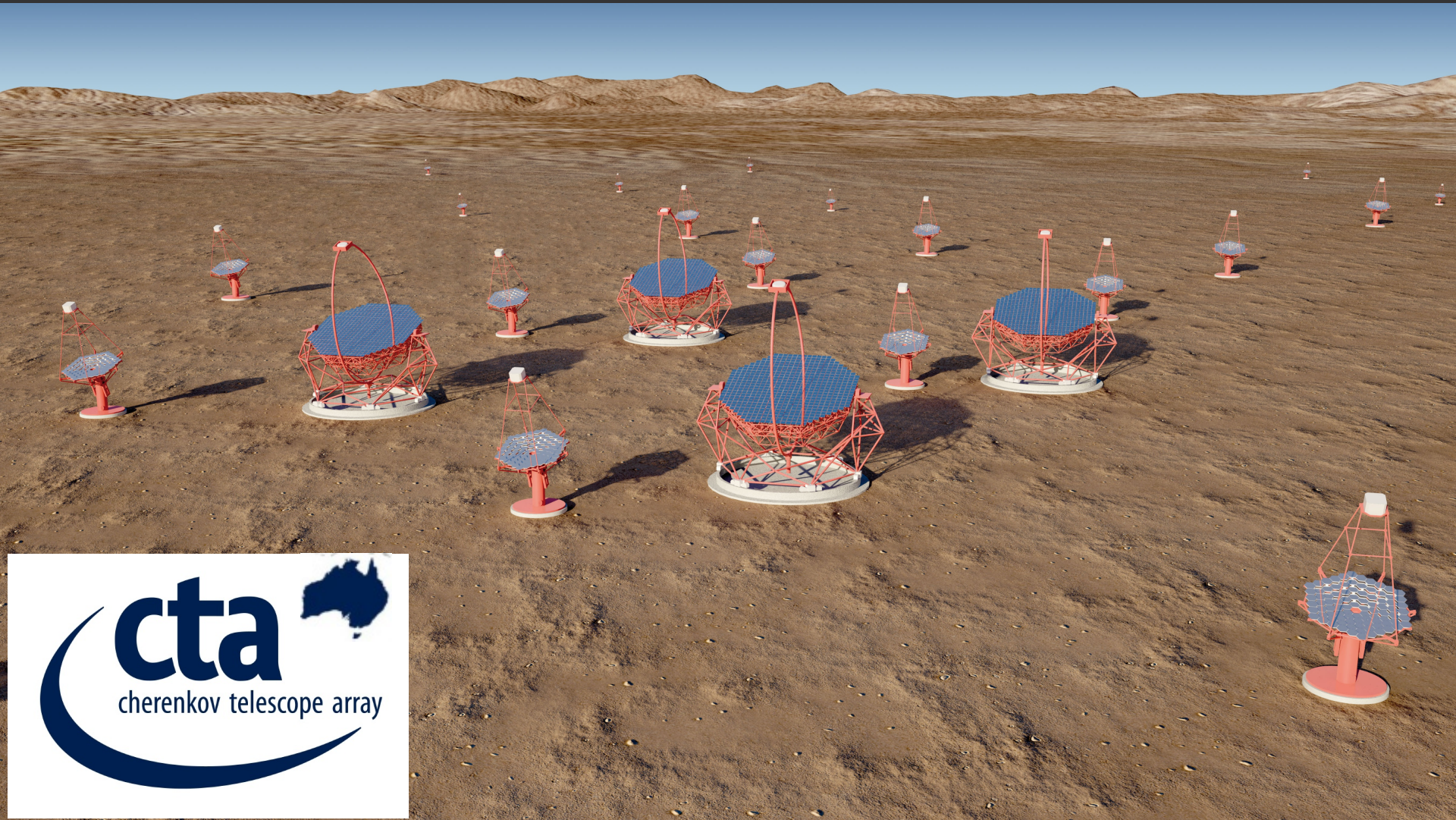


CTA – Australia Consortium Worskhop III

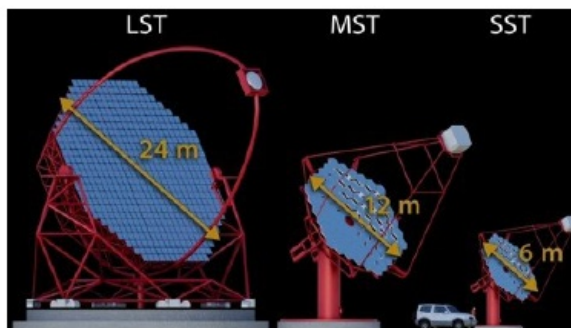
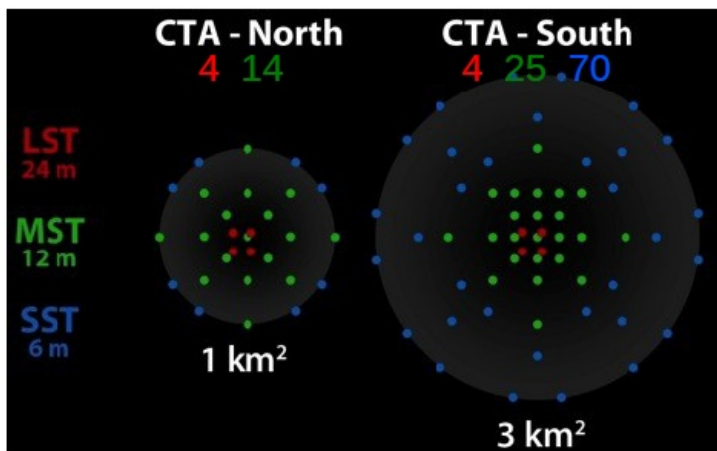


CTA-Australia Workshop 2016 Adelaide



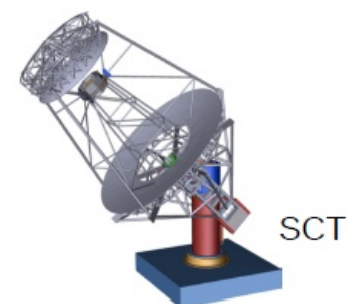
Stefan Wagner's talk next....

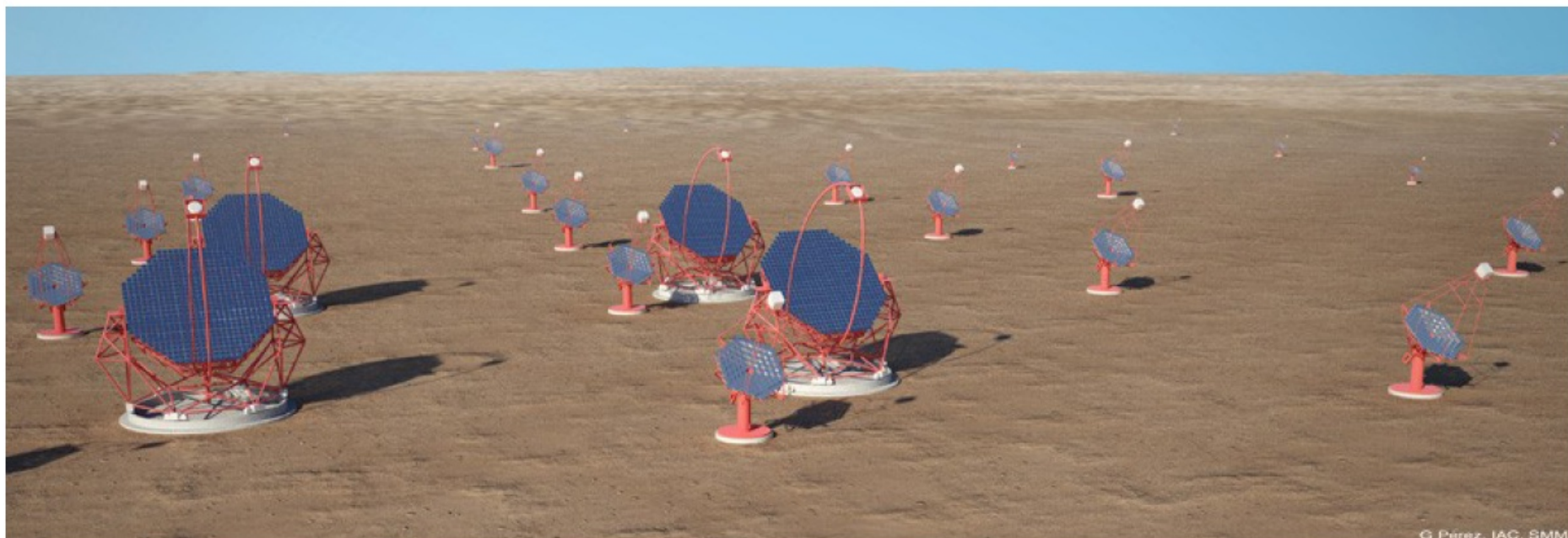
G Pérez, IAC, SMM



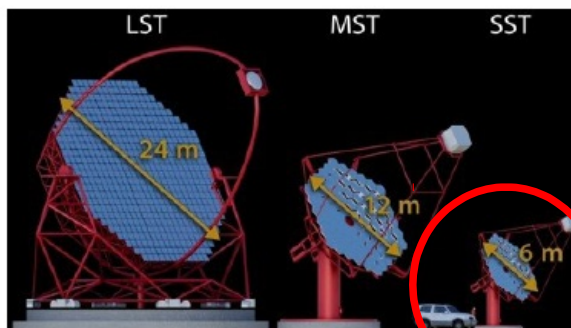
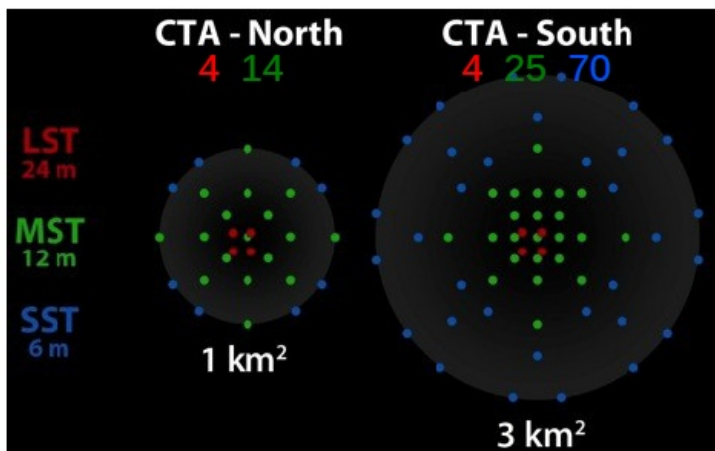
Characteristics

- 3 telescope classes
- 2 sites (South and North)
- About 120 (+25) telescopes





G Pérez, IAC, SMM



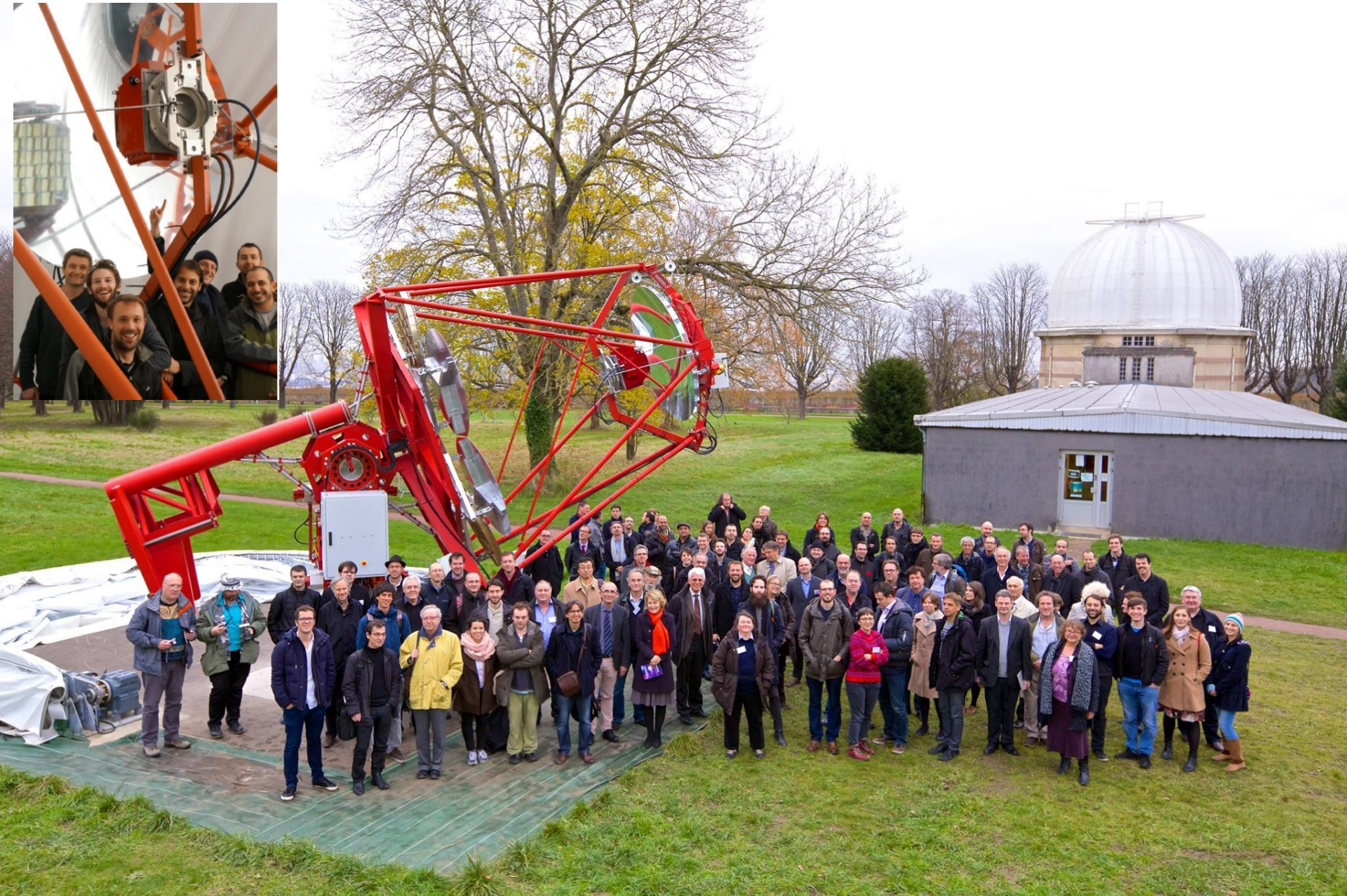
Characteristics

3 telescope classes
2 sites (South and North)
About 120 (+25) telescopes



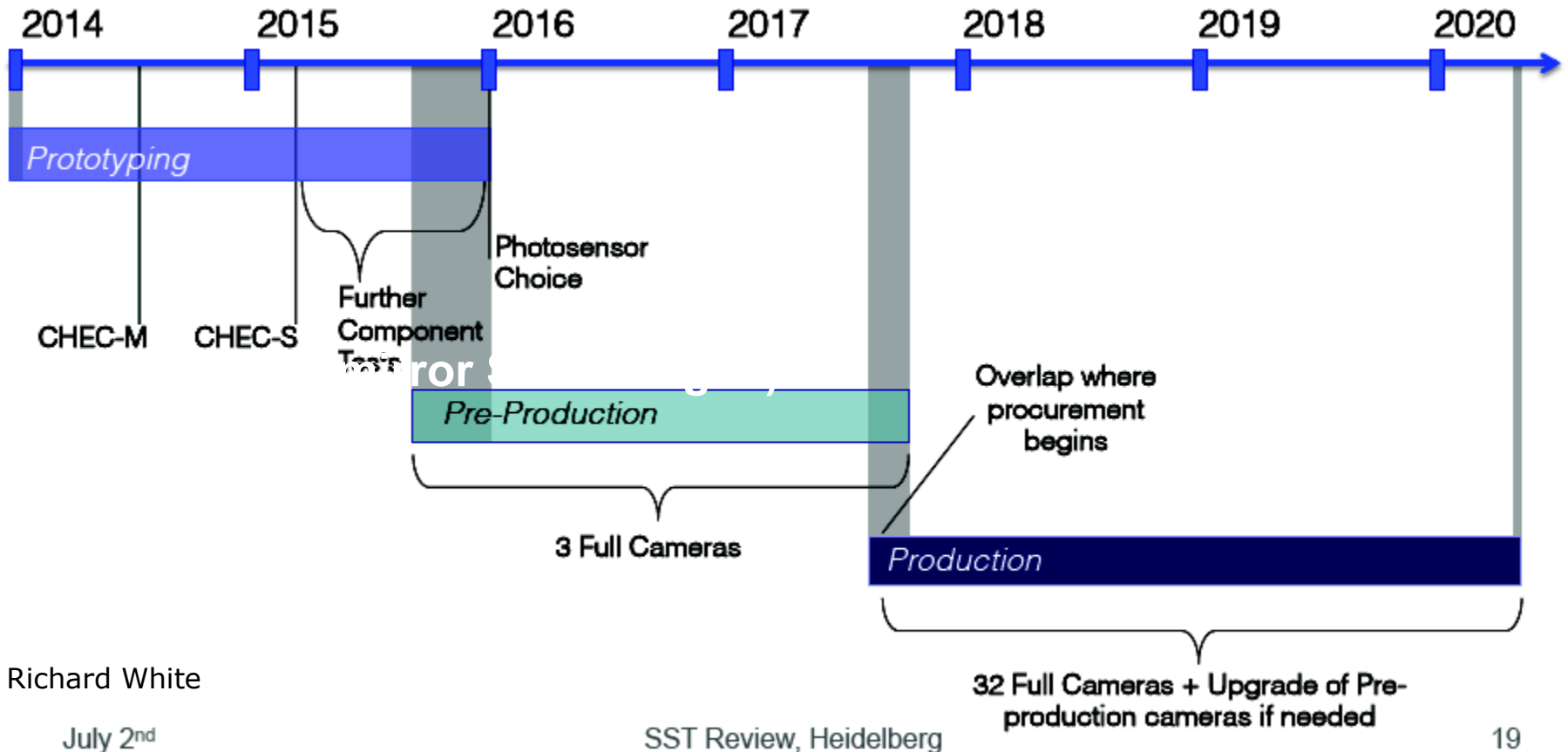
Australia contributes to the
Small Sized Telescopes (SSTs)

GCT Prototype (Small Size Telescope) – Dec. 2015 Paris



Australia - ARC LIEF 2015 support for GCT hardware and commissioning. LIEF#2 submitted

Timeline (2015) for GCT (Gamma Cherenkov Telescope)



Tim Greenshaw's talk ~5pm today...

Funding then, now, future.....

ARC LIEF 2015 \$465k (Adel, UNSW, ANU, USyd, UWS, Monash)

1. Si-PMs for 2-3 SST cameras (pre-production phase)
2. Additional camera hardware
3. Camera commissioning (travel, salary, labour)
4. CTA engagement (travel, meetings, **Adelaide 2015**)

NCRIS 2015/16

Items 2,3,4 above \$95k **This meeting**

ARC LIEF 2017+ **x5 yrs** (\$A550k/yr) application **submitted**

1. Si-PMs for production phase GCT cameras
2. Auxillary GCT parts
3. CTA Central on-costs (site prep, labour)
4. Research Assoc. salary (for telescope install/commission labour)

EoI submitted to CTA Project Office (Jan 2016) items 1, 2, 3

NCRIS 2016/17

Items 3,4 above \$95k

NCRIS 2017+ AAL HE/MM-Astro WG

- CTA engagement + Mopra 2017/18 'missing ARC LIEF'
- CTAO fees (40kEuro/yr now) min 2% share (membership) \$80k/yr
- CTAO running costs ~15kEuro/scientist/year ?

→ CTA-Australia project office/institute from now? Rep – AAL?

- Computation needs – HP Comp WG AAL

Linkages with Australian Astronomy:

ISM Surveys

- Mopra (CO, CS surveys, KSP extensions, LMC/SMC), HEAT (CI, C+)
- ASKAP (GASKAP HI, OH), MWA, UTMOST, SKA (RRLs..OH, HI..)

Radio Continuum

- MWA, UTMOST, ASKAP, SKA
- Deep Fields of CTA-KSP Regions, TeV Shell SNRs, TeV PWN, AGNs

Optical

- Shocked Gas Lines
- Deep Fields with Skymapper? AGN

X-rays

- E-Rosita, [Astro-H](#) surveys of CTA-KSP regions AGN

Particles

- Auger (CRs) & IceCube (PeVatrons)

Transients

- All above + A/LIGO GW triggers (new CoE hopefully!) AGNs

Theoretical HE Astro

- Optimising CTA observation targets for science impact

Industry Engagement (Hardware components from Australia?) LIDARs, PLATOs?

CTA General Meeting (Tokyo) May 2016

- G. Rowell, M. Burton, M. Filipovic, C. Braiding (MWL session Mon/Tues)
Talks on ISM, radio facilities, MWL support of CTA from Australia

ACTION ITEMS for me/us (Tokyo CTA Meeting)

- FTEs for Australia
- CTAO Membership → AAL rep? On CTAO Council (by 2017?) “full member”
CHECK – Any funding obligations attached to Founding Agreement?
- Australian industry/hardware engagement
(LIDAR, PLATOs, ...misc.)
- MWL/theory in-kind contributions recognised? Leverage Mopra etc outputs?
- KSP Science Use cases (talks at Tokyo)
- Explore MoUs with radio facilities (ASKAP, MWA, UTMOST, SKA, Optical!)
via AAL/CTA-Oz-office?
- Bid for CTA General meeting 2018 (April/May & Sept/Oct) or later? CTA PO
funding? Industry sponsor?

CTA-Australia Multi-wavelength Meeting (Sept. 2016)

- Focused on bringing our radio/MWL data into CTA
- Follow-up from Tokyo meeting...prepare for Bologna meeting..

CTA General Meeting (Bologna) Oct 2016

- Aim for CTAO membership by then?

Funding 2017+

- LIEF #2 2017-2021 Construction costs (mostly)
- NCRIS multi-year? CTAC/CTAO membership, travel, CTA-Oz Support Office?

CTA Meetings in Australia

- CTA-Australia 'regular' Apr (annual) WSU 2017
- CTA-Australia MWL Sept 2016, 2017 → annual?

MoUs

- ASKAP, MWA....
- Computing facilities (Pawsey)

HE/MM-Astro CTA Funding Request (5 years)

- CTAO membership fees (~40kEuro/yr?) \$70k/yr
- Formation of CTA-Australia Office/Headquarters \$50k/yr
- CTA-Australia engagement (as per prev. NCRIS awards) \$100k/yr
- CTA Support scientist salary \$150k/yr (incl 30% on-costs)
- Mopra support 2017/2018 only \$150k/yr essential ISM survey support.
(aim to leverage back some Mopra costs as in-kind MWL support).
- Explore options to offer Mopra/ATCA as support for CTAC science needs
(ISM maps, radio follow-ups of flares, transients)

2018+

Mopra \$350k/yr (\$500k/yr incl. science manager)

ATCA \$2.5M/yr min or pro-rata for XX hrs/yr

CTA Production-Phase Construction Costs:

CTA Cost Estimate

Used for Expression of Interest
By CTA-Australia (Jan 2016)

- GCT Si-PMs
- GCT Auxillary telescope hardware
- GCT commissioning

Not including CTA Central On-costs (30%)

→ **ARC LIEF #2**




OBS-TDR/140715 | v. 1.5 | 17 May 2015

Construction Project
Cost Estimate

Observatory Model

MAN-PLANS/150511 | v. 1.1 | 13 October 2015

WBS-Nr.	Description	# of items	Official CTA Cost Estimate per item	
			Equipment [EUR]	Labour [FTE]
4.6G.5.2.2.1	Photodetectors	4	48,088 €	0.01
4.6G.6	Auxillary	9	89,110 €	
4.6.G.7.3	GCT On-site Commissioning	30	1,743 €	0.03
Total (single item cost x no. of each item)			1,046,632 €	0.72

	Cherenkov Telescope Array	CTA Ref: MAN-PO/130119
	The CTA Consortium in the CTAO Phase: Membership, Rights and Duties	Version: 0.3 Date: 12. Feb. 2014 Page: 1/12

The CTA Consortium in the CTAO Phase: Membership, Rights and Duties

Authors/Editors	<i>Laboratory</i>	Approved by
Werner Hofmann		Discussion document

KEY SCIENCE PROJECTS

1. CTA Galactic Plane Survey
2. CTA Extragalactic Survey
3. Exploring extreme particle acceleration in the Galaxy
4. Probing DM with precision measurements of the Galactic Center
5. CTA studies on active galaxies
6. On the connection between cosmic rays and the star-formation process
7. Observations of clusters of galaxies
8. Observations of the LMC
9. Observations of the Cygnus region
10. Observation of Galactic DM dominated targets
11. Observations of transient phenomena

Some merging or down-selection to take place...