on the multiwavelength SEDs of a complete sample of BL Lacertae objects (BL Lacs) selected from the Deep X-ray Radio Blazar Survey (DXRBS). About a third of the DXRBS BL Lacs have been detected at gamma-ray frequencies by Fermi and I will present possible interpretations for their high-energy emission.

Presenter: Hermine Landt

Fri 12:30 – 13:45

Jets and Accretion in Protostellar Disks

Raquel Salmeron
Australian National University

Magnetocentrifugal jets and magnetic turbulence can redistribute angular momentum in protostellar disks, enabling accretion to take place. Current jet and disk models, however, are largely disconnected and overly simplified. Critically, the impact of the microphysics on the magnetic heating and the resulting structure and observational signatures of these objects remains largely unexplored. In my talk I will examine the launching of outflows from protostellar disks under realistic fluid conditions, and present new models that self-consistently calculate the dynamical and thermal structure of the disk and wind. These models allow us to study the vertical structure and properties of the coupled disk-wind solution as a function of location, as well as to estimate the likely radial extent of the wind-launching region. Finally, I will discuss the implications and future applications of these studies, focusing on the analysis of the observational signatures of the protostellar system.

Presenter: Raquel Salmeron

POSTER TITLES & ABSTRACTS

Student presenters are identified with an '(S)' symbol.

Poster displays are split across two rooms (Eclipse and Rumours) in the Union Building.

P1 - P59: Eclipse Room Level 4 Union Building (Extragalactic, Optical/IR Surveys/Techniques)

P60 - P127: Rumours Room Level 6 Union Building (Galactic, Radio Surveys/Techniques, Gamma-Ray/Particles/Grav.Waves Surveys/Techniques, Computing, History/Education/Outreach)

Note the Poster Sparkler session assignments:

TUE3 15:15 - 15:30 poster sparklers x 30 (P1-P30)
WED1 10:15 - 10:30 poster sparklers x 30 (P31-P60)
WED3 15:15 - 15:30 poster sparklers x 30 (P61-P90)
THU1 10:15 - 10:30 poster sparklers x 30 (P91-P120)
THU3 14:45 - 15:00 poster sparklers x 30 (P121-P127 + extras P49b, P77b, P87b, P93b, P94b, P110b)

Abstracts: Posters 1 - 59 Eclipse Room, Level 4

P1: **A survey of globular cluster kinematics in early-type galaxies**

V. Pota[1], Duncan A. Forbes[1], C. Foster[1], L. Spitler [1], A. Romanowsky[2], Jean Brodie [2], J. Strader[3]
[1] *Swinburne University*
[2] *Unversity of California, Santa Cruz*
[3] *Harvard University*

To date, only a dozen GC systems have been kinematically investigated in detail. This small sample size has hindered attempts to search for global trends with host galaxy properties. We present an extended spectro-photometric survey of a dozen never-before studied GC systems, thus doubling the sample of galaxies studied. For each GC system we exploit the combination of Subaru/Suprime-Cam wide-field imaging with spectra from Keck/DEIMOS multi-object spectrograph. We examine the rotation and velocity dispersion properties for each GC system and for their metal-rich and metal-poor subpopulations separately. Our survey results are integrated with those from the literature to provide a new insight into the kinematics and hence origin of GC systems.
Presenter: Vincenzo Pota (S)

P2: **Extragalactic Globular Cluster Metallicities**

Christopher Usher[1]
[1] *Swinburne University of Technology*

A galaxy's globular cluster system provides important clues to its formation. Since globular clusters were formed early during intense periods of star formation and have survived to the present day they provide a unique view of a galaxy's evolution. As part of a photometric and spectroscopic survey of extragalactic GCs, we have used the DEIMOS spectrograph on Keck to observe the GCs around ten early-type galaxies. We have used the strength of the near infrared calcium triplet to derive metallicities for over five hundred GCs associated with these galaxies. This is the largest homogeneous sample of spectroscopic extragalactic GC metallicities available. We recover the non-linear colour-metallicity relation seen in Milky Way GCs. We find evidence that the distribution of GC metallicities is bimodal in most galaxies, indicating that globular cluster formation and hence intense star formation was either an extended process or occurred multiple times.
Presenter: Christopher Usher (S)

P3: **A new view of the Local Group's Antlia Dwarf Galaxy via high-redshift analysis techniques**

Kevin A. Pimbblet[1], Warrick J. Couch[2]
[1] *Monash*
[2] *Swinburne*

The Antlia Dwarf Galaxy resides at the very edge of our Local Group and has been targeted repeatedly over recent years to fully comprehend its origins. Our new study successfully applies high redshift analysis techniques to HST imaging of this galaxy. Using our innovative statistical field correction, we derive a new distance to Antlia of 1.31 ± 0.03 Mpc via the red giant branch standard candle method coupled with a Sobel edge detection filter. For the first time for a Local Group Member, we compute the concentration, asymmetry and clumpiness (CAS) quantitative morphology parameters for Antlia and show that it is a classic dwarf elliptical (C = 2.0, A = 0.063 and S = 0.077), but has an appreciable blue stellar population at its core, confirming ongoing star-formation. We interpret these values in the context of Antlia's relationship with NGC3109, its nearest neighbour whom it may have had recent interactions with.
Presenter: Kevin Pimbblet

P4: **Hunting Sagittarius: Stellar Kinematics and Abundances in the Sagittarius Dwarf and Stellar Stream**

Elaina A. Hyde[1],D. B. Zucker[1,2], J. Penarrubia[3], M. Irwin[3], R. Lane[4,5], G. F. Lewis[5], G. Gilmore[3],A. Koch[6], R. Ibata[7]
[1] *Macquarie University*
[2] *Australian Astronomical Observatory*
[3] *University of Cambridge*
[4] *Universidad de Concepcion*
[5] *University of Sydney*
[6] *University of Leicester*
[7] *Observatoire de Strasbourg*

The Sagittarius dwarf galaxy and its vast associated stellar stream represent the most dramatic example of a satellite accreting onto the Milky Way. However, despite intensive efforts over the past 15 years, to date no simulations have been able to reproduce all the observed features of the Sagittarius dwarf remnant and the stream. The constraints on the MW potential derived from the Sgr stream are quite likely linked to the internal (dynamical) properties of the dwarf progenitor, and we investigate this connection. We have obtained spectra of over 6000 red giant stars near the core of Sagittarius with AAOmega on the AAT – roughly an order of magnitude more than previous studies – deriving kinematics and elemental abundances for each. Our goal is to investigate the properties and history of the Sagittarius system, as well as probe the profile of the Milky Way's dark matter halo, through which Sagittarius falls.
Presenter: Elaina A. Hyde (S)

P5: **Environmental effects on the cluster dwarf galaxy population**

S. Penny[1]
[1] *Swinburne University of Technology*

We present the results of a deep Hubble Space Telescope ACS and WFPC2 imaging survey of the core of the Perseus Cluster to examine its dwarf elliptical galaxy population to $M_V = -12$. Using this deep dataset, we examine the effect of environment on these low mass galaxies, which are likely the most sensitive galaxies to environmental effects due to their low mass. This imaging reveals a large population of remarkably undisturbed dEs in the cluster core, which must be highly dark matter dominated to allow their survival in the strong tidal potential of the core, with mass-to-light ratios $\sim$100 for the least massive dwarfs. Dwarfs in the cluster outskirts have, on average, more disturbed structures than those in the core, suggesting a more recent infall origin than the smooth core population. We also present the first results of a search for ultra compact dwarfs in Perseus Cluster.
Presenter: Samantha Penny

P6: **Hunt for Ultra-faint Dwarf Galaxies in the Southern Sky**

Tammy Roderick[1], Helmut Jerjen[1]
[1] *Australian National University*

The Stromlo Milky Way Satellite Survey aims at trawling all 20,000 sq. degrees of the Southern Hemisphere to SDSS photometric sensitivities, in the search for ultra-faint dwarf galaxies. This newly discovered class of optically elusive galaxies are the most dark-matter dominated stellar systems in the Universe, and harbour some of the most extreme metal-poor stars known to exist. Here we describe briefly the fundamental components of our photometric data processing pipeline for creating accurate colour-magnitude diagrams of millions of stars, which serve as crucial input for our data mining algorithms. We also present first results from SkyMapper images obtained during the ongoing telescope commissioning.
Presenter: Tammy Roderick (S)

P7: **A study of kinematically-anomalous HI gas in the nearby galaxy NGC 3521**

E. Elson[1].
[1] *ICRAR (UWA)*

NGC 3521 is a nearby, moderately-inclined disk galaxy. Its rotation curve was presented by Casertano & Gorkom (1991) as being one of the first cases for which a declining HI rotation curve was found in a spiral galaxy. The system as since been observed at $\sim$ 5" resolution with the VLA as part of The HI Nearby Galaxy Survey. These new data show the galaxy's HI kinematics to be complex, and reveal the presence of a kinematically anomalous HI component which is evident in the HI line profiles as very extended wings. I present the results of a suite of detailed dynamical analyses of NGC 3521 aimed at characterizing and quantifying the properties of the anomalous HI component, specifically its distribution and kinematics. It is checked whether the anomalous HI component is responsible for the previous determination of a declining outer rotation curve, and whether a different form of the rotation curve is derived when excluding the kinematics of the anomalous HI.

The sorts of analyses presented in this talk are particularly relevant to future large HI surveys that will be carried out with ASKAP, MeerKAT and the SKA. These instruments will ultimately allow us to study the full gas cycle in nearby galaxies, thereby refining our understanding of the roles played by ejected and accreted gas in a galaxy evolution context.

Presenter: Ed Elson

P8: **The Evolution of Neutral Hydrogen with HI Stacking**

M. Meyer[1], L. Staveley-Smith[1], J. Delhaize[1]
[1] *ICRAR, The University of Western Australia.*

Our understanding of how the neutral hydrogen content of the universe has evolved across cosmic time is still very limited. As the fundamental fuel for star formation, this similarly limits our ability to fully understand the processes that drive and regulate galactic evolution. How does the global HI content of the universe evolve? How has the cosmic web and the distribution of neutral hydrogen changed over time? What processes drive the accretion and removal of cold gas in galaxies? The SKA and its pathfinders will make significant in-roads into this topic, with facilities such as ASKAP and MeerKAT tailored to the detection of HI content. Key to maximising the scientific return of deep HI studies is the development of techniques such as HI stacking that do not require the statistically significant detection of individual galaxies, but rather combine that signals from to many to increase the depth at which HI galaxy properties can be studied. I will discuss recent HI stacking results derived from Parkes and HIPASS data, along with future prospects for studying the evolving HI universe with such techniques in upcoming pathfinder studies.

Presenter: Martin Meyer

P9: **Evolution of the B band luminosity function of red and blue galaxies between redshifts 0.2 and 1.2**

Richard Beare
Monash University

Optical light traces both stellar masses and star formation rates of galaxies, and can be measured using luminosity functions. We have determined B-band luminosity functions for red and blue galaxies separately for $0.2<z<1.2$, using data on 350,000 galaxies from the NOAO Wide Deep Field and Spitzer IRAC Surveys. We find that the total luminosity density for all [red, blue] galaxies decreased by 0.24 [0.32, 0.44] dex per unit redshift, while the space density parameter ϕ^* increased by 0.13 [0.09; 0.11] dex per unit redshift. The red population stellar mass increases by a factor of $\sim$2 between z=1.2 and z=0.2, presumably due to truncation of star formation in blue galaxies. Contrary to prior studies, we see no evidence for a rapid change in the rate of evolution of blue and red galaxies at z$\sim$1. The number of red galaxies at z$\sim$1 has been underestimated by $\sim$50% by both COMBO-17 and DEEP2.

Presenter: Richard Beare (S)

P10: **Galaxy Spectra from the UV to the IR**

Michael Brown[1]
[1] *Monash University*

Template spectra of galaxies are essential for studies of distant galaxies, enabling the physical properties of galaxies to be derived from observables. This includes luminosities utilising k-corrections and photometric redshifts determined by fitting template spectra to photometry. We demonstrate that many commonly used galaxy spectra templates have significant errors, in some cases on the order of tens of percent. These errors can propagate through to the resulting science, including studies of galaxy stellar populations and galaxy mass assembly. We present new galaxy spectra templates, derived from UV spectra, optical spectra, Spitzer IRS spectra and galaxy spectra models. These spectra have been constrained and verified with 25-band photometry stretching from the UV to the far-IR. We illustrate how these templates can be used to significantly improve science derived from the new generation of galaxy imaging and spectroscopic surveys, including Bootes and GAMA.
Presenter: Michael Brown

P11: **HI absorption line studies of nearby galaxies**

S. Reeves[1], E. Sadler[1]
[1] *University of Sydney*

The study of galaxy evolution requires detailed measurements of the size and distribution of galaxies over the history of the universe. As the most abundant element in the Universe, and the main fuel for star formation, neutral hydrogen provides as important probe of these properties. Since the detection limit of HI absorption is independent of redshift it provides an ideal tool for studying neutral hydrogen out to high redshifts. In this project I will investigate how far out into spiral disks HI absorption can be detected, using a combination of new ATCA-CABB observations and archival data. The results of this investigation will contribute to our understanding of galaxy evolution in the local universe (z $<$ 0.1) and aid in the design of ASKAP-FLASH, which will study HI absorption to redshift z=1. Here I present the initial set of targets selected for observation, and discuss the next steps in this investigation.
Presenter: Sarah Reeves (S)

P12: **What Shapes the Galaxy Luminosity Function**

Nicolas J. Bonne[1], Michael J. I. Brown[1], Kevin A Pimbblet[1]
[1] *Monash Centre for Astrophysics, Monash University*

By measuring the galaxy luminosity function and its evolution, we can better understand what factors contribute to the star formation rate and growth of galaxies. We can also measure and constrain the relation between galaxy and halo mass. Selecting galaxy samples based on color or morphology can provide additional information as galaxy shape measures the distribution, and reflects the motions, of stars within a galaxy. Colour generally relates to galaxy morphology. Previous studies of local luminosity functions with morphology-selected samples have largely produced conflicting results and functions with varying shapes (Marzke et al, 1998, Kochanek et al, 2001, Devereux et al, 2009). Unexpectedly, such functions often differ from functions derived from colour-selected samples. We have derived local galaxy luminosity functions, as a function of morphology using 2MASS and RC3 data. We discuss our results, contrasting and comparing the shape of our functions to others in the literature.
Presenter: Nicolas J. Bonne (S)

P13: **Is there a third parameter in the Tully-Fisher relation?**

Taissa Danilovich[1], Heath Jones[2], Jeremy Mould[3], Edward Taylor[4,1], Chiara Tonini[1,3], Rachel Webster[1]
[1] *University of Melbourne*
[2] *Monash University*
[3] *Swinburne University of Technology*
[4] *University of Sydney*

A quantitative approach for classifying spiral galaxies by rotation velocity. Their central velocity dispersion (bulge) tends to be roughly one half of their rotation velocity (disk). But some spirals have a velocity dispersion up to a factor of two larger. In hierarchical galaxy formation models, the relative contributions of σ and W depend on the mass accretion history of the galaxy, which determines the mass distribution of the different dynamical components. The wide variety of histories that originate in the hierarchical mass assembly produce a wide range of σ/W, that reaches high values in more bulge-dominated systems. Another way of saying this is asking whether σ is a third parameter in the Tully-Fisher relation. Thus spirals are mostly one dimensional, but σ/W (bulge to disk ratio) is often larger than average. Is this a signature of merger history?
Presenter: Taissa Danilovich (S)

P14: **Multi-wavelength analyses of local star-forming galaxies**

Angel Lopez-Sanchez[1,2], Baerbel Koribalski[3], Helmut Jerjen[4], Cesar Esteban[5]
[1] *Australian-Astronomical Observatory*
[2] *Macquarie University*
[3] *CSIRO Astronomy and Space Science*
[4] *ANU - Research School of Astronomy and Astrophysics*
[5] *Instituto de Astrofisica de Canarias (Spain)*

We are combining the HI and 20-cm radio-continuum data of local star-forming galaxies provided by the LVHIS ("The Local Volume HI Survey" using the ATCA) project with UV (GALEX), optical/NIR (AAT and 2.3m ANU telescopes) and IR (Spitzer) data. Our aim is analyse the star-formation processes, the metal redistribution, the importance of galaxy interactions, the fate of the neutral gas, and the chemical evolution in nearby galaxies. We here present our results for two very different objects: the blue compact dwarf galaxy NGC 5253 (López-Sánchez et al. 2011a) and the galaxy pair NGC 1512 / 1510 (Koribalski & López-Sánchez 2009; López-Sánchez et al. 2011b). In both cases we found evidences that indicate that the star-formation processes have been triggered by the interaction with or between low-luminosity dwarf galaxies or HI clouds (López-Sánchez 2010).
Presenter: Angel Lopez-Sanchez

P15: **The Clustering of $z < 1$ Star Forming Galaxies**

T. Dolley[1], M. Brown[1], K. Pimbblet[1]
[1] *Monash University*

By measuring the clustering of galaxies at various epochs, we can determine their dark matter halo masses and connect them to today's galaxies in an evolutionary sequence. We present clustering measurements of the largest sample of 24μm sources from $0.2 < z < 1.0$, using Spitzer Space Telescope. Emission at 24μm is primarily from dust, heated by young hot stars. This provides us with a star forming galaxy sample, unbiased by the varying dust obscuration afflicting optical bands. We find relatively weak clustering of $r_0 \approx 4h^{-1}$Mpc from $0.2 < z < 0.8$. These galaxies reside within dark matter halos of $10^{12} < M/M_{\odot} < 10^{12.5}$, with a bias close to 1. Since these are the most luminous star forming galaxies, this places an upper limit on the halo masses of star forming galaxies. We see evidence for an increase in clustering and halo mass at $0.8 < z < 1.0$, corresponding to star forming progenitors of more massive galaxies at present day ($L \sim 2L^*$).
Presenter: Tim Dolley (S)

P16: **The galaxy 3-point correlation function**

Felipe Marin[1]
[1] *Swinburne University*

The galaxy 3-point correlation function(3PCF), which measures the probability to find galaxies in certain triangular configurations, is a complementary statistic of galaxy clustering measured by the (2-point) correlation function. Apart of being sensitive to scale, the 3PCF is also sensitive to the morphology of the large-scale clustering, and can add important information about galaxy bias (difference of clustering between dark matter and galaxies), constraints in cosmological parameters and galaxy population models. I present measurements of the galaxy 3PCF for different surveys such as SDSS-LRG and WiggleZ and the resulting constraints in the galaxy bias parameters and cosmological parameters such as σ_8 and the growth rate.
Presenter: Felipe Marin

P17: **Power spectrum forecasts for baryon acoustic oscillationexperiments using the Lyα forest**

Bradley Greig[1,2], James S. Bolton[1,2] and J. Stuart B. Wyithe[1]
[1] *University of Melbourne*
[2] *ARC Centre of Excellence for All-sky Astrophysics (CAASTRO)*

High redshift measurements of the baryonic acoustic oscillation scale (BAO) from large Lyα forest surveys represent the next frontier of dark energy studies. As part of this effort, efficient simulations of the BAO signature from the Lyα forest will be required. We construct a model for producing fast, large volume simulations of the Lyα forest on a desktop PC using a GPU enabled version of our code. We find our simulated data to be in broad agreement with observational measurements of the flux probability distribution and 1D flux power spectrum. We correctly recover the input BAO scale from the 3D Lyα flux power spectrum measured from our simulated data, and estimate that a BOSS-like 10^4 deg^2 survey with $\sim$ 15 background sources per square degree and a signal-to-noise of $\sim$ 5 per pixel should achieve a measurement of the BAO scale to within $\sim$1.4 per cent. The speed and flexibility of our approach is well suited for exploring parameter space and the impact of observational and astrophysical systematics on the recovery of the BAO signature from forthcoming large scale spectroscopic surveys. forthcoming large scale spectroscopic surveys.

Presenter: Bradley Greig (S)

P18: **Tests of Modified Gravity theories using Redshift-space distortion measurements from WiggleZ**

D. Parkinson[1], T. M. Davis[1], C. Blake[2]
[1] *University of Queensland*
[2] *Swinburne University of Technology*

The mysterious dark energy that drives the acceleration can be seen either as a failure of Einstein's theory of General Relativity, or the requirement of (yet another) dark fluid to reconcile the theory with observations. However, both explanations make similar or identical predictions for the distances as a function of redshift. In order to break this degeneracy new data is needed, such as measurements of the growth of structure on large scales by redshift-space distortions. WiggleZ has provided us with just such a data set to test these theories. I will describe the procedure for generating predictions for the different theories, the WiggleZ redshift-space distortion data set, and the constraints this data places on the different theories.

Presenter: David Parkinson

P19: **How the expansion rate evolves: the role of quintessence and curvature**

J. Mould
Swinburne University

The case of dark energy with w = -4/3 is explored for curved universes.

Presenter: Jeremy Mould

P20: **Building model universes in the "cloud": the Theoretical Astrophysical Observatory (TAO)**

D. Croton[1], M. Bernyk[1], S. Mutch[1], G. Poole[1], M. Martig[1], C. Tonini[1,2]
[1] *Swinburne University*
[2] *University of Melbourne*

In this talk I will discuss the use of new technologies to build and deliver cosmological-scale galaxy formation models to the community. Combining high performance computing, a "web 2.0" front-end architecture, and cloud-based processing and storage, our "Theoretical Astrophysical Observatory" (TAO) will allow astronomers to run their own galaxy formation models (or use pre-built ones), filter the output through virtual telescopes, and download the results for their own scientific use. This tool will be of value to both large survey teams and individuals and should serve a wide range of science needs.

Presenter: Darren Croton

P21: **Early Science on gSTAR: The Systematics of Cosmological MicrolensingMagnification Maps**

G. Vernardos[1], C. Fluke[1], N. Bate[1]
[1] *Swinburne University of Technology*

Gravitational microlensing is a valuable tool for studying the properties of distant quasars, such as placing constraints on the sizes of the central supermassive black hole accretion disks. To consistently study cases of cosmological microlensing, including testing the robustness of the macro-image modeling, we are generating a series of magnification maps that provide complete coverage of convergence and shear parameter space. Our approach is to use the immense processing power of modern Graphics Processing Units (GPUs) to accelerate an implementation of the direct, inverse ray-shooting technique. We report here on the generation of a first set of high resolution magnification maps, and discuss their statistical properties. Our full, high resolution, microlensing parameter survey (GERLUMPH) will produce some of the first new science with the gSTAR supercomputing facility.
Presenter: Georgios Vernardos (S)

P22: **A semi-empirical sky simulation: radio continuum, dust and HI**

R.J. Wilman[1]
[1] *Swinburne University*

The semi-empirical radio continuum sky simulation developed by Wilman et al. (2008) as part of the EU SKA Design Study has found wide application in preparations for surveys with SKA pathfinders. I will review its recent extension to the infrared & sub-mm regime to exploit synergies with Herschel, and outline ongoing work to devise a realistic treatment of HI emission. The latter will be incorporated in a forthcoming 'all sky' version of the simulation, of which I will give a preview.
Presenter: R.J. Wilman

P23: **Deep Studies of the Universe at 21cm. The Arecibo Ultra-Deep Survey (AUDS)**

L. Hoppmann[1], L. Staveley-Smith[1], W. Freudling[2]
[1] *ICRAR*
[2] *ESO*

The Arecibo Ultra Deep-Survey (AUDS) is an ongoing, blind 21-cm survey with the Arecibo L-band Feed Array (ALFA) at the Arecibo 305m telescope. Due to Arecibo's unique sensitivity, AUDS will be able to directly detect 21-cm HI emissions from galaxies at redshifts between 0 and 0.16. Detection of HI galaxies at these high redshifts will enable us to investigate the HI content of the universe $\Omega_{\rm HI}$ and its evolution over time.
Presenter: Laura Hoppmann (S)

P24: **GMRT 150 MHz deep observation of LBDS region**

Sabyasachi Pal[1], C. H. Ishwara-Chandra[2], S. Sirothia[2], Y. Wadadekar[2], R. Windhorts[3]
[1] *ICRAR-UWA*
[2] *NCRA-RIFR*
[3] *Arizona State Univ.*

Using steep radio spectra as indicator is age proof and most efficient way to search for high redshift radio galaxies. Most of the radio galaxies with $z > 3$ have been discovered using this redshift-spectral index correlation. We have started a programme with the Giant Metrewave Radio Telescope (GMRT) to exploit this correlation at flux density levels about 10 to 100 times deeper than the known high redshift radio galaxies. In our programme, we have obtained deep, high resolution radio observations at 150MHz with GMRT for several deep fields which are well studied at higher radio frequencies and in other bands of the electromagnetic spectrum, with an aim to detect candidate high-redshift radio galaxies. In this paper we present results from the deep 150MHz observations of LBDS-Lynx field, which has been already imaged at higher radio frequencies by WSRT and VLA. The 150MHz image made with GMRT has a rms noise of $\sim$ 0.7 mJy/beam. It is the deepest low frequency image of the LBDS-Lynx field. The source catalog of this field at 150MHz has about 765 sources. We find about 150 radio sources with spectra steeper than 1. About two third of these are not detected in Sloan Digital Sky Survey, hence are strong candidate high-redshift radio galaxies.
Presenter: Sabyasachi Pal

P25: **Bias: The Galaxies-Matter Connection**

Greg Poole[1]
[1] *Swinburne*

Studies of the Universe's large-scale structure have now reached the level of maturity necessary to conduct precision cosmological measurements which are competitive in many regards with other standard approaches such as supernovae and weak lensing surveys. However, to place these measurements within (or against) our contemporary theoretical understanding, we need to understand how observed distributions of galaxies connect to their underlying distribution of matter. This connection is called galaxy bias. In this talk I will discuss the nature of this connection using results from large dark matter simulations; a tool of critical importance in this increasingly important field.
Presenter: Gregory Poole

P26: **The life and times of spinning dark matter haloes.**

Holly Trowland, Geraint F. Lewis and Joss Bland-Hawthorn
University of Sydney

The spin angular momentum of a dark matter halo is a relic of its past. It is the culmination of mergers, slow accretion and torquing by the surrounding landscape early on in the halo's life. To investigate how these different factors affect halo spin, N-body simulations are used to go back in time to see how the direction and magnitude of spin has evolved.
Presenter: Holly Trowland (S)

P27: **The Merger Times of High Redshift Dark Matter Halos**

T. McCavana[1], G. Lewis[1], M. Micic[1], K. Holley-Bockelmann[2], M. Sinha[2]
[1] *University of Sydney*
[2] *Vanderbilt University*

Dynamical friction is thought to have a significant influence on the merger times for Dark Matter Halos(DMHs) and galaxies alike. Approximations of DMH merger times are often used in semi-analytical methods to estimate important quantities such as gas abundances, AGN activation rates as well as black hole binary formation and merger rates. Recent works have sought to tighten approximations of DMH merger times through both numerical and analytical approaches. In our work we use a high resolution (mass resolution of $7.05 \times 10^5 M_{\odot}$) cosmological n-body simulation to measure the merger times for DMH mergers between redshifts z=10 to z=1. We follow the satellite haloes particles checking for bound subsets in subsequent snapshots. We find mergers that begin at high redshifts finish faster then those starting at low redshifts. Halo potentials at high redshifts are to some extent dynamic, constantly growing and changing via accretion, mergers and tidal interactions.
Presenter: Tom McCavana (S)

P28: **Neutral Gas and Dark Matter in the Sculptor Group**

T. Westmeier[1], B.S. Koribalski[2], R. Braun[2]
[1] *ICRAR, The University of Western Australia*
[2] *CSIRO Astronomy and Space Science*

The new generation of radio telescopes and instruments (including ASKAP and MeerKAT) will provide an unprecedented combination of large field of view and high sensitivity ideally suited to study nearby galaxy groups and shed light on interaction and feedback processes in the group environment, such as tidal interaction, accretion flows, and ram pressure. In my presentation I will discuss the latest results of deep precursor HI observations towards the Sculptor group with the ATCA, including the discovery of a population of extra-planar gas clouds around NGC 55. I will also present evidence for ram-pressure interaction between NGC 300 and the surrounding intergalactic medium and demonstrate how the effects of ram pressure forces on the outer discs of galaxies can be used to constrain the physical parameters of the IGM in galaxy groups.
Presenter: Tobias Westmeier

P29: **The Warm-Hot Intergalactic Medium**

J. Malarecki[1], L. Staveley-Smith[1], L. Saripalli[2], R. Subrahmanyan[2], H. Jones[3]
[1] *University of Western Australia - ICRAR*
[2] *Raman Research Institute*
[3] *Monash University*

Half of all baryons predicted by nucleosynthesis have not been observed in the present-day universe. The 'missing' matter may exist as a tenuous, 10^5 to 10^7 K gas, called the Warm-Hot Intergalactic Medium (WHIM), which is a generic prediction of hydrodynamic simulations in Lambda-Cold Dark Matter cosmology. The WHIM gas would reside within galaxy filaments connecting the denser virialised objects of the large-scale structure (LSS) of the universe. However, is difficult today to detect in either absorption or emission due to its low overdensities. I will outline my PhD project which will build on previous studies that have demonstrated interactions of the radio lobes of giant radio galaxies (GRGs) with the ambient intergalactic medium. It will be the first of its kind to utilise a sample of GRGs with a combination of radio and optical data to characterise and determine the distribution of the WHIM.
Presenter: Jurek Malarecki (S)

P30: **Spatial kinematics of Brightest Cluster Galaxies and their close companions from IFU spectroscopy**

S. Brough[1], GAMA Team[2]
[1] *AAO*
[2] *Australia, UK, Europe*

I will present Integral Field Unit (IFU) spectroscopy of four brightest cluster galaxies (BCGs) at z$\sim$0.1. Three of the BCGs have close companions within 20 kpc and one has no companion within that radius. I will show that while the lowest mass companion (1:4) is not bound, the two nearly equal mass (1:1.45 and 1:1.25) companions are likely to merge with their host BCGs in 0.35 Gyr in major, dry mergers. I conclude that BCGs continue to grow from major merging even at z$\sim$0. I will also present the stellar kinematics of these systems, analysed using the SAURON lambda_R parameter which offers a new and unique means to measure the stellar angular momentum of BCGs and make a direct comparison to other early-type galaxies. Not all these massive galaxies have low angular momentum as one might expect. One of the four BCGs and two of the massive companions are found to be fast-rotating galaxies with high angular momentum, thereby providing a new test for models of galaxy evolution and the formation of Intra-Cluster Light.
Presenter: Sarah Brough

P31: **Measuring the energy output of the nearby Universe with GAMA**

Simon P. Driver (1) and the GAMA team The spectral energy distribution of the nearby Universe can be measured directly from the nearby galaxy population and compared to that expected from the combination of the cosmic star-formation history combined with the initial stellar mass function and a basic stelar population model. Here we report results from the GAMA survey with complimentary image data from GALEX, WISE and Herschel and how these results compare to our expectations.
Presenter: Simon Driver

P32: **Dust obscuration and star formation rate histories**

Dinuka Wijesinghe[1], Andrew Hopkins[2] and the GAMA team
[1] *University of Sydney*
[2] *Australian Astronomical Observatory*

We use multiwavelength data from the Galaxy And Mass Assembly (GAMA), Galaxy Explorer Medium Imaging Survey (GALEX-MIS) and Herschel ATLAS (H-ATLAS) surveys to compare the relationship between various dust obscuration measures in galaxies. We present self-consistent star formation rates derived through pan-spectral analysis of galaxies drawn from the Galaxy and Mass Assembly (GAMA) survey. We determine the most appropriate form of dust obscuration correction via application of a range of extinction laws drawn from the literature as applied to Hα, [OII], UV luminosities by considering several different obscuration curves, and then explore the connections between the ultraviolet (UV) spectral slope, β, the Balmer decrement, and the far infrared (IR) to 150 nm far ultraviolet (FUV) luminosity ratio.
Presenter: Dinuka Wijesinghe (S)

P33: **GAMA+SDSS: Mass, metallicity and SFR relationships.**

M.A. Lara-Lopez[1], A. Hopkins[1], A.R. Lopez-Sanchez[1] and the GAMA team.
[1] *Australian Astronomical Observatory, PO Box 296, Epping, NSW 1710, Australia*

To understand the formation and evolution of galaxies, it is important to have a full comprehension of the role played by Metallicity, Star Formation Rate (SFR), and stellar mass of galaxes. The interplay of these parameters at different redshifts will substantially affect the evolution of galaxies and, as a consequence, their evolution provides important clues and constraints for the galaxy evolution models. The Mass-Metallicity (M-Z), Mass-SFR, Metallicity-SFR, and Mass-SSFR relationships for star-forming galaxies are studied for the GAMA and SDSS surveys using volume limited samples up to a redshift $\sim$0.4. We estimated metallicities using the recomended method in Kewley & Ellison (2008), and SFR following Hopkins et al. (2003). We found that the GAMA and SDSS samples complement to each other in the above relationships, following both in good agreement the same tendency. We also found evidence of a SFR evolution for galaxies at z$\sim$0.3, and confirm the existence of a Fundamental Plane identified previously in Lara-Lopez et al. (2010) and Mannucci et al. (2010)
Presenter: A. R. Lopez-Sanchez

P34: **The 6dF Galaxy Survey: Baryon Acoustic Oscillations and the Local Hubble Constant**

Florian Beutler[1], Chris Blake[2], Matthew Colless[3], D. Heath Jones[3], Lister Staveley-Smith[1], Lachlan Campbell[4], Quentin Parker[3,5], Will Saunders[3], Fred Watson[3]
[1] *ICRAR*
[2] *Swinburne University*
[3] *Australian Astronomical Observatory*
[4] *Western Kentucky University*
[5] *Macquarie University*

The large-scale correlation function of the 6dF Galaxy Survey (6dFGS) allows the detection of a Baryon Acoustic Oscillation (BAO) signal. The low effective redshift of 6dFGS makes it a competitive and independent alternative to Cepheids and low-z supernovae in constraining the Hubble constant. It also depends on very different (and arguably smaller) systematic uncertainties. We found a Hubble constant of H_0 = 67 +/- 3.2 km/s/Mpc. The sensitivity to H_0 can also be used to break the degeneracy in the CMB data e.g. to determine the dark energy equation of state w.
Presenter: Florian Beutler (S)

P35: **The 6dFGS Galaxy Survey: Fundamental Plane Trends with Passband, Morphology and Global Environment**

Christina Magoulas[1], Christopher Springob[2], Matthew Colless[2], Heath Jones[2,3], Jeremy Mould[4]
[1] *University of Melbourne*
[2] *AAO*
[3] *Monash University*
[4] *Swinburne University*

The 6dF Galaxy Survey (6dFGS) has measured Fundamental Plane (FP) parameters in the J, H and K passbands for 10,000 ellipticals, S0s and early-type spiral bulges. We fit the FP with a robust maximum likelihood procedure that is largely unaffected by potential biases such as censoring of the sample and correlated errors in the data. This fitting technique is used to investigate the trends in the FP with passband, morphology and environment. We find the variations in the FP with passband are consistent with the trends expected for an old stellar population. Using group and cluster richness as a proxy, we find no evidence for variantions in the FP with global environment. We also find no difference in the FP slope for morphologically selected subsamples, although we do find a size offset that we attribute to preferential selection in our sample of larger spiral bulges.
Presenter: Christina Magoulas (S)

P36: **The 6dFGS Galaxy Survey: Stellar Population Trends, and an Improved Fundamental Plane Distance Indicator**

Christopher Springob
Australian Astronomical Observatory

The 6dF Galaxy Survey (6dFGS) includes Fundamental Plane (FP) parameters for 10,000 ellipticals, S0s, and spiral bulges. We investigate the trends of stellar population parameters in FP space for these galaxies. We find clear stellar population trends across and through the FP, but no variation along the long dimension of the FP, which corresponds to luminosity density. We interpret a galaxy's position along this dimension as being tied to its merger history, which is then unrelated to its stellar populations. We also find that one can slightly decrease the scatter in the FP by segregating the sample into subsamples based on stellar age. This is because galaxies with stellar age greater than 3 Gyr occupy a slightly thinner FP which is offset from the plane corresponding to younger galaxies.
Presenter: Christopher Springob

P37: **The blazar B0208-512, from radio to gamma-ray.**

Jay M. Blanchard[1,2] , James E. J. Lovell[1], John Dickey[1], Philip Edwards[2], Roopesh Ojha[3,4], Matthias Kadler[5]
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[3] *NASA, Goddard Space Flight Center, Greenbelt, MD 20771, USA*
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[5] *Institut für Theoretische Physik und Astrophysik, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany*

B0208-512 is a redshift one blazar that shows flaring type behaviour at frequencies ranging from radio to gamma-rays. The advent of Fermi has dramatically improved the gamma-ray light curves available, allowing direct comparisons of individual flares. We present radio data from single dish monitoring using the University of Tasmania's 30m telescope at Ceduna, South Australia, as well as data from the Australian Telescope Compact Array, X-ray data from the Swift-XRT X-ray telescope, and the Fermi gamma-ray light curve and discuss possible relations between flaring behaviour observed in these bands.
Presenter: Jay M. Blanchard (S)

P38: **Environments of hot- and cold- mode radio-loud AGN**

J. Ching[1], S. Croom[1], E. Sadler[1], A. Hopkins[2]
[1] *The University of Sydney*
[2] *The Australian Astronomical Observatory*

Current theories of radio-loud active galaxies suggest that they accrete gas in two modes, the quiescent hot mode and the rapid cold mode. They also suggest these modes are dependent on both redshift and/or environment. Using a carefully selected sample of radio-loud active galaxies in the Galaxy and Mass Assembly (GAMA) and the WiggleZ survey, I investigate the environments of radio-loud active galaxies accreting in the hot and cold mode. I use the 5-th nearest neighbour densities and the Friends-of-Friends (FoF) group catalogue as a probe for the environments for radio galaxies in the GAMA survey, and a cross-correlation analysis for the radio galaxies in the WiggleZ survey.
Presenter: John Ching (S)

P39: **Constructing Consistent Leptonic Acceleration and Emission Models for Blazars**

C. Hudson[1], R.J. Protheroe[1]
[1] *University of Adelaide*

Blazar photon spectra are frequently modelled as emission by a population of energetic electrons. Modelling of flaring activity has usually involved fitting separately the quiescent and flaring states, rather than focusing on the cause of the transition between high-luminosity and low-luminosity states. Here we attempt to reconcile observed blazar emission using a box model of electron acceleration in an effort to investiage the links between electron acceleration and flaring. These simulations can provide a set of parameters for the emission region which should provide insight into the nature of blazar variability and the viability of various acceleration mechanisms.
Presenter: R.J. Protheroe

P40: **Quasar Structure**

David Floyd[1], Andrea Ruff[2], Rachel Webster[2]
[1]*Monash University*
[2]*University of Melbourne*

We highlight recent advances in Gravitational Microlensing and Photoionization modelling that are beginning to resolve the structure and physics of the central engine in quasars. While quasar accretion disks and broad line regions will remain well beyond the resolution limits of our telescopes for the foreseeable future, microlensing provides us with effective resolutions $\sim \mu$-arcseconds, sufficient to study their structure. New photoionization modelling that fully accounts for the structure of the hydrogen atom allows individual quasar spectra to place strong constraints on the physical conditions in their broad line regions. We present application of these methods to IRTF, Gemini and VLT spectra.
Presenter: David Floyd

P41: **The Contribution of X/Ka-band VLBI to Multi-wavelength Celestial Frame Studies**

S. Horiuchi[1], C. Garcia-Miro[2], I. Sotuela[2], C.S. Jacobs[3], J.E. Clark[3], O.J. Sovers[3]
[1]*CDSCC/CASS/CSIRO*
[2]*MDSCC/INSA*
[3]*JPL/Caltech/NASA*

We report the results of VLBI astrometry using NASA's Deep Space Network at X/Ka-band (3.6/0.9cm, 8.4/32 GHz). We detected 459 quasars with current accuracy of 200-300 μas. More than 300 of our sources should also be detectable by Gaia (V$<$ 20 mag). A covariance study using the existing X/Ka radio data and simulated Gaia uncertainties for the 300+ objects shows that a frame tie could be made with a precision of 10-15 μas (1-sigma) for each of the three rotation parameters with the potential for 5 μas precision if our error budget reduction plan succeeds. The characterization of wavelength dependent systematic errors from extended source morphology and core shift should benefit greatly from adding X/Ka-band measurements to existing and planned S/X-band measurements thus helping to constrain astrophysical models of the wavelength dependence of photocenter positions.
Presenter: Shinji Horiuchi

P42: **Luminosity Distributions of Radio Quiet Quasars: Stacking in the ECDF-S**

G.A. Rees[1,2], R.P. Norris[2], A.M. Hopkins[3]
[1]*CSIRO Australia Telescope National Facility, PO Box 76, Epping, NSW, Australia*
[2]*Centre for Astrophysics Research, Science and Technology Research Institute, University of Hertfordshire, AL10 9AB, UK*
[3]*Australian Astronomical Observatory, PO Box 296, Epping, NSW 1710, Australia*

We are attempting to measure the radio luminosity distribution of radio-quiet Quasars by stacking optically selected Quasars in the ECDF-S. Current distribution models are severely hampered by the sensitivity limits of modern telescopes and as such do not accurately represent lower energy sources. "Mean Stacking" is a process by which sources with accurate positions in one frequency regime can be studied (in aggregate) at another, despite being individually below detection. Using this we are able to determine the average luminosity of Radio Quiet Quasars, calculate their average luminosity at 3 different redshifts, investigate the optical to radio ratios in the micro-Jansky regime and utilise Monte Carlo simulations to determine which of the several proposed luminosity distributions best models the observed data. Finally we investigate several different methods of masking bright sources with the aim of ending their tyrannical rule over mean stacked images.
Presenter: Glen Rees (S)

P43: **What have we learned from interstellar scintillation of quasars?**

H. Bignall[1], J.Y. Koay[1], J.-P. Macquart[1], B.J. Rickett[2], J.E. J. Lovell[3], C. Reynolds[1], D.L. Jauncey[4,5], T. Pursimo[6], L. Kedziora-Chudczer[7], and R. Ojha[8]
[1] *ICRAR/Curtin University*
[2] *University of California, San Diego*
[3] *University of Tasmania*
[4] *CSIRO Astronomy and Space Science*
[5] *Mount Stromlo Observatory*
[6] *Nordic Optical Telescope*
[7] *University of New South Wales*
[8] *NASA Goddard Space Flight Center*

Our understanding of short timescale (hours to days), centimetre-wavelength flux density variability of compact extragalactic radio sources has come a long way since its discovery in the 1980s. The MASIV VLA Survey showed that the occurrence of short timescale variability is linked to the overall distribution of the ionised Galactic interstellar medium (ISM), although in the most extreme cases, scintillation-induced variability is strongly influenced by small-scale structure in the ISM. MASIV and subsequent follow-up observations demonstrated that interstellar scintillation (ISS) is also strongly dependent on source properties, with more compact, inverted-spectrum sources showing larger ISS. ISS provides a means of studying the highest brightness temperature components of quasars, frequency-dependent ”core-shifts”, polarisation structure, and angular size as a function of redshift, with resolution almost two orders of magnitude higher than achievable with VLBI. I will summarise recent results and discuss prospects, and reasons, for undertaking future surveys in this field.
Presenter: Hayley Bignall

P44: **Interaction of the radio galaxy Hydra A with the cluster environment**

Mohammad Ali Nawaz, Geoff Bicknell, Alex Wagner
The Australian National University

We have used the FLASH code with adaptive mesh refinement to conduct 3D simulations of a jet and its associated lobe interacting with the hot intracluster medium. Our purpose in conducting these simulations is to model the radio and X-ray structure of the radio galaxy Hydra A. We establish the parameter of the intracluster medium and jet, using the Chandra X-ray observations of McNamara et al. (2000) and a bubble model of the middle lobe combined with the radio data of Taylor et al. (1990) to estimate the jet energy flux. Our simulations reproduce three significant features of Hydra A: (1) Formation of a shock front in the cluster atmosphere (2) The turbulent transition between the jet and the plume approximately 20 kpc from the core and (3) The low frequency extent of the radio source transverse to the jet.
Presenter: Mohammad Ali Nawaz (S)

P45: **Thermal Constraints on Hydrogen Reionisation**

S. Raskutti[1], James Bolton[1], Stuart Wyithe[1], George Becker[2]
[1] *University of Melbourne*
[2] *Kavli Institute for Cosmology, Cambridge*

New and upcoming measurements of high-redshift quasars represent a unique probe of the reionisation epoch. In particular, observations of IGM temperature around such quasars will provide powerful constraints on the evolutionary history of neutral hydrogen, due to the thermal imprint left by photoionisation. We use the first direct measurement of IGM temperature in a quasar proximity zone at $z \sim 6$ to establish new constraints on the redshift at which hydrogen reionisation completed. Using a semi-numerical model, we compute the spatially inhomogeneous temperature distribution at z = 6 for a variety of reionisation scenarios. Under suitable assumptions for the ionising spectra of stellar and quasar sources, we infer reionisation to be complete to by $z < 8.5$ (10.3) at 68 (95) per cent confidence. The constraints obtained from our approach will be significantly improved by forthcoming observations of distant quasars.
Presenter: Sudhir Raskutti (S)

P46: **Still RAVEing**

Fred Watson[1] and the RAVE collaboration
[1]*Australian Astronomical Observatory*

For the past five years, the Australian Astronomical Observatory's UK Schmidt Telescope has been devoted to data acquisition for the RAVE project using the 6dF multi-object spectroscopy system. RAVE (RAdial Velocity Experiment) is a 9-nation collaboration that was set up to generate an archive of stellar radial velocities and atmospheric parameters for more than half a million southern hemisphere stars with $\mathrm{I} > 9$. That target is now close to being reached, and a significant range of science outcomes is beginning to appear. This talk presents an overview of the project, an update on progress, and some recent science results.
Presenter: Fred Watson

P47: **The HAT-South Survey**

D. Bayliss[1], G. Zhou[1], B. Schmidt[1]
[1]*Australian National University*

The HAT-South survey is a multi-site, wide-field, r-band optical survey designed to discover transiting planets around bright (V=11-15) southern stars. We currently have over half a million science frames, and these have been used to produce high cadence (4.5min) light-curves. Candidates with light-curves showing possible planet transits have been selected for further spectroscopic and photometric follow-up. In this talk we will present an overview of the survey, focusing in particular on the image characteristics, the precise relative photometry, and the follow-up work which is being carried out in Australia.
Presenter: Daniel Bayliss

P48: **A 2 micron sky survey beyond VISTA**

J. Mould
Swinburne University

In the era of JWST a survey telescope with near infrared capability and high angular resolution will be greatly sought after. This may be a role for a 2 metre telescope on the antarctic plateau.
Presenter: Jeremy Mould

P49: **The Laser Tomography Adaptive Optics System of the Giant Magellan Telescope**

R. Conan[1], B. Espeland[1], M. Van Dam[2], A. Bouchez[3]
[1]*RSAA - ANU , Australia*
[2]*Flat Wavefronts, Christchurch, New Zealand*
[3]*Giant Magellan Telescope, Pasadena, USA*

The Laser Tomography Adaptive Optics (LTAO) system of the Giant Magellan Telescope (GMT) is currently in its Preliminary Design phase. The system design goal is to deliver at K band at least 50% ensquared energy in 50 milliarcsecond squared over 80% of the sky and to achieve better than 20% Strehl ratio in J band over 60% of the sky. To reach these performance, the LTAO system will use 6 Laser guide stars (LGS) evenly located on a 30 arcsec ring centered on the science target. The measurements from the 6 Sodium LGS Shack–Hartmann wavefront sensors will drive the adaptive secondary mirror which actuator motion are derived from a minimum–mean square error tomographic reconstructor. A single infrared tip–tilt star will provide the science target tip–tilt correction. A dedicated deformable mirror in the tip–tilt path will correct the tip–tilt star wavefront aberrations. In addition to the tip–tilt sensor, a focus wavefront sensor combined with a zoom optics will keep the telescope focused on the mean altitude of the sodium layer and a high order wavefront sensor will track the so–called LGS aberrations and the system quasi static aberrations.
Presenter: Rodolphe Conan

P49b: **A Radio-Continuum study at 20 cm of the nearby Spiral Galaxy M31.**

T. Galvin[1], M. Filipovic[1]
[1] *School of Computing and Mathematics, Uni. Western Sydney*

At approximately 780 kpc away, M31, the closest spiral type galaxy to our own, is the largest galaxy within the Local Group. This is rather advantageous, at such a close distance allows for this galaxy to be intimately examined and studied. A number of previous studies focusing on M31 utilized the Very Large Array (VLA), located in Socorro County, New Mexico, USA, as their primary instrument. However, these past radio-continuum studies of M31 suffer from either low resolution, poor sensitivity or a combination of both. Prior to the use of next generation radio-telescopes, such as the ASKAP, MEERCAT and SKA, a large number of existing radio observation data focusing on M31 can be combined. In this project, we re-examine a number of archived radio-continuum observations performed the Very Large Array (VLA) at 20cm (1.4GHz) with the intention of merging all these observations to form a single radio-continuum image. In order to produce a high-resolution and highly sensitive image of M31, a collection of VLA observations will be used. These observations will be identified and obtained using the National Radio Astronomy Observatory (NRAO) Science Data Archive. The MIRIAD, AIPS and KARMA software packages will be used for data reduction, imaging and analysis. Due to the large volume of VLA observation data which will be used, the MIRIAD package was compiled to run on a 16-processor computer system in order to enhance performance. A series of mosaic images will be created using the collected VLA observations. Due to the varied array configurations used throughout the collection of observations, the final set of mosaic images produced will possess both a higher resolution and sensitivity, and have improved inner uv-coverage when compared to previous radio-continuum studies. Using these mosaic images, a list of potential sources within M31 will be created. This list will describe a particular sources Right Accession and Declination values from a J2000 referencing frame and integrated flux levels in terms of mJy. Where possible these sources will be compared to those found in previous studies, and differences will be discussed.

Presenter: Timothy Galvin (S)

P50: **The technical capabilities of the HERMES spectrograph for the AAT**

J. Heijmans
AAO

The AAO is building a High Efficiency and Resolution Multi Element Spectrograph (HERMES). The primary HERMES science project is the 'Galactic Archaeology' (GA) Survey. HERMES is a cutting-edge instrument, aiming to produce high-resolution (28,000 or 50,000) spectra of a large number of target objects simultaneously. This brings its design close to the limits of the state of the art, particularly with available grating technology. HERMES will work with the 2dF fibre positioner and work in parallel with the existing spectrograph AAOmega. HERMES has past its final design review in December 2010 and is planned for arrival at the AAT telescope early 2013. An overview will be given of its capabilities.

Presenter: Jeroen Heijmans

P51: **Exploration of integrated photonic lanterns fabricated by femtosecond laser inscription**

I. Spaleniak[1,3], N. Jovanovic[1,3], S. Gross[1], M. Ireland[1,3], J. Lawrence[1,3] and M. Withford[2,3]
[1] *Macquarie University*
[2] *Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS)*
[3] *Australian Astronomical Observatory (AAO)*

We present the concept and a summary of the characterization of a prototype of integrated multimode to single-mode light converters (photonic lanterns) fabricated by femtosecond laser inscription. Astronomers have been using multimode fibres for many years to transport or to reformat light from the telescope focus to instruments. All fibre fed spectrographs used in astronomy so far work only with multimode fibre inputs and employ macroscopic optics – they are thus bulky, expensive, and not readily scalable. Technologies for miniaturisation offer the potential to revolutionise spectrograph capabilities, with integrated photonics showing great promise. They require, though, light input from a single-mode optical fibre. Therefore, a device that converts a multimode fibre core into a compact array, single-mode in at least the dispersion direction, would have major implications for astronomy.

Presenter: Izabela Spaleniak (S)

P52: **GNOSIS - an operational fibre Bragg grating OH suppression system at the AAT**

A.J Horton[1], J.S. Lawrence[1,2], S.C. Ellis[1], J. Bland-Hawthorn[3], J. Bryant[3], S. Case[1], L. Gers[1], R. Haynes[4], S. Lee[1], S. Leon-Saval[3], H. Loehmannsroeben[4], S. Miziarski[1], J. Tims[1], J. O'Byrne[3], W. Rambold[4], M. Roth[4], S. Smedley[1], C. Trinh[3]

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[3] *University of Sydney*

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Fibre Bragg grating (FBG) OH suppression employs photonic technologies to efficiently and effectively suppress OH airglow lines at high resolution before they enter a spectrograph and thereby greatly reduce the scattered airglow which otherwise dominates the observed interline background. As a result it has the potential to dramatically improve the sensitivity of ground based near-infrared spectroscopy. GNOSIS is a pathfinder facility intended to demonstrate these sensitivity gains by performing the first scientific observations to use FBG OH suppression. The initial implementation of GNOSIS consists of a 7 element IFU/image slicer with a 1.2 arcsec field of view, an H-band OH suppression unit which filters out 103 OH doublets over 1.47–1.70 microns and an interface to the existing IRIS2 spectrograph. GNOSIS has recently been commissioned at the Anglo-Australian Telescope and science observations are scheduled to commence at the start of July. We describe the GNOSIS system and present early on-sky results.

Presenter: Dr Anthony Horton

P53: **HERMES VPH design and guidelines for future science cases**

Luke Gers

Australian Astronomical Observatory

The AAO is building a 4-channel VPH-grating High Efficiency and Resolution Multi Element Spectrograph (HERMES). HERMES will provide a nominal spectral resolving power of 28,000 for Galactic Archaeology with an optional high-resolution mode of 45,000 with the use of a slit mask. The opto-mechanical design of HERMES allows for upgrades of the VPH gratings for scientists to pursue other spectral bands of interest from 370 nm to 1000 nm. An overview of the current HERMES VPH grating design as well as design requirements and tolerances for future VPH gratings is presented.

Presenter: Jeroen Heijmans

P54: **i-INSPIRE (initial - INtegrated SPectrograph, Imager and Radiation Explorer): The beginning of Australian space-based instrumentation.**

Christopher Betters[1], Prof. Joss Bland-Hawthorn[1], Prof. Iver Cairns[1], Dr Xiaofeng Wu[2], Dr Lisa Fogarty[1], Jiro Funamoto[1,2], Dr Sergio Leon-Saval[1], Dr Tony Monger[1].

[1] *School of Physics, University of Sydney*

[2] *Aerospace, Mechanical, and Mechatronic Engineering, University of Sydney*

The i-INSPIRE (initial - INtegrated SPectrograph, Imager and Radiation Explorer) picosatellite is intended to be Australia's first University satellite to be launched and operated in space. It will carry a novel photonics-based spectrograph (NanoSpec), an imaging camera, and a radiation counter. The i-INSPIRE project has both engineering/technological and scientific goals. Technological goals include the designing, building, testing, integration, launching, and successful operation in space of the i-INSPIRE satellite and onboard instruments. The primary scientific goals of the satellite are: (1) Analysing the first spectra from a space-borne, photonics-based spectrograph to identifying features related to the Earth, Sun and the effects of radiation events; (2) Obtaining radiation maps of the Earth to compare with space weather events and spectrograph data. In this poster we will review the design and goals of each instrument and the spacecraft.

Presenter: Christopher Betters (S)

P55: **Liquid Atmospheric Dispersion Corrector**

Jessica Zheng[1], Florent Bastien[1], Will Saunders[1], Guy Monnet[1] and Jon Lawrence[1]
[1] *Australian Astronomical Observatory*

A liquid atmospheric dispersion corrector (LADC) is investigated to compensate the atmospheric dispersion for modern extreme large telescopes. Unlike traditional dispersion corrector with two or more thin glass prisms, the LADC uses a pair of immiscible liquids in a small glass container and can be placed very close to the telescope focal plane. A pair of liquid prisms is formed within the glass cell and their interface varies according to telescope's zenith because of gravity. Therefore, the LADC is an adaptive device and can correct atmospheric dispersion automatically. However, suitable liquids have to meet some specific requirements, making them difficult to find. In this work, we first identified two pair of liquids, and experimentally verified their transparency, dispersion, immiscibility and some other physical properties. A LADC has since been set up with a pair of liquids, namely methanol and laser oil. It is demonstrated that the LADC works well theoretically and experimentally.
Presenter: Jessica Zheng

P56: **Putting the SCOPE engine to work with spectroscopic surveys**

A. Casey[1], S. Keller[1]
[1] *The Australian National University*

The coming decade will see a series of massive spectroscopic surveys with increasing complexity. Surveys such as the HERMES Galactic Archaeology program on the AAT will survey the abundances of up to 25 elements in 1.2 million stars. Automation of spectroscopic analysis is essential to match such a volume of data. This transition from single chi-by-eye measurements must be graceful, reduce systematic errors and ensure reproducible results. The Spectral Comparison and Parameter Evaluation (SCOPE) engine compares spectroscopic observations against large grids of synthetic spectra with defined parameters or observed standards with established parameters. To yield the best fitting parameters, a suite of optimisation algorithms and solution techniques are available which quickly minimise the χ^2 difference between the observed spectra and the comparison grid points. SCOPE incorporates the spectrum synthesis package MOOG for stellar spectra to verify that derived! parameters (T_{eff}, $\log g$, [Fe/H], [α/Fe], k, $v \sin i$ and abundance ratios) are consistent with local thermal equilibrium assumptions. As SCOPE iteratively converges to a solution, every aspect of introspective analysis and data visualisation is available in real time over the web. SCOPE is designed to consecutively prioritise accuracy, robustness and speed, and is readily applicable to high-volume survey data. We welcome the opportunity for collaborative testing.
Presenter: Andy Casey (S)

P57: **Resolving Short Timescale Astronomy using Fibre Bragg Gratings**

Geraldine Mariën[1,4], Nick Cvetojevic[1,4], Nemanja Jovanovic[1,2,4], Judith Dawes[1,4], Roger Haynes[3], Jon Lawrence[1,2], Quentin Parker[1,2], Michael J. Withford[1,4],
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Short timescale astronomy looks at astrophysical phenomena showing spectral variability on very short timescales. Fibre Bragg gratings enable a spectral variation in the stellar target to be converted into a photometric one at the detector, allowing for short timescale variations to be resolved. Fibre Bragg grating based technologies promise to surpass current astronomical instrumentation in reaching faster observations with a smaller and simpler instrument. The different possible uses of fibre Bragg gratings are presented for the detailed observation of several specific astronomical targets.
Presenter: Geraldine Marien (S)

P58: **Single-Mode Precision Spectroscopy in Astronomy**

M. Ireland[1,2]
[1]*Astronomy, Astrophysics and Astrophotonics Research Center, Macquarie University, NSW 2109, Australia*
[2]*Australian Astronomical Observatory, PO Box 296, Epping, NSW 1710, Australia*

The cost and complexity of astronomical spectrographs have long been known to increase substantially with the slit size, which scales with telescope size. The smallest possible spectrograph for a given spectral resolution is a single-mode spectrograph, where the ”slit” is single-mode in the spectral direction. Where the goal of spectroscopy is precision radial velocity, a single-mode spectrograph has the additional goal of having an intrinsically stable PSF. I will describe efforts to create a single-mode high-resolution spectrograph for small telescopes, including an affordable calibration unit. This will be used to jointly study asteroseismology and extrasolar planets, with the aim of finding planets amidst the noise of their dying stars.
Presenter: Michael Ireland

P59: **Starbugs: parallel fibre positioning technology**

M. Goodwin[1], J. Gilbert[1], J. Heijmans[1], S Miziarski [1], R. Mueller[1]
[1]*Australian Astronomical Observatory*

Starbugs is an ongoing technology R&D project at the AAO to demonstrate parallel fibre positioning technology to feed multi-object spectrographs. Starbugs are miniaturized robotic devices that can accurately ’discrete step’ over large area focal surfaces to position payloads, such as multi-IFUs. The Starbugs concept overcomes the limitations inherent with all traditional ’pick and place’ methods where a robot places fixed buttons onto the field plate one-by-one in turn. Starbugs significantly reduces the field configuration time and is relatively unaffected with increasing number of targets. Starbugs technology is a key component for the MANIFEST concept for the GMT. Progress has been demonstrated with the recent development of a laboratory demonstrator for a multiple Starbug system. In this presentation I will describe the progress of the Starbugs R&D project.
Presenter: Michael Goodwin

Abstracts: Posters 60 - 127 Rumours Room, Level 6

P60: **A New Magnetar Candidate Located Outside the Galactic Plane**

J. Callingham[1], S. Farrell[1], B. Gaensler[1], G. Lewis[1]
[1] *The University of Sydney*

Magnetars are believed to be neutron stars with surface magnetic field strengths $>$ 1E13 G. There are currently only 16 confirmed members of this class, with an additional 5 candidates. While two magnetars are located in the Magellanic Clouds, the remaining objects are all within the Galactic plane. The association of a number of magnetars with supernova remnants has led to the conclusion that they are all young objects ($<$ 10,000 years old) with low spatial velocities ($<$ 500 km/s), consistent with the low Galactic latitudes. We have recently discovered a new transient magnetar candidate in archival XMM-Newton data that is located $\sim$20 deg off the plane. The transient behaviour, X-ray spectrum, and lack of an optical counterpart lead us to conclude that it is most likely a new member of the magnetar class. A run away progenitor star that wandered outside the plane could explain the high Galactic latitude.

Presenter: Sean Farrell

P61: **Discovery of the New Gamma-ray Binary 1FGL J1018.6-5856**

R.H.D. Corbet[1] on behalf of the LAT collaboration, M.J. Coe [2], P.G. Edwards[3], M.D. Filipovic[4], J.L. Payne[4], J. Stevens[3], M.A.P. Torres[5]
[1] *University of Maryland, Baltimore County, NASA GSFC*
[2] *University of Southampton*
[3] *CSIRO Astronomy & Space Science*
[4] *University of Western Sydney*
[5] *SRON/CfA*

We present the discovery of a new gamma-ray binary system from the search for periodic modulation in the Fermi LAT light curves of all sources in the first Fermi-LAT catalog. 1FGL J1018.6-5856 was found to have a 16.6 day modulation in its gamma-ray flux that is accompanied by spectral variability. We have identified counterparts in the X-ray, radio, and optical wavebands, and their features will be described. The overall properties of 1FGL J1018.6-5856 indicate that it is a member of the (currently) rare gamma-ray binary class of objects, and that although it shares several properties with LS 5039 there are also some significant differences. The similarities and differences will allow us to develop our understanding of the astrophysics involved in these enigmatic objects.

Presenter: Philip Edwards

P62: **Asteroids around Neutron Stars: Evidence from a Millisecond Pulsar and Implications for Precision Pulsar Timing**

Ryan Shannon
CSIRO Astronomy and Space Science

Pulsar timing measurements have revealed companions to neutron stars that include other neutron stars, white dwarfs, main-sequence stars, and planets. We demonstrate that the correlated and apparently stochastic residual times of arrival from the millisecond pulsar B1937+21 are consistent with the signature of an asteroid belt having a total mass $\lesssim$ 0.05 $M_{\oplus}$. Unlike the solar system asteroid belt, the best fit pulsar asteroid belt extends over a wide range of radii, consistent with the absence of any shepherding companions. We suggest that any pulsar that has undergone accretion-driven spin-up and subsequently eliminated its companion may have timing precision limited by debris fragments. Millisecond pulsars with white dwarf companions are expected to have better timing precision, all else being equal, because the binary clears smaller objects out of a gap. Observational tests of this model include searches for periodicities from individual asteroids, which are difficult, and tests for statistical stationarity that become possible when further timing data accrue. Timing noise associated with asteroid belts may fundamentally limit the timing precision of some millisecond pulsars.

Presenter: Ryan Shannon

P64: **Expanding Atmospheres on Accreting Neutron Stars**

Hauke Worpel[1], Duncan Galloway[1], Daniel Price[1]
[1]*Monash University*

Thermonuclear (Type-I) X-ray bursts are caused by the sudden, unstable ignition of material accreted from a companion on the surface of a neutron star. Photospheric radius expansion (PRE) bursts are a subset of Type-I X-ray bursts in which the luminosity reaches the Eddington limit, causing the accreted atmosphere to be temporarily lifted from the surface to several times the neutron star's radius. Since the Eddington limit depends upon the mass and radius of the neutron star, careful observations during these events can place constraints on the equation of state of neutron star interiors and yield insights into properties of matter at super-nuclear densities. The usual blackbody models have limited success at describing the spectrum at the peak of the radius expansion. I discuss my approaches to selecting and fitting more refined models, and outline plans for computer simulations of bursting neutron stars that will provide theoretical spectra for this purpose.
Presenter: Hauke Worpel (S)

P65: **Orbital constraints for the High Mass X-ray Binray XTE J0658-073**

D.Kleiner[1], D.Galloway[1]
[1]*Monash University*

High mass X-ray Binaries (HMXB) are gravitationally bound systems containing a compact object (often a neutron star) and a young supergiant/giant mass donor. Neutron stars are known for their extreme densities and magnetic fields. HMXB's allow us to observe young neutron stars undergoing dynamical evolution. A detailed timing analysis has produced preliminary orbital constraints for the HMXB XTE J0658-073. The first outburst was detected in November 2003 and a series of 4 smaller outbursts was observed in November 2007. Due to the spacing of the outbursts it's believed that the orbital period is $\sim$ 105 days and potentially associated with periastron passage. From the orbital period the projected semi-major axis has an upper limit of 300 ls. The spin down rate between the first two outbursts was found to be $\sim$ 4 x 10^{-14} Hz/s and the the e-folding time for the first outburst was found to be 19 days.
Presenter: Dane Kleiner

P66: **Are two of the Neptune Trojans dynamically unstable?**

J. Horner[1], P.S. Lykawka[2]
[1]*University of New South Wales*
[2]*Kinki University, Osaka, Japan*

The Neptunian Trojans represent the most recently discovered addition to the enagerie of stable small body reservoirs in the Solar system. As such, they represent an unparalleled opportunity for astronomers to directly test models of planetary formation. But are the seven known members of the population truly dynamically stable? In this work, we present the results of highly detailed dynamical simulations of two of the Neptunian Trojans, namely 2001 QR322 (the first to be found at the Neptunian L4 Lagrange point) and 2008 LC18 (the first to be found at the Neptunian L5 Lagrange point). Our results suggest that these objects display dynamical instability on gigayear timescales, and that the Neptune Trojans might therefore contribute a significant amount of material to the dynamically unstable Centaur population, the origin of which remains the subject of intense debate.
Presenter: Dr. Jonathan Horner

P67: **A search for Doppler imaging targets using the ANU 2.3m telescope.**

D.M. Burton[1], B.D. Carter[1], G. De Silva[2], S.C. Marsden[3], I.A. Waite[1]
[1]*University of Southern Queensland*
[2]*Australian Astronomical Observatory*
[3]*James Cook University*

Observations and theory both indicate that magnetic fields play an important role in the early evolution of solar-type stars, but our knowledge of the physical processes involved is hampered by a lack of empirical information. As part of ongoing efforts to use Doppler Imaging (DI) to detail the early magnetic histories of the Sun and solar-type stars, we present the results of a high-resolution spectroscopic survey of young sun-like stars looking for potential DI targets. Our observational survey of some 250 stars was carried out on the 2.3m ANU telescope and its echelle spectrograph at Siding Spring between August 2008 and April 2011, and has identified several potential new targets for DI, with HIP2729 and HIP108422 the most outstanding. Thus, it should be possible to use the 2.3m telescope to Doppler Image young Suns, to clarify the early evolutionary history of dynamos in the Sun and similar stars.
Presenter: Donna Burton (S)

P68: **Estimating spin-orbit alignment of transiting planetary systems by observing the RM effect**

Brett Addison[1] and Chris Tinney[1]
[1] *Department of Astrophysics and Optics, School of Physics, Faculty of Science, University of New South Wales, Sydney, Australia*

Over 500 extrasolar planets have been discovered (exoplanet.eu) over the last 15 years. Many more will be discovered in the next few years from Kepler and other planet finding missions. In addition to discovering new extrasolar planets, a detailed analysis of their structure, composition, and other bulk properties is also needed in order to gain an understanding of the processes involved in the formation of planets in other systems as well as in our own solar system. The Exoplanetary Science group at UNSW is commissioning a Cassegrain-fed optical-fibre bundle spectrograph called Cyclops at the Anglo-Australian Telescope (AAT) to carry out Doppler spectroscopy of transiting planet candidate stars arising from Southern Hemisphere transit searches. In addition, our team will carry out measurements of the Rossiter-McLaughlin (RM) effect in transiting exoplanets in order to obtain their orbital characteristics. This will allow us to better understand the processes behind planetary formation and migration.
Presenter: Brett Addison (S)

P69: **The curious case of HU Aquarii**

J. Horner[1], J. Marshall[2], R. Wittenmyer[1], C. Tinney[1]
[1] *University of New South Wales*
[2] *Universidad Autónoma de Madrid, Spain*

In early 2011, the surprising discovery of two planets orbiting the eclipsing polar HU Aquarii was announced. We present a detailed dynamical study of the orbital stability of the HU Aquarii planetary system, revealing that the proposed planetary orbits are highly dynamically unstable. In order for the planets to be dynamically stable on timescales greater than $\sim$10000 years, they must move on significantly different orbits than were suggested in the discovery work. In fact, unless the orbit of the outer planet is inclined by 180 degrees to that of the innermost, we find that it must instead orbit well beyond the 1-sigma uncertainties stated in that work if the system is to remain stable over even moderate timescales. This suggests that the HU Aquarii planetary system is either more complicated or significantly different to that proposed, or that it is currently undergoing a significant dynamical destabilisation.
Presenter: Dr. Jonathan Horner

P70: **Following-up HAT-South Planet Candidates with WiFeS**

Y. Zhou[1], D. Bayliss[1]
[1] *Research School of Astronomy and Astrophysics, Australian National University*

The HAT-South project is a large southern hemisphere survey for transiting exoplanets. So far, the survey has identified more than a hundred exoplanet candidates, all of which will require extensive follow-up observations. We use the Wide Field Spectrograph (WiFeS) on the ANU 2.3m telescope to obtain multi-epoch radial velocity measurements at 2km/s precision. 40 candidates have been followed-up so far, of which 30% show large amplitude (K$>$10km/s) radial velocity variations, in phase with transit ephemeris, which indicate the candidate is an eclipsing binary rather than a transiting planet. We here present the details of the WiFeS radial velocity pipeline that performs data reduction and radial velocity cross-correlation in near real time. This capability allows us to make adjustments to the priorities of candidates during an observing run, and rapidly identify the candidates that require high precision radial velocity measurements on other instruments.
Presenter: Y. Zhou (S)

P71: **Jupiter - Friend or Foe? An answer...**

J. Horner[1], B. W. Jones[2]
[1] *University of New South Wales*
[2] *The Open University, United Kingdom*

It has long been believed that the planet Jupiter has played an important role in the development of life on Earth. Without the particular size and placement of Jupiter, it is argued, the Earth would have experienced a greatly enhanced flux of impacts from asteroids and comets, hindering or entirely preventing the development of life. Despite the vigour with which this belief is held, very little work has been performed to examine the effect of Jupiter on the terrestrial impact flux. We have now completed the first detailed study on the effect of Jupiter's mass on the impact rate of the three types of potentially hazardous objects - the Near Earth Asteroids, the Short Period Comets, and the Long Period Comets, and have found that the situation is, at the very least, significantly more complicated than was previously thought.
Presenter: Dr. Jonathan Horner

P72: **Probability of Capture of Irregular Satellites via Collisions Around the Gas Giant Planets as a Function of the Minimum Mass Solar Nebula**

F.E. Koch[1], B. Hansen[2]
[1] *UNSW School of Physics*
[2] *UCLA Department of Physics and Astronomy*

We investigated the probability that an inelastic collision of planetesimals within the Hill sphere of the Jovian planets could explain the presence and orbits of observed irregular satellites. Capture of satellites via this mechanism is highly dependent on not only the mass of the protoplanetary disk, but also the shape of the planetesimal size distribution. We performed 2000 simulations for integrated time intervals $\sim$ 2 Myr and found that, given the currently accepted value for the minimum mass solar nebula and planetesimal number density based upon the Bottke (2010b) size distribution $dN \sim D^{-1.8}dD$, the collision rates for the different Jovian planets range between $\sim$ 60 and $\gtrsim$ 10^3 Myr^{-1}. Additionally, we found that the probability that these collisions remove enough orbital energy to yield a bound orbit was $\lesssim 10^{-5}$ and had very little dependence on the relative size of the planetesimals. Of these collisions, the collision energy between two objects was $\gtrsim 10^3$ times the gravitational binding energy for objects with radii $\sim$ 100 km. We find that, capturing irregular satellites via collisions between unbound objects can only account for $\sim$ 0.1% of the observed population, hence can not be the sole method of producing irregular satellites.
Presenter: F.E. Koch

P73: **Strange Tails of Distant Comets**

P Francis
ANU

Long period comets are surrounded by remarkable amounts of dust even when far from the Sun, when they should be frozen solid and ejecting nothing. I attemped to study this by observing the largest ever sample of distant comets with Gemini and the SSO 2.3m telescope. Rather than helping solve this puzzle, my observations have made it worse - it turns out that the comet tails point systematically in the wrong directions and have the wrong shapes. It seems that distant comets actually fall into two quite distinct classes. In one class, dust grains are spun off the surface of the rotating nucleus, like dirt from a frisbee. In the second class, dust grains escape much faster. It seems that coming within the asteroid belt changes the first type of comets into the second, and that the change is permanent. Why this happens is still a mystery.
Presenter: Paul Francis

P74: **The Future of Exoplanetary Science in Australia**

C.G.Tinney
University of NSW

Exoplanetary science is without a doubt the fastest growing research area in astrophysics. Both the recent US and Australian Decadal surveys have led their research agendas with a significant emphasis on the science of how (and how often) planetary systems form. Australia has traditionally been a minor player in the field of planetary science, but has a rapidly growing research community in this new field of **exoplanetary** science. New instruments and new instrumentation technologies are needed to propel this field over the coming decade. Fortunately, Australia is well placed to play a key role in this endeavour.
Presenter: Chris Tinney

P75: **Tidal capture and synchronisation in giants with planetary and stellar companions**

N. Madappattu Alikutty[1,2], O. De Marco[1], M. Wardle[1]
[1] *Macquarie University*
[2] *AAO*

Tides increase the orbital separation out to which companions can be captured by evolving, expanding giant stars. The farthest companions can be captured the largest the number of interacting binaries and common envelope interactions that take place. Tidal capture prescriptions are used by population synthesis models to predict the birthrate of evolved compact binaries such as type Ia supernova progenitors. We study the evolution of the orbit of companions with mass ranging from 0.001 to 1 $M_\odot$ as the primary star evolves during the red giant branch phase, horizontal branch phase and during the thermal pulses in the asymptotic giant branch phase. The stellar models are calculated using the recent detailed stellar evolution code MESA (Paxton et al. 2010). We present a prescription for the capture radius and capture timescales, including the effect of synchronisation and a non constant tidal strength (f) parameter.
Presenter: Mr.Niyas Madappattu Alikutty (S)

P76: **The hunt for the binary fraction**

D. Douchin[1], O. De Marco[1], D. Frew[1], Q. Parker[1], G. Jasniewicz[2]
[1] *Macquarie University, NSW*
[2] *University of Montpellier II, France*

During the past 20 years, the idea that non-spherical planetary nebulae (PN) might need a binary or planetary interaction to be shaped was discussed by various authors. It has recently been generally agreed that the different shapes and structures observed in PN cannot be easily explained by single star evolution. This has promoted a renewed hunt for binary central stars of PN which has more than doubled the sample in the last 3 years. Thanks to these efforts, approximately 45 binary central star of PN have been detected. All of these are either very close binaries (periods less than a few days), detected via flux and radial velocity variability or visual binaries (periods of the order of thousands of years). To determine the binary fraction, and hence the importance of binarity in the formation and evolution of PN we have been searching for companions using the red and infrared excess technique aimed at detecting binaries at any separation. We confront our results so far with predictions of the current text book PN evolutionary scenario, as well as scenarios where PN are predominantly a binary phenomenon.
Presenter: Dimitri Douchin (S)

P77: **The Music of the Stars**

Emily Brunsden[1] [1]University of Canterbury

Astroseismology is the study of vibrational physics in stars. Gravity modes of pulsation in Gamma Doradus stars are of particular interest as they probe deep into the stellar interiors. We wish to further our understanding of these modes under the influence of stellar rotation. We present the mode identification of frequencies found in the slow-rotating star HD135825 from spectroscopic data. Furthermore, we present the frequencies found in a fast-rotating Gamma Doradus star HD12901. We make a preliminary comparison of spectroscopic detection of pulsations in slow and rapid rotating stars.
Presenter: Emily Brunsden (S)

P77b: **Studying gravity mode pulsations in gamma Doradus stars**

Matt Davie
University of Canterbury

The gravity modes (g-modes) present in gamma Doradus stars probe the deep stellar interiors and are thus of particular interest in asteroseismology. We obtain extensive single and multi-site spectra of gamma Dor stars (and other types of interesting pulsating stars). We cross-correlate the spectra with a template in order to obtain a high signal-to-noise line profile that is representative of the spectrum. Through Fourier analysis we derive the pulsational frequencies and identify these with pulsational modes excited in this star. These results may then be compared with theoretical models to place constraints on the stellar structure and physical conditions within the star. Presenter: Matt Davie (S)

P78: **First on-sky results from the Dragonfly instrument**

N. Jovanovic[1,2,3], B. Norris[4], P. G. Tuthill[4], S. Gross[1,5], P. Stewart[4], S. Lacour[6], M. Ams[1,5], N. Charles[4], J. Lawrence[1,2,3], G. Robertson[4],G. Marshall[1,5], M. Ireland[1,2,3], and M. Withford[1,5]
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[5] *Centre for Ultrahigh Bandwidth Devices for Optical Systems (CUDOS)*
[6] *Observatoire de Paris, 5 place Jules Janssen, Meudon, France*

Optical stellar interferometry techniques are extremely powerful for detecting and studying extra-solar planets for they promise both the resolution and fidelity to directly image faint companions in the immediate circumstellar environment. The incorporation of miniature photonic components into stellar interferometers promises to revolutionize the field with dramatic gains in simplicity and ease of alignment while delivering proven gains in signal-to-noise as a result of spatial filtering. We have exploited the technique of pupil remapping; a photonic reformulation of aperture masking developed for the Dragonfly instrument. In this paper we will present the results from the first commissioning run of the Dragonfly instrument on the Anglo-Australian Telescope (AAT) in late May 2011.
Presenter: Nemanja Jovanovic

P79: **Modelling the sunspot number with a Fokker-Planck equation.**

P.L. Noble[1], M.S. Wheatland[1]
[1] *The University of Sydney*

Sunspot numbers exhibit large short-timescale (daily-monthly) variation in addition to longer-timescale variation due to solar cycles. These large short-term fluctuations have important implications for Earth's local space weather. A formal statistical framework is presented for estimating and forecasting randomness in sunspot numbers on top of deterministic (including chaotic) models for the solar cycle. The Fokker-Planck approach formulated assumes a specified long-term or secular variation in sunspot number over an underlying solar cycle via a driver function. The model then describes the observed randomness in sunspot number on top of this driver. This framework should be particularly useful for solar cycle forecasters and is complementary to existing modelling techniques.
Presenter: Patrick Noble (S)

P80: **Sub-arcsecond Observations & Models of the DG Tauri Outflow**

Marc White[1], Peter McGregor[1], Geoff Bicknell[1], Raquel Salmeron
[1] *Research School of Astronomy and Astrophysics, the Australian National University*

The outflows commonly observed in young stellar objects are a crucial ingredient of the star formation process. We have obtained observations of the outflows from the T Tauri star DG Tauri over multiple epochs at sub-arcsecond resolution, using the NIFS instrument on Gemini North. These data show stationary and moving knots in the blueshifted outflows, as well as a range of edge-brightened structures. We have constructed analytical models in an attempt to understand these structures, using a statistical averaging approach from turbulent fluid mechanics. We find that the moving knots could be caused by variations in the jet launch velocity, while the edge-brightened structure may be due to the formation of a turbulent mixing layer along the jet boundary. These models provide useful information to upcoming detailed MHD simulations. My poster will present our observations, methodology and initial results.
Presenter: Marc White (S)

P81: **The planetary nebula – open cluster connection**

D.J. Frew[1], Q.A. Parker[1,2], P. Dobbie[2]
[1] *Macquarie University*
[2] *Australian Astronomical Observatory*

Planetary nebulae (PNe) are the short-lived shrouds of ionized gas ejected from AGB stars. Consequently, they are powerful probes of the chemical enrichment and mass-loss processes acting in intermediate mass stars. Recently, the first PN found to be a physical member of a Galactic open cluster was announced by our team. Hence, for the first time we can accurately estimate the mass of a PN progenitor star. We have discovered 4 additional promising PN/OC associations, including a very likely PN member of a young (60$\sim$Myr) cluster containing 2 cepheid variables. The progenitor of this PN must have had a mass of at least 6 $M_{\odot}$. Interestingly, all potential cluster PNe to date have bipolar morphologies and are strongly nitrogen enriched. Observations of their central stars will add valuable data to the initial-final mass relation for white dwarfs, while accurate elemental abundances of the nebular shells will allow confrontation with stellar evolution theory, providing empirical mass constraints on the occurrence of hot-bottom burning and dredge-up processes. Preliminary results will be presented.
Presenter: David Frew

P82: **The Sulfur Anomaly in Planetary Nebulae and Post-AGB Stars**

L. Shingles[1], A. Karakas[1]
[1] *Research School of Astronomy and Astrophysics, Australian National University*

In a sample of Galactic planetary nebulae (PNe) and H II regions, Henry et al. 2004 found that the PNe had systematically lower sulfur abundances when compared to H II regions with similar metallicity. More precise followup observations in the infrared have confirmed the existence of a 'sulfur anomaly', something which had not been predicted by theoretical models of the AGB stars that form PNe. My testing of a three solar mass AGB model has failed to show any evidence of sulfur depletion, even when the nuclear network is expanded to include many isotopes of Si, P, S, Cl, Ar, with reaction rates from three different sources and a range of widths for a partial mixing zone, which effectively controls rate of neutron captures. I have also made a comparison between the models' intershell abundances and observations of PG1159 type post-AGB stars whose surfaces are believed to exhibit intershell composition.
Presenter: Luke Shingles (S)

P83: **The radio evolution of Supernova 1987A**

G. Zanardo[1], L. Staveley-Smith[1], T.M. Potter[1], S. Tingay[2], C.-Y. Ng[3], B.M. Gaensler[4], A. Tzioumis[5], M.J. Kesteven[5].
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SN 1987A, a core-collapse supernova in the Large Magellanic Cloud, at a distance of 52 kpc was the nearest supernova observed in the last 400 years. Extensive monitoring observations of the supernova remnant (SNR) at 1.4, 2.4, 4.8 and 8.6 GHz with the Australia Telescope Compact Array (ATCA) have been ongoing since the first detection of the remnant in 1990. Recently, the analysis of ATCA monitoring data have been coupled with high-resolution observations via Very Long Baseline Interferometry (VLBI) with the Australian Long Baseline Array (LBA). While the ATCA observations are giving an insight at a macroscopic level into the evolving interactions of the shock wave with a denser circumstellar medium, the VLBI observations allow to investigate the radio emission from the small-scale features of the ring-like structure that characterizes the SNR in the equatorial plane.
Presenter: Giovanna Zanardo (S)

P84: **3D simulations of the hydrodynamics and radio emission from the expanding remnant of SN 1987A**

T. Potter[1], L. Staveley-Smith[1], D. Gertsmann[1], J.G. Kirk[2], B. Reville[3], G.V. Bicknell[4], R.S. Sutherland[4], A.Y. Wagner[4]
[1] *ICRAR/UWA*
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As the brightest supernova since 1604 supernova 1987A has been the most well studied, with long-term monitoring programs conducted at a variety of wavelengths ranging from radio to X-ray. Such a wealth of data provides a test laboratory for our understanding of the physics of particle acceleration in supernova remnants. I present three-dimensional hydrodynamical simulations of expanding remnant of SN 1987A. Semi-analytical models of diffusive shock acceleration are applied to the simulations and the resulting non-thermal emission is compared to Australia Telescope Compact Array and VLBI data. Model fits to the observed radius, morphology, and spectral index have the potential to provide new insights on longstanding questions surrounding SN1987A, such as the one-sidedness of the radio remnant and the morphology of the magnetic field.
Presenter: L.Staveley-Smith

P85: **Unveiling the real 3D shape of Young Supernova Remnants**

F. Vogt[1], Michael A. Dopita[1]
[1] *Mount Stromlo Observatory, The Australian National University*

We have used the Wide Field Spectrograph (WiFeS) on the 2.3m telescope at Siding Spring Observatory to map the [O III] λ5007 Ådynamics of the young oxygen-rich supernova remnants 1E0102.2-7219 and N132D, respectively located in the Small and Large Magellanic Clouds. From the resultant data cube, we have reconstructed the full 3D structure of the system of [O III] emitting filaments in those two supernova remnants (SNR) - an asymmetric bipolar structure in the case of 1E0102.2-7219, and a distorted ring for N132D. We used projections, interactive .pdf and stereo pairs to visualize the 3D structure of the ejecta. Those 3D maps especially lift up any uncertainties related to the actual shape of the ejecta, and give us clues regarding the SN explosion characteristics and the subsequent degree of interactions of the SNR with its environment - weak for 1E0102.2-7219, and strong for N132D.
Presenter: Frédéric Vogt (S)

P86: **Chandra X-Ray Observations of the HII Region G5.89-0.39 and TeV Gamma-Ray Source HESSJ1800-240B**

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[5] *http://www.mpi-hd.mpg.de/hfm/HESS/*

The TeV gamma-ray sources in the field of the old age ($> 10^4$yr) supernova remnant W28 present an opportunity to probe for a new type of multi-TeV particle accelerator, namely, HII regions. Our focus is on the TeV source HESSJ1800-240B towards the energetic, ultracompact HII complex G5.89-0.39 at the southern edge of W28. Preliminary results from our Chandra observations ($\sim$80ks) of G5.89-0.39 reveal over 200 sources, with two groups of sources centering on the two HII components G5.89-0.39A and B respectively. The X-ray sources exhibit energetics typical of young massive stars suggesting the HII components represent young massive clusters. Further results will be presented in this poster.
Presenter: Gavin Rowell

P87: **Ammonia observations with Tidbinbilla from the G333 star-forming complex**

Vicki Lowe[1,2], Maria R. Cunningham[1], James S. Urquhart[2], Shinji Horuchi[2], Michael Burton[1]
[1] *University of New South Wales*
[2] *CSIRO Astronomy and Space Science*

High-mass stars are known to be born within giant molecular clouds (GMCs); However, the exact processes involved in forming a high-mass star are still not known. One such GMC lies within the Galactic plane at l = 333°, b = -0.5° and has been mapped with the ATNF Mopra telescope (83-110 GHz), and with the Swedish-ESO Submillimeter Telescope (SEST) in the 1.2 mm cool dust continuum. The region is also within the Spitzer GLIMPSE infrared survey (3.6, 4.5, 5.8, and 8.0 μm) area. We have decomposed the dust continuum using a clump-finding algorithm (CLUMPFIND), and are using the multiple molecular line traditions from the Mopra telescope to classify the type and stage of star formation taking place therein. To accurately determine the temperatures, and hence other physical parameters of each identified clump, we have obtained pointed Tidbinbilla NH_3 observations and in this talk I will present our preliminary results.
Presenter: Vicki Lowe (S)

P87b: **Compact HII Regions in the small magellanic cloud**

Graeme Wong[1],
[1] *University of Western Sydney*

We present and discuss new high- sensitivity and resolution radio-continuum images of the SMC at 20 cm. The new images were created from merging 20-cm mosaic radio surveys, from the ATOA, and later the data from Parkes 64-m radio-telescope. We also catalogue 47 Compact HII regions and 1466 point sources within the region of the SMC.
Presenter: Graeme Wong (S)

P88: **Deep NH_3 observations of the W28 supernova remnant TeV gamma-ray source HESS J1801-233.**

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The W28 supernova remnant (SNR) is an old SNR ($> 10^4$ yr.) interacting with the molecular clouds (MC) at its north-eastern (NE) boundary. Using the Mopra telescope we have conducted deep NH_3 mapping of the SNR/MC interaction region. These deep observations probe the dense and disrupted gas towards the TeV (10^{12} eV) gamma-ray source HESS J1801-233. The NE clouds are known to be shocked and disrupted with many 1720 MHz OH masers populating the region. In previous campaigns we mapped the clouds surrounding W28 in 7 & 12 mm wavelength line surveys revealing dense cloud components and tracing sites of stellar formation in the region. Here, deeper mapping provides a pixel-by-pixel determination of NH_3 gas parameters such as temperature and column density across the entire NE cloud. Preliminary results of these analyses will be presented.
Presenter: Brent Nicholas (S)

P89: **New observations of the Carina nebula with the Tidbinbilla 70m dish.**

T.A. Young[1], S. Horiuchi[2], J.A. Green[2]
[1] *Research School of Astronomy and Astrophysics ANU*
[2] *CSIRO Astronomy and Space Sciences*

Carina nebula is renowned for its proximity to a concentration of massive stars and is thus an ideal target for studying the parameters of the photodisassociation regions (PDRs) and massive star forming regions in general. Using new observations with the Tidbinbilla 70m radio telescope, we present the first emission maps of the ammonia inversion transition lines in the Carina Nebula. The emission maps of these transitions are supplemented with maps of the continuum emission and the recombination line, H81beta. Two distinct velocity features in the ammonia molecular cloud are identified, and parameters are derived separately. For the two features, a rotational temperature, optical depth, excitation temperature, column density and hydrogen density are obtained. These parameters are presented alongside emission spectra for the (1,1), (2,2) and (3,3) inversion transitions and their associated emission maps. We hope to achieve with this new data a greater understanding of the processes involved in massive star forming regions and particularly the associated PDR's
Presenter: Tye Young (S)

P90: **GSH 006-15+7: A Galactic supershell transitioning from HI emission to absorption**

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We report on the discovery and analysis of a Galactic supershell GSH 006-15+7 from the Galactic All Sky Survey data. Basic observed and derived properties are presented and compared with the known population of Galactic supershells. The shell wall features the unusual property of undergoing transition from HI emission to HI self-absorption (HISA) in the Galactic plane, and we use this feature along with HISA diagnostics to better constrain optical depth, temperature and mass. We also investigate the origin of GSH 006-15+7 and assess the energy contribution of candidate powering sources.
Presenter: Vanessa Moss (S)

P91: **HESS J1745-303 : TeV Emission from Two Interacting Supernova Remnants?**

Phoebe de Wilt[1], Gavin Rowell[1], Bruce Dawson[1], Andrew Walsh[2], Yasuo Fukui[3], Akiko Kawamura[3], Micheal Burton[4], Felix Aharonian[5]
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[2] *James Cook University*
[3] *Nagoya University*
[4] *University of New South Wales*
[5] *Dublin Institute for Advanced Studies*

HESS J1745-303 is an extended, unidentified TeV gamma-ray source discovered using the H.E.S.S. Galactic Plane Survey. The supernova remnant (SNR) G359.1-0.5 is located within a few hundred parsecs of the galactic centre and interacts with an adjacent molecular cloud as evidenced by a cluster of 1720 MHz OH masers towards the SNR rim. HESS J1745-303 partially overlaps the molecular cloud and G359.1-0.5 although this interaction is not adequate to explain the extent of the gamma-ray emission. A second SNR found in archival radio data has been found which may explain the remaining gamma-ray emission. We will also discuss our recent observations, using the Mopra Radio Telescope, of the dense molecular gas towards HESS J1745-303.
Presenter: Phoebe de Wilt (S)

P92: **The Central Molecular Zone of our Galaxy**

M.G. Burton[1], P. Jones[1] and the CMZ Team
[1] *UNSW*

The Central Molecular Zone (the CMZ) resides in the inner 3 degrees of the Galaxy, home to 5% of its total molecular content. A rich variety of organic molecules are found there, widely spread over several hundred parsecs, a facet which remains unexplained. This organic repository in the galactic centre is a very different environment to that of the GMCs in the molecular ring. Making use of the Mopra telescope's ultra-wide bandpass spectrometer, the 8 GHz UNSW-MOPS, a multiple molecular line mapping survey is now possible of this unique region. We have mapped the CMZ in 18 molecular lines simultaneously in the 86-94 GHz band, and in a further 23 lines simultaneously in the 42-50 GHz band. We report on some results of this special survey.
Presenter: Michael Burton

P93: **The Millimetre Astronomy Legacy Team 90 GHz Survey (MALT90): Results from the First Season**

James M. Jackson[1], Jill Rathborne[2], Jonathan Foster[1], Steven Longmore[3], Kate Brooks[2], and Friedrich Wyrowski[4]
[1] *Boston University*
[2] *CSIRO - CASS*
[3] *ESO*
[4] *MPIfR*

We present the first season results of the Millimetre Astronomy Legacy Team 90 GHz Survey (MALT90), which will image 3 mm molecular line emission from 3,000 dense star-forming cores. MALT90 exploits the capability of the ATNF Mopra 22 m telescope for fast mapping and simultaneous imaging of 16 molecular lines near 90 GHz. These molecular lines probe the cores' physical, chemical, and evolutionary state. The target cores are selected from the 870 micron ATLASGAL survey to host the early stages of high-mass star formation and to span the complete range of evolutionary states from pre-stellar cores, to protostellar cores, and on to H II regions. Each core will be mapped at excellent angular (40") and spectral (0.1 km/s) resolution. We present preliminary results for three key science projects: (1) determining the kinematic distances and Galactic distribution of dense cores, (2) investigating the chemical evolution of dense cores, and (3) comparing the extragalactic molecular line-infrared luminosity correlations with those in Galactic cores.
Presenter: James M. Jackson

P93b: **A Pilot Survey for the Galactic Plane Survey MALT-45**

Chris Jordan
James Cook University

By pioneering new observational techniques and conducting an untargeted survey of the Southern Galactic plane at 7mm, we will search for emission from the strongest class I CH3OH maser, SiO masers, thermal CS and high frequency continuum. This survey will use the ATCA in fast mosaicking mode, using CABB to its full potential and simultaneously making use of cross-correlation and auto-correlation data. My project focusses on processing the auto-correlation data, with the view to producing a reliable map of CS(1-0) emission, tracing the high density gas in our Galaxy. Presented here are the results from the pilot survey conducted in March, 2010.
Presenter: Chris Jordan (S)

P94: **The shocked gas towards the gamma-ray-emitting supernova remnant CTB 37A and coincident partial shell, G348.5−0.0.**

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[3] *Nagoya University*
[4] *James Cook University*

CTB 37A is believed to be a supernova remnant interacting with gas. Coincident TeV gamma-ray emission suggests that cosmic ray acceleration has been/is occurring in the region. Thermal infrared emission and the presence of 1720 MHz OH maser emission are strong signposts of shock interactions in the region. We present results from our 7 mm dense gas mapping campaign, which detected broad and narrow CS(1-0) emission originating from dense gas within a number of spiral arms. A comparison with CO(2-1) emission (a diffuse gas tracer) allows the gas structure towards CTB 37A to be investigated. A knowledge of this molecular gas, HI absorption features, 1720 MHz OH maser data and kinematic galactic rotation modeling allows the connection (if any) of CTB 37A and the coincident partial shell supernova remnant G348.5−0.0 to be investigated.
Presenter: Nigel Maxted (S)

P94b: **A Study of New Galactic SNR G308.3−1.4.**

J. Collier[1], M. D. Filipovic[1], A. De. Horta[1], E.J. Crawford[1]
[1] *University of Western Sydney, Australia*

In this study, we construct the deepest ever radio-continuum images of the newly discovered Galactic Supernova Remnant (SNR) G308.3-1.4, at wavelengths of 13 cm and 20 cm, using observations from the Australian Telescope Compact Array (ATCA). Previous studies, conducted in the X-ray and optical bands, named G308 only as a candidate, and had poor resolution and sensitivity. In our study, we confirm the nature of G308 as a SNR and determine its shape and structure, as well as its polarisation, spectral index, age, type and stage in the evolutionary process.
Presenter: Jordan Collier (S)

P95: **Tracing the Vela C star-forming complex with the Mopra radio telescope**

Vicki Lowe[1,2], Nadio Lo[3,4], Maria R. Cunningham[1], Tracey Hill[3], Vincent Minier[3], Andrew Walsh[4], James S. Urquhart[2], Michael G. Burton[1]
[1] *University of New South Wales*
[2] *CSIRO Astronomy and Space Science*
[3] *Laboratoire AIM*
[4] *Universidad de Chile*
[5] *James Cook University*

The Vela C giant molecular cloud complex hosts a variety of low- and high-mass star formation which allows us to study the dynamics of molecular gas and star formation. We have commenced a Mopra survey to map the molecular gas in the Vela C cloud in multiple transitions to complement Herschel imaging survey of OB Young Stellar objects (HOBYS) observations. These observations will be used to investigate the relationship between the chemistry and dynamics of the molecular gas and the young stellar object content. Here we report the current progress of our multi-wavelength spectral line study of Vela C with the Mopra radio telescope.
Presenter: Vicki Lowe (S)

P96: **Masers: an evolutionary clock for high-mass star formation**

Shari Breen[1], Simon Ellingsen[2]
[1] *CSIRO Astronomy and Space Science*
[2] *University of Tasmania*

Determining an evolutionary clock for high mass star formation is a much sought after result in astrophysics, as it will allow comprehensive quantitative studies of the formation of high mass stars to be completed. We have carried out detailed studies of a large number of sources suspected of undergoing high mass star formation and have found that common masers transitions can be very helpful in determining their relative evolutionary stage. We have combined new observations of the common maser species with complementary data such as 1.2 mm dust emission, molecular data, radio continuum, GLIMPSE point sources and Extended Green Objects. Comparison between the characteristics of coincident sources has revealed strong evidence for an evolutionary sequence for the different maser species in high-mass star formation regions. We present our proposed sequence for the common maser species associated with young high-mass stars, along with the data supporting our arguments.
Presenter: Shari Breen

P97: **Understanding periodic flares of methanol masers**

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[3] *University of Tasmania*
[4] *Ural State University*
[5] *North-West University*

The discovery of a small number of periodically variable 6.7-GHz methanol masers has been an intriguing find of the last decade. The theory of these periodic flare events is still in an early stage of development, but seems to require the presence of multiple high-mass stars forming or substantial inhomogeneities in the accretion disc around a high-mass star. Through simultaneous monitoring of two, differently pumped, transitions of maser with the Australia Telescope Compact Array, we hope to be able to determine the source of the variability: the infrared radiation which pumps one of the transitions quenches the emission of the other, hence if both transitions flare simultaneously the origin of the variability is the underlying continuum emission. Here we present the first year of monitoring data which has revealed a quasi-simultaneous dip in the light curves of both transitions.
Presenter: Maxim Voronkov

P98: **Variability of masers towards Orion and NGC6334I**

A. J. Walsh[1], C. R. Purcell[2], S. N. Longmore[3], M. A. Voronkov[4]
[1] *James Cook University*
[2] *Leeds University*
[3] *European Southern Observatory*
[4] *CSIRO Astronomy and Space Science*

During Mopra observations for the H_2O Southern Galactic Plane Survey (HOPS), we monitored emission towards a few standard Galactic sources in multiple spectral lines, including water, methanol and ammonia masers, as well as thermal line emission from ammonia, cyanoacetylene and radio recombination lines. We report on comparisons of the variability of these lines. Whilst some the water maser shows the most prominent variations, we see variability in other maser lines, some of which are correlated, implying a similar excitation mechanism.
Presenter: Andrew Walsh

P99: **Water maser follow-up of the Methanol Multi-beam Survey**

Anita Titmarsh[1,2], Simon Ellingsen[1], James Caswell[2], Shari Breen[2], Maxim Voronkov[2], Andrew Walsh[3], Kate Brooks[2]
[1] *University of Tasmania*
[2] *CASS*
[3] *James Cook University*

Interstellar masers, along with maser pumping models, provide us with valuable information about the physical conditions at sites of star formation. Many questions remain about the formation of high-mass stars, and it is recognised that the presence/absence of various maser transitions trace an evolutionary sequence in their formation. However, work still needs to be done to quantify the timescale over which the water maser transition occurs. We are currently surveying all of the 6.7 GHz methanol masers found by the Methanol Multi-Beam survey in the Galactic longitude range l = 310 - 20 degrees for 22 GHz water maser emission using the ATCA. These observations will provide accurate maser positions to help determine the relative evolutionary phase traced by water masers in comparison with the other common maser transitions.
Presenter: Anita Titmarsh (S)

P100: **CARPARCS - Carina Parkes-ATCA Radio Continuum Survey**

K. Brooks[1], M. Reiter[2] and the CARPARCS team.
[1] *CSIRO - CASS*
[2] *University of Arizona*

With more than 65 O-stars and several hundred protostars identified, the Carina nebula is a rich environment for studying the interplay between clustered star formation, massive star feedback, and triggered star formation. Growing interest in the Carina nebula has lead to recent large surveys with high spatial resolution (less than 2 arcsec) at X-ray wavelengths with Chandra, optical wavelengths with Hubble and infrared wavelengths with Spitzer. In order to bring the radio coverage of the Carina nebula up to the high quality that has now been achieved with the large datasets at other wavelengths, the Carina Parkes-ATCA Radio Continuum Survey (CARPARCS) collaboration has been assembled. CARPARCS will map the entire Carina Nebula over a frequency range of 1-3 GHz with the Australia Telescope Compact Array. This poster contains details of the survey specifications and science goals.
Presenter: Kate Brooks

P101: **The Galactic Archaeology with HERMES Survey: Deciphering the Milky Way's History**

D. Zucker[1,2], G. De Silva[2], K. Freeman[3], J. Bland-Hawthorn[4] and the HERMES team
[1] *Macquarie University*
[2] *Australian Astronomical Observatory*
[3] *Australian National University*
[4] *University of Sydney*

The Galactic Archaeology with HERMES (GALAH) Survey is a major Australian-led project to obtain detailed elemental abundances for a million stars, with the goal of using chemical tagging to decipher the formation history of the Milky Way. HERMES is a multi-fibre spectrograph being built for the AAT 3.9m telescope at Siding Spring, designed to simultaneously obtain high resolution (R$\approx$ 28000) spectra for $\sim$ 400 stars over a 2° field of view. For the GALAH Survey, $\sim 10^6$ stars (down to V$\sim$ 14, at a S/N of $\sim$ 100 per resolution element) will be observed in four passbands; these passbands are selected to include elements from all major independently-varying element groups, allowing direct determination of abundances for each star. Beyond its primary objectives, the survey will be directly complementary to wide-area photometric surveys such as Skymapper, and the multidimensional dataset which will come from ESA's Gaia mission.
Presenter: Daniel Zucker

P102: **Structure in the Rotation Measure sky**

Dominic Schnitzeler[1]
[1] *CASS/Australia Telescope National Facility*

Faraday rotation of the plane of polarization of radio waves has been used successfully in the past to study the properties of the Galactic magnetic field, and the rotation measure (RM) catalogue by Taylor et al. (2009) has enabled us to study the geometry of the Galactic magnetic field over more than 80% of the sky. Here I show how the Galactic and (intrinsic) extragalactic RM contributions can be separated. The Galactic contribution dominates the observed RM on scales $>$ 1 degree, and, furthermore, sigma$_{RM}$ depends in the same way on Galactic latitude as the dispersion measure (DM), hinting that structure in RM is magnified by an increase in DM. I review the predictive quality of 10 different models of the free electron density of the Milky Way, and show how ongoing and future projects can help us better understand the properties of the Galactic RM sky.
Presenter: Dominic Schnitzeler

P103: **The α elements of NGC3680**

A.W. Mitschang[1], G. De Silva[2], D.B. Zucker[1,2]
[1] *Macquarie University*
[2] *Australian Astronomical Observatory*

We present an abundance analysis of several α elements in the intermediate aged open cluster NGC3680 using high resolution VLT-UVES data. The sample includes 8 giants and 12 dwarf stars that have high probabilites of membership based on the catalog of Nordström et al. (1997). The results are discussed in the greater context of chemical tagging as a membership determinate.
Presenter: A. W. Mitschang (S)

P104: **Ages and Emission Line Star content of LMC Clusters**

S. Iqbal[1], S. Keller[1]
[1] *Research School of Astronomy & Astrophysics, The Australian National University*

We have observed clusters in the LMC in U, V, R, I and Hα filters, using the Faulkes Telescope (south), in order to determine the age and emission line star content of each cluster. Where possible, we compare our age and interstellar reddening determinations to those in the literature. We also explore the evolution of the specific frequency of Be stars as a function of cluster age, for clues regarding the impact of stellar evolution on the Be phenomenon.
Presenter: Shaheen Iqbal (S)

P105: **Globular Cluster Sizes: Metallicity vs. Environment**

A. Sippel[1], J. Hurley[1]
[1] *Swinburne Univerity*

We have evolved a suite of N-body star cluster simulations to study the effect of metallicity on the size of globular clusters. Observations of globular cluster systems have shown a bimodal color distribution defining two subpopulations: a blue, metal-poor and a red, metal-rich subpopulation. On average, the blue clusters are found to be $\approx$ 20% bigger than their red counterparts. It is an ongoing debate whether this difference arises from projection effects or from different metallicities between those two subpopulations. Low metallicity stars evolve faster along the main sequence than their high metallicity counterparts - which implies different mass-loss rates and hence possibly different sizes for blue and red clusters. In order to explore this, we use direct N-body simulations that self-consistently model stellar evolution in combination with dynamical evolution. To be comparable to observations, we measure half-*light* radii from our simulated! clusters and show that the observed size difference could indeed be explained by the difference in metallicity.

Presenter: Anna Sippel (S)

P107: **Sky Tessellation Patterns for Field Placement in the All-Sky HI Survey WALLABY**

B. E. Warren[1]
[1] *International Centre for Radio Astronomy Research, University of Western Australia*

We present a preliminary investigation of possible field placement strategies for the proposed Widefield ASKAP L-band Legacy All-sky Blind surveY (WALLABY) on the Australian Square Kilometre Array Pathfinder. We examine two methods for tessellation of a sphere, Declination Bands and HEALPix, to see if they can be used to generate a field placement pattern that can cover the sky south of Dec = +30 deg efficiently. We find that Declination Bands is an efficient and adaptable method of field placement that ensures there are no gaps occur between fields. It has the minor disadvantage of having large overlap areas between polar fields, though we can mitigate this some what by using an adjusted strategy in this region. HEALPix however does not appear to be an appropriate method of field placement, being much less efficient, inflexible, and not covering all regions of the sky without significant adjustments.

Presenter: Bradley E. Warren

P108: **The Australia Telescope Compact Array 16cm upgrade**

J. Stevens, N. McClure-Griffiths, M.A. Bowen, S.F. Castillo, Y.S. Chung, A.R. Dunning, H.P. Kanoniuk, L.J. Reilly, P.G. Edwards
CSIRO Astronomy & Space Science

The lowest frequency receivers on the Australia Telescope Compact Array have recently been upgraded to provide continuous frequency coverage of 1.1–3.1 GHz and take advantage of the Compact Array Broadband Backend upgrade. The new system, renamed the 16cm band, has greatly improved the performance of the ATCA at low frequencies. The system temperature across the band has been reduced by $\sim$30% to $\sim$22 K across the full band. The decreased system temperature, coupled with the increase in instantaneous bandwidth means that these receivers are almost seven times as sensitive as the previous receivers. The upgrade has also fixed a long-standing problem with off-axis polarization at 2–2.5 GHz. The resulting system is exquisitely sensitive, has on-axis polarization purity of 1–2% across the band, and off-axis polarization of less than $<$3% up to 2.6 GHz. This upgrade opens up a range of new scientific possibilities, including deep continuum observations and broadband spectropolarimetry.

Presenter: Philip Edwards

P109: **Tidbinbilla 70m radio telescope 4-channel K-band receiver upgrade**

S. Horiuchi[1], T. Kuiper[2], M. Franko[2], L. Teitelbaum[2], S. Smith[3], L. Greenhill[4], G. Baines[1], A. Soni[1]
[1] *CDSCC/CASS/CSIRO*
[2] *JPL/Caltech/NASA*
[3] *Caltech*
[4] *SAO/Harvard*

The radio telescopes at Tidbinbilla are operated by the Canberra Deep Space Communication Complex, part of NASA's Deep Space Network (DSN). As part of the Host Country agreement with NASA, a fraction of the time on the Tidbinbilla 70-m and two of 34-m antennas has been available to the Australian astronomical community. In 2011 DSN has started implementing dual-feed receivers operating simultaneously between 17 and 27 GHz for radio astronomy with the Tidbinbilla 70m. Each feed has five dual-polarization down-converters with 2 GHz bandwidth. Each baseband polarization has selectable I/Q or USB/LSB outputs for a total of up to 40 digitizable data streams. Digital signal processors capable of handling two 1 GHz bandwidths have also been developed in collaboration with the UC Berkeley CASPER project. Science capabilities enabled by this new equipment and the latest status of the upgrade and are highlighted.
Presenter: Shinji Horiuchi

P110: **10C Survey of Radio Sources at 15.7 GHz**

Thomas Franzen[1]
[1] *CSIRO*

We present the first results from the Tenth Cambridge (10C) Survey of Radio Sources, carried out using the Arcminute Microkelvin Imager Large Array (LA) at 15.7 GHz. The survey fields cover an area of approx. 27 deg^2 to a flux-density completeness of 1 mJy. Results for some deeper areas, covering approx. 12 deg^2 and complete to 0.5 mJy, are also presented. The 10C survey is the deepest radio survey of any significant extent ($>$ 0.2 deg$^{2)}$ above 1.4 GHz. The 10C source catalogue, which contains 1897 entries, has been combined with that of the Ninth Cambridge Survey to calculate the 15.7-GHz source counts. A broken power law is found to provide a good parameterisation of the differential count between 0.5 mJy and 1 Jy. The measured source count has been compared to that predicted by de Zotti et al. (2005) ? the model is found to display good agreement with the data at the highest flux densities. However, over the entire flux-density range of the measured count (0.5 mJy to 1 Jy), the model is found to under-predict the integrated count by approx. 30 per cent. Over the range of flux densities (40 mJy to 1 Jy) covered by the Australia Telescope 20-GHz (AT20G) survey, the fraction of steep-spectrum sources ($alpha_{1^{20}} < -0.5$) was found to increase with decreasing flux density. The 10C data suggest that at fainter flux densities ($<$ 10 mJy) this trend is reversed, with a move back towards a flatter spectrum population. Approx. 5 per cent of the sources are found to be extended relative to the LA synthesised beam of approx. 30 arcsec. Investigations using higher-resolution data showed that most of the genuinely extended sources at 15.7 GHz are classical doubles, although some nearby galaxies and twin-jet sources were also identified.
Presenter: Thomas Franzen

P110b: **Visibility stacking and the quest for SNIa radio emission**

Paul Hancock
University of Sydney

We describe the process of stacking radio interferometry visibilities to form a deep composite image and its application to the observation of transient phenomena. We apply "visibility stacking" to 46 archival Very Large Array observations of nearby type Ia supernovae (SNIa). This new approach provides an upper limit on the SNIa ensemble peak radio luminosity of $1.2x10^{25} erg/s/Hz$ at 5 GHz, which is 5–10 times lower than previously measured. This luminosity is consistent with the double degenerate scenario for SNIa and rules out intermediate and high mass companions in the single degenerate scenario. In the era of time domain astronomy, techniques such as visibility stacking will be important in extracting the maximum amount of information from observations of populations of short lived events.
Presenter: Paul Hancock (S)

P111: **Astronomy Visualisation in the Planetarium**

T. Hill[1], M. Ratcliffe[2]
[1] *Museum Victoria*
[2] *Sky-Skan, Inc*

We present a new opportunity for displaying and manipulating astronomical data. Digital planetariums have a powerful but under-utilised ability to take your 3D astronomical dataset or simulation, project it onto the dome overhead, then allow you to travel above, below, around and through it. You can see things in the data that didn't previously make sense, or perhaps connections that didn't even appear, in the usual flat-view of a computer screen. For example, Brent Tully (IfA, Hawaii) has had success interpreting his galaxy catalogue using planetarium software and is now working towards a new visualisation that best conveys the story of the nearest galaxies to the Milky Way. Other datasets already available in planetariums include the CFHT Legacy Survey Deep Field, the 2dF Galaxy Redshift Survey, the Sloan Digital Sky Survey, and many more. Consider what might be found in your data if you could become immersed in it.

Presenter: Tanya Hill

P112: **AstroPhD - a New Online Forum for Astro Students**

J. Delhaize[1], V.A Moss[2,3], J. Blanchard[3,4]
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[2] *Sydney Institute for Astronomy, School of Physics A29 The University of Sydney, NSW 2006, Australia*
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We all know Python is awesome. But when you have a specific astronomy-related problem and you can't find any Python documentation to help you, it's not so awesome. We all know the new CABB zoom modes are awesome. But when the data reduction is just not working, it's not so awesome. Where can you get help? AstroPhD! AstroPhD is a new online forum mainly aimed at Australian astronomy students, although anyone is welcome to join. AstroPhD is your one-stop shop for all your astro needs: ask any hardware/software/programming questions, share useful web resources, get some good tips on observing and data reduction, and connect with other astro students. Visit today at astrophd.proboards.com

Presenter: Jacinta Delhaize, Vanessa Moss, Jay Blanchard (S)

P113: **Space to Grow : A High School Astronomy Education Intervention using the Faulkes Telescopes.**

Mr Michael Fitzgerald[1], Prof Quentin Parker[1], A/Prof David H. McKinnon[2],Dr Lena Danaia[2]
[1] *Macquarie University*
[2] *Charles Sturt University*

The "Space to Grow" $2.4m ARC Linkage Project aims to increase the level of scientific engagement, inquiry and learning by developing a novel learning and teaching program to engage students in science. It is being conducted through Macquarie and Charles Sturt Universities with the support of CEO Parramatta and Bathurst, DET Western Region and LCOGT.net. Students and their teachers have the opportunity to engage in real science at school through obtaining new data from the two 2-metre Faulkes Telescopes. Working through the carefully developed project materials coupled with obtaining new data from these telescopes provides students and teachers with the opportunity to undertake authentic astronomical scientific inquiry and through this process develop both their inquiry-based skills and a better understanding of both physical and astronomical concepts in general. This poster outlines the current state of the project, presents some preliminary results and identifies future directions within this project.

Presenter: Michael Fitzgerald (S)

P114: **Star Cluster Photometry in the Classroom : Case studies of Australian and Canadian Classrooms**

Mr Michael Fitzgerald[1], A/Prof David H. McKinnon[2], Rob Edwards[3]
[1] *Macquarie University*
[2] *Charles Sturt University*
[3] *West Kildonian Collegiate Institute*

Over the past year, significant effort has been put into developing high quality inquiry-based educational materials that can be used by teachers and which require little preparation in implementing star cluster photometry in the classroom. These materials were pilot-tested by classes at a Bathurst high school in late 2010, and a Canadian high school in early 2011 and are currently being implemented at a larger scale across NSW. In this presentation, a brief overview of the materials, while focusing on the results, both scientific and educational, from within the classrooms themselves will be presented. Some of the scientific work undertaken by the keener students has focused on neglected and unstudied clusters, while some of the educational results have shown an ability to engage these 'keen' students through the use of these guided-inquiry materials.
Presenter: Michael Fitzgerald (S)

P115: **The awakening of the Sleeping Beauty: glass plate astrometry in the age of digitisation.**

T. Stevenson[1], Dr Nick Lomb[2], Dr Andrew Jacob[3]
[1] *University of Sydney Department of Museum Studies, Manager Sydney Observatory*
[2] *Sydney Observatory and the Powerhouse Museum*
[3] *Sydney Observatory*

Abstract: This paper presents a rationale that disconnects the Carte du Ciel and Astrographic catalogue from the demise of the State Observatories and the slow rate of development of Astrophysics in Australia in the early 20th Century, overturning previous arguments presented to the contrary. Through a historical perspective the rise of the Universities and multi-disciplinary science organisations in the Twentieth Century will be equated to Federal policy, the nature of Astrophysics and the inevitable rationalising of resources. Long portrayed as an object lesson in over ambition, the Astrographic Catalogue has more recently turned into a lesson in the ways that old data can find new uses (Urban,1998). Recent research on the usefulness of Carte du Ciel and Astrographic Catalogue glass plate digitisation and conservation in the latter twentieth and early twenty first centuries will be summarised and the importance of the preservation of these collections briefly discussed in terms of educational, sociological and cultural value. The burning question is now who, in Australia, is to be the Gallant Prince delivering the kiss of life?
Presenter: Andrew Jacob

P116: **The Achievements of the Adelaide Observatory**

P.G Edwards
CSIRO Astronomy & Space Science

After Dr William Ullathorne visited Adelaide in 1839, he noted "I puzzled my friends in Sydney by telling them that the streets in Adelaide were fitter for the study of astronomy than for commerce." This compliment (back-handed, as it turns out) aside, it was not until the appointment of Charles Todd in 1855 as Government Astronomer and Superintendent of Telegraphs that astronomical work officially got underway. Despite his title, it was work on telegraphs that dominated Todd's time, culminating in the completion in 1872 of the Overland Telegraph linking Australia directly to the rest of the world. This presentation will review the work of the Observatory and answer the questions: why is SA's eastern border not straight? why does SA have a half-hour time zone? when were the two big earthquakes in SA? why was the solar eclipse of 1922 so important? and what astronomical work did the Observatory do?
Presenter: Philip Edwards

P117: **High Performance Computing for "Grand Challenge" Australian Astrophysics Research**

Jon Smillie[1], Dr Darren Croton[2], Amanda Kocz[3], Luke Hodkinson[2], Dr Gregory Poole[2], Dr Chiaki Kobayashi[1]
[1] *Australian National University*
[2] *Centre for Astrophysics and Supercomputing, Swinburne University of Technology*
[3] *Astronomy Australia Limited*

In response to the increasing demands for high-performance computational resources from internationally significant Australian astronomical research projects such as the Square Kilometre Array, Australian Astronomy Limited, through the NCI National Facility, and Swinburne Centre for Astrophysics and Supercomputing, have arranged for dedicated computational resources to be made available for world-class "grand challenge" Australian astrophysics research. One million CPU hours per annum on the NCI peak system have been earmarked for such research, along with a matching one million hours per annum on the Swinburne CAS supercomputer. A dedicated support team has been assembled at both locations to assist researches wishing to access these schemes, supported by advice from AAL's Astronomy eResearch Advisory Committee.
Presenter: Luke Hodkinson, Jon Smillie

P118: **Magnetic Divergence Constraint in Smoothed Particle Magnetohydrodynamics**

T. Tricco[1]
[1] *Monash University*

From Maxwell's equations, the divergence of the magnetic field should always be zero. In other words, magnetic monopoles do not exist in nature. In numerical simulations then, it is important to consider how to uphold this constraint. As the goal of any simulation should be to model real physics behaviour, the growth of any spurious divergence in the magnetic field needs to be minimized and tightly controlled. For this work, our numerical method of choice is Smoothed Particle Magnetohydrodynamics, and here we present our approaches for limiting the growth of magnetic divergence. By isolating divergence and diluting it over a larger region while simultaneously diffusing it, we find improvements to all test cases employed.
Presenter: Terrence S. Tricco (S)

P119: **Gravitational wave detection without estimation in an all-sky search for periodic sources**

Mark Bennett, Andrew Melatos, Aurore Delaigle and Peter Hall
University of Melbourne

There have been a number of blind and targeted searches for periodic gravitational wave sources, such as rotating elliptical neutron stars, however no detection has been recorded to date. We propose using a form of higher criticism, a statistical technique introduced by Donoho & Jin (2004), to enhance these searches. Higher criticism is designed to detect the presence of many sparse, weak sources, none of which are large enough to be reliably estimated or detected individually. Gravitational wave searches for periodic sources typically use an optimised detection statistic, known as the the $\mathcal{F}$-statistic. We apply higher criticism to the $\mathcal{F}$-statistic values computed for a simulated blind, all-sky search. Compared to current searches for a single strong source, higher criticism can, in theory, detect the presence of a large population of sources, all of which are below the threshold for direct detection.
Presenter: Mark Bennett (S)

P120: **Low Energy Studies using a High Energy Observatory**

Kerridwen Barber[1], Roger Clay[1], Bruce Dawson[1]
[1] *University of Adelaide*

The Pierre Auger Observatory, at a latitude of 35 degrees S, studies the Universe at EeV (10^{18} eV) energies. Its surface array consists of 1660 10 m^2 radiation detectors which can also be used as individual units. These detectors are responsive to muons from low energy cosmic rays (sensitive to heliospheric and local interstellar conditions) with high statistical accuracy. The operation of the Pierre Auger Observatory at low energies (10 GeV-10 TeV) will be described, together with some representative results.
Presenter: Kerri Barber

P121: **Measuring Cosmic Ray Energy and Mass using the Surface Detector of the Pierre Auger Observatory**

A. Herve[1], B. Dawson[1], J. Bellido[1], R. Clay[1]
[1] *University of Adelaide*

The 3000 square kilometre Pierre Auger Observatory observes air showers initiated by the highest energy cosmic rays. The array of particle detectors, known as the surface detector, yields a measurement of the lateral distribution function (LDF) of every shower, the particle density as a function of distance from the shower core. From the LDF we derive the primary particle energy, and we are working to extract information on the primary particle mass. We describe the techniques and discuss new modifications to the functional form of the LDF that will improve its sensitivity to the mass of the incoming cosmic ray.
Presenter: Alex Herve (S)

P122: **Measuring the Mass of Cosmic Ray Particles with the Fluorescence Detector of the Pierre Auger Observatory**

T. Harrison[1], B. Dawson[1], J. Bellido[1], R. Clay[1]
[1] *University of Adelaide*

Cosmic Rays (CRs) are extremely energetic particles of unknown origin with energies of up to 10^{20} eV. The Pierre Auger Observatory, located in Argentina, is comprised of 1600 water-Cherenkov tanks and 5 Fluorescence Detector sites and is designed to detect the highest energy CRs ($>10^{18}$ eV). One of its primary aims is to determine the mass of the CR by analysing the Extensive Air Shower (EAS) that is produced when the CR interacts with the atmosphere. The parameter Xmax, defined to be the atmospheric depth at which the number of particles in the EAS reaches a maximum, is known to be sensitive to the mass of the primary particle. We will describe the methods used to measure Xmax using the fluorescence detectors, including techniques designed to remove detector-induced biases in our mass estimates.
Presenter: Tom Harrison (S)

P123: **Monitoring Cloud over the 3000 square kilometre Pierre Auger Observatory**

Mathew Cooper[1], Bruce Dawson[1], Roger Clay[1]
[1] *University of Adelaide*

Most observatories around the world measure light that has propagated through the atmosphere. Clouds can block or scatter light, giving unexpected measurements for a source's light flux. The problem is magnified in the case of the Pierre Auger Observatory for the highest energy cosmic rays, since over 3000 square kilometres of ground area must be monitored for cloud during moonless nights. We tackle this using an infrared camera at each of the observatory's four fluorescence detector telescope sites to look for clouds that would be impossible to see with a standard camera. We describe the system and our progress towards an automated analysis which provides information on telescope pixels influenced by cloud every 5 minutes during detector operations.
Presenter: Mathew Cooper (S)

P124: **PeV explorer (PeX): A new multi-TeV gamma-ray telescope**

J. Denman[1], G. Rowell[1], V. Stamatescu[1,2], R.W. Clay[1], B.R. Dawson[1], A.G.K. Smith[1], T. Sudholz[1], G.J. Thornton[1], N. Wild[1]
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[2] *Institut de Física d'Altes Energies, Edifici Cn., E-08193, Bellaterra(Barcelona), Spain*

We are designing a new array of Image Atmospheric Cherenkov Telescopes (IACTs) to detect multi-TeV ($E > 10^{12}$ eV) gamma-ray sources. The array consists of 5 telescopes in a square layout with one central telescope. PeX is motivated by the results from H.E.S.S. pointing to a population of sources in the critically important $E > 10$ TeV energy regime. A focus in this work is on the improvement in the astrophysical performance (such as angular resolution) in the 10 to 500 TeV energy range, as well as the robustness of the event reconstruction with varying sky brightness.
Presenter: Jarrad Denman (S)

P125: **R & D Studies for Very High Energy Gamma-Ray Astrophysics at Energies Greater than 10 TeV**

M. Ohishi[1], R. Clay[2], B. Dawson[2], Y. Matsubara[3], M. Mori[4], T. Naito[5], K. Nishijima[6], G. Rowell[2], T.Toyama[1], T. Yoshikoshi[1]
[1] *ICRR, University of Tokyo*
[2] *University of Adelaide*
[3] *Nagoya University*
[4] *Ritsumeikan University*
[5] *Yamanashi Gakuin University*
[6] *Tokai University*

Very high energy gamma-ray astronomy has grown to a new branch of observational astronomy by the many discoveries made by the current imaging atmospheric Cherenkov telescope (IACT) arrays. In spite of those successes by the current detectors, Galactic cosmic ray accelerators up to the cosmic-ray knee region (around 10^{15} electonvolt) is still unclear. PeV Explorer is a future project of a relatively small IACT array, optimized to detect gamma rays greater than 10 TeV and aiming to explorer Galactic accelerators up to PeV energies. We present the status of our R & D studies in hardware for this project.
Presenter: M. Ohishi

P126: **Site Studies for TeV Gamma-Ray Telescopes in Australia**

T. Sudholz[1], G. Thornton[1], A. Smith[1], D. Hampf[2], G. Rowell[1], R. Clay[1], B. Dawson[1], N. Wild[1], M. Burton[3]
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[2] *Dept. of Physics, University of Hamburg, Hamburg 22761, Germany*
[3] *School of Physics, University of New South Wales, Sydney 2052*

We present an update of our ongoing effort to find sites in Australia for new ground-based gamma-ray telescopes. Australian sites (near sea-level) are suitable for the detection of $E > 1$ TeV gamma-ray energies, and such sites offer excellent coverage of the southern sky in a unique longitudinal band that complements other sites in the sites in the southern hemisphere. Using satellite-based cloud data we have selected a number of sites for further study, and this poster highlights results from one such site, Fowler's Gap (NSW), 100km north of Broken Hill. Since late 2009 we have conducted measurements of the night sky brightness, star extinction coefficients, and sky infrared temperature to characterise local night-time cloud cover. From the preliminary results, Fowlers Gap appears to offer an excellent night-time sky for ground-based gamma-ray astronomy.
Presenter: Tristan Sudholz (S)

P127: **Astronomy Australia Ltd update.**

Amanda Kocz
Astronomy Australia Ltd

Astronomy Australia Ltd (AAL) has, in the past twelve months, continued to fund access for astronomers in Australia to the Gemini and Magellan telescopes. AAL's other infrastructure projects for the year included continued development of the Murchison Widefield Array and the shipping of UNSW's automated observing platform PLATO-F to Dome Fuji in Antarctica, along with funding projects at the AAO and CSIRO. AAL also completed its initial assessment of Australian membership of the European Southern Observatory (ESO), and submitted this assessment to the Department of Innovation. In the next twelve months AAL will continue to fund access to Gemini and Magellan. In addition the gSTAR GPU-based supercomputer will be commissioned at Swinburne University of Technology and become available to astronomers in Australia. AAL will continue to work with the Department of Innovation on the case for Australian membership of ESO.
Presenter: Amanda Kocz