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DEREK BRUCE LEINWEBER  
*Curriculum Vitae*

## Contact Information

Centre for the Subatomic Structure of Matter  
Department of Physics  
University of Adelaide, SA 5005  
Australia

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Web: <http://www.physics.adelaide.edu.au/theory/staff/leinweber/>

## Citizenship

Nationality: Australian Citizen and Canadian Citizen

## Academic Record and Qualifications

### Doctor of Philosophy in Theoretical Physics

McMaster University, Hamilton, Ontario, Canada. (27 May 1989)  
Thesis Title: *QCD Sum Rule Analysis of Spin-Orbit Splitting in Baryons*  
Supervisor: Prof. Rajat K. Bhaduri

### Master of Science in Theoretical Physics

McMaster University, Hamilton, Ontario, Canada. (8 Nov. 1985)  
Thesis Title: *Vector Meson Decay and the Pion-Quark Coupling Constant*  
Supervisor: Prof. Rajat K. Bhaduri

### Honours Bachelor of Science in Theoretical Physics (with Distinction)

University of Guelph, Guelph, Ontario, Canada. (2 June 1983)  
Graduated first in the class of the College of Physical Sciences

## Current and Previous Appointments

### Professor (Level-E) – University of Adelaide

Department of Physics, School of Physical Sciences, University of Adelaide, SA 5005  
(2008–present)

*Research Focus:* Structure of Hadrons and their Excited States  
QCD Vacuum Structure  
Chiral Effective Field Theory

**Head of the School of Chemistry & Physics**

School of Chemistry & Physics, Faculty of Sciences, University of Adelaide, SA 5005  
(2008–2013)

**Associate Dean (ICT) – University of Adelaide**

Faculty of Sciences, University of Adelaide, SA 5005  
(2006–2008)

*Portfolio Focus:* Information and Communication Technology (ICT)  
Undergraduate student learning experience in ICT  
Enabling world class research

**Associate Professor (Level-D) – University of Adelaide**

Department of Physics and Mathematical Physics, University of Adelaide, SA 5005  
(2003–2007)

*Research Focus:* Strangeness magnetic moment of the proton  
Meson electromagnetic form factors  
Search for the Pentaquark resonance in Lattice QCD  
Hybrid and Exotic Meson Spectroscopy  
Quark and Gluon Propagator Structure  
Regularisation of chiral effective field theory

**Associate Director – ARC Special Research Centre for the Subatomic Structure of Matter (CSSM)**

Faculty of Sciences, University of Adelaide, SA 5005  
(2004–present)

**Deputy Director (Visualization) – South Australian Partnership for Advanced Computing (SAPAC)**

Level 1, Physics Building, University of Adelaide, SA 5005  
(2002–2009)

*Portfolio Focus:* Scientific Data Visualization  
Parallel Supercomputer Applications Development

**Tenured Senior Lecturer (Level-C) – University of Adelaide**

Department of Physics and Mathematical Physics, University of Adelaide, SA 5005  
(2000–2003)

*Research Focus:* Chiral symmetry and lattice QCD extrapolations  
Creation of the Fat-link Irrelevant Clover (FLIC) lattice fermion action  
Baryon electromagnetic form factors  
 $N^*$  baryon structure from the lattice  
Quark propagator structure

**Lecturer (Level-B) – University of Adelaide**

Department of Physics and Mathematical Physics, University of Adelaide, SA 5005  
(1997–1999)

*Research Focus:* Mean-field improved lattice QCD actions and odd-parity baryons  
Gluon propagator structure from lattice QCD with improved actions

**Postdoctoral Research Fellow – University of Washington**

Department of Physics, Box 351560, Seattle, WA, 98195, USA  
(1995–1996)

*Research Focus:* New finite-density nuclear-matter QCD sum rules for the nucleon  
QCD sum rule validity and Monte-Carlo uncertainty analysis

**Visiting Research Associate – TRIUMF**

Theory Group, 4004 Wesbrook Mall, Vancouver, B.C., Canada, V6T 2A3  
(1994–1995)

*Research Focus:* Compton scattering from lattice QCD  
Finite-density nuclear-matter QCD Sum Rules for vector-mesons  
QCD sum rules and  $\rho - \omega$  mixing with finite mesonic widths

**Postdoctoral Research Associate – The Ohio State University**

Department of Physics, 174 West 18th Avenue, Columbus, OH 43210-1106, USA  
(1993–1994)

*Research Focus:* Lattice QCD tests of QCD Sum Rule methods  
Chiral nonanalyticities in hadron electromagnetic properties  
Finite-density nuclear-matter QCD Sum Rules

**Postdoctoral Research Associate – University of Maryland**

Department of Physics, College Park, MD 20742, USA  
(1991–1993)

*Research Focus:* Hadron structure from lattice QCD  
Lattice field theory methods and techniques  
Chiral perturbation theory

**NSERC Postdoctoral Research Fellow in Theoretical Physics – TRIUMF**

Theory Group, 4004 Wesbrook Mall, Vancouver, B.C., Canada, V6T 2A3  
(1989–1991)

*Research Focus:* The electromagnetic structure of baryons in lattice QCD  
Magnetic moment sum rules

## Honours, Awards and Distinctions

### **Excellence in Teaching in the field of Physics**

2015 Certificate awarded by the Adelaide University Sciences Association

### **Chair of Lattice 2012 – International Symposium on Lattice Field Theory**

2012 Elected to host the premier meeting for the field of lattice field theory.

### **South Australian Science Excellence Awards Finalist – Science Educator of the Year**

2009 One of four finalists for Science Educator of the Year

### **South Australian Science Excellence Awards Finalist – Science Educator of the Year**

2008 One of three finalists for Science Educator of the Year

### **Australian Institute of Physics Walter Boas Medal**

2007 Awarded for original research making the “most important contribution to physics.”

### **Fellow of the Australian Institute of Physics**

2007 Recognises significant contributions to the field of Physics.

### **Executive Dean of Sciences Prize for Excellence in Teaching**

2007 Awarded for outstanding teaching in undergraduate science at the University of Adelaide to staff with more than five years of teaching experience.

### **Stephen Cole the Elder Prizes for Excellence in Teaching**

2007 Nominated for outstanding teaching in undergraduate courses at the University of Adelaide.

### **Stephen Cole the Elder Prizes for Excellence in Teaching**

2006 Nominated for outstanding teaching in undergraduate courses at the University of Adelaide.

### **Nobel Prize Lecture**

2004 Renowned for lattice QCD research illustrating the vacuum structure of Quantum Chromodynamics, featured in the Nobel Prize Lecture by Prof Frank Wilczek. Published in *Les Prix Nobel. The Nobel Prizes 2004*, Editor Tore Frängsmyr, [Nobel Foundation], Stockholm, 2005.

### **Baryons '95 International Conference**

1995 Prize for Best Presentation by a Young Investigator

### **TRIUMF**

1989–91 Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship

### **McMaster University**

1985–87 Desmond G. Burns Graduate Scholarships in Theoretical Physics

1983–86 NSERC Postgraduate Scholarships

1983–86 Harry Lyman Hooker Graduate Scholarships

### **University of Guelph**

1983 College of Physical Science Graduation Prize (1st in class)

1982–83 NSERC Summer Research Scholarships.

1982 Alma Mater B. Sc. and College of Physical Science Scholarships.

1981 Copernicus and University of Guelph Early In Course Scholarships.

1979–80 University of Guelph Entrance and Honours Physics Scholarships.

### **Canada-Wide Science Fair**

1979 Canadian Association of Physicists Prize for best physics investigation.

## Research Supervision and Mentoring

### Summary

- Graduated 27 postgraduate students. Currently Principal Supervisor of 4 postgraduate students.
- Graduates have received the Postgraduate Alumni University Medal for best PhD thesis at the University of Adelaide and University Doctoral Research Medals.
- Four Graduates received the Faculty of Sciences Woolhouse Prize for best PhD thesis.
- Five Graduates were deemed to have the best Physics PhD thesis in South Australia.
- Graduated 23 Honours students.
- Supervised more than 50 students in Summer-Research and Course-Work Projects.

### Postgraduate Research Supervision and Mentoring

- **Ryan Bignell** – PhD Program – 2016 to present  
Exploration of Background Field Methods in Lattice QCD
- **Finn Stokes** – PhD Program – 2013 to present  
Centre Clusters in Finite Temperature QCD  
Electromagnetic Transitions of Nucleon Excited States
- **Adrian Kiratidis** – PhD Program – 2012 to present  
Multi-Particle Structure of Baryon Excitations in Lattice Quantum Chromodynamics
- **Sam Thomas** – PhD Program – 2012 to present  
Vacuum Structure and Hadron Spectroscopy  
Relativistic wave function of the nucleon and its excited states
- **Daniel Trewartha** – PhD Program – 2012 to 2016 – **Graduated**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
Centre Vortices Underpin Dynamical Chiral Symmetry Breaking in  $SU(3)$  Gauge Theory
- **Ben Owen** – PhD Program – 2011 to 2015 – **Graduated**  
**2016 AIP Bragg Gold Medal Nomination**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
A Variational Approach to Hadron Structure in Lattice QCD  
**Postdoctoral Position:** Australian Government Bureau of Meteorology, Melbourne VIC
- **Dale Roberts** – PhD Program – 2009 to 2014 – **Graduated**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
The Wave Function of the Nucleon and its Excited States  
**Postdoctoral Position:** National Computational Infrastructure,  
Australian National University, Canberra ACT, Australia.
- **Thomas Primer** – PhD Program – 2009 to 2013 – **Graduated**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
Background Field Formalism in Lattice QCD  
**Postdoctoral Position:** University of Arizona, USA

- **Adrian Kiratidis** – MPhil Program – 2010 to 2012 – **Graduated**  
**Dean’s Commendation for M.Phil. Thesis Excellence**  
 Multi-Particle Baryon Spectroscopy in Lattice Quantum Chromodynamics
- **Daniel Trewartha** – MPhil Program – 2010 to 2012 – **Graduated**  
**Dean’s Commendation for M.Phil. Thesis Excellence**  
 The Influence of Instantons on the Quark Propagator in Lattice Quantum Chromodynamics
- **Jonathan Hall** – PhD Program – 2008 to 2011 – **Graduated**  
**2011 CSSM Doctoral Prize**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
 Intrinsic Scales in Chiral Effective Field Theory  
**Postdoctoral Position:** CSSM, University of Adelaide
- **Ahmed El Bakry Mahmoud** – PhD Program – 2007 to 2010 – **Graduated**  
 Confining String in Finite Temperature Lattice QCD  
**Postdoctoral Position:** CSSM, University of Adelaide
- **Peter Moran** – PhD Program – 2007 to 2010 – **Graduated**  
**2010 University Doctoral Research Medal**  
**2010 Woolhouse Prize**  
**2010 CSSM Doctoral Prize**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
 QCD Vacuum Structure from Lattice QCD  
 Electromagnetic Form Factors  
 Centre Vortex Phenomenology  
**Postdoctoral Position:** CSIRO continuing position, Melbourne, VIC
- **Selim Mahbub** – PhD Program – 2006 to 2010 – **Graduated**  
 Roper Resonance in Lattice QCD  
**Postdoctoral Position:** CSSM, University of Adelaide
- **Jonathan Carroll** – PhD Program – 2006 to 2009 – **Graduated**  
**2009 University Doctoral Research Medal**  
**2009 CSSM Doctoral Prize**  
**Dean’s Commendation for Doctoral Thesis Excellence**  
 Hadronic Physics and Stellar Models  
**Postdoctoral Position:** CSSM, University of Adelaide
- **John Hedditch** – PhD Program – 2002 to 2007 – **Graduated**  
**2007 Postgraduate Alumni University Medal**  
**2007 Woolhouse Prize**  
**2007 SA AIP Bragg Gold Medal Nomination**  
 Correlation Matrix Analysis of Nucleon Resonances  
 Hybrid Meson Spectroscopy and Exotics  
 Electromagnetic Form Factors of Mesons  
**Postdoctoral Position:** University of Queensland, Brisbane
- **Ben Lasscock** – PhD Program – 2003 to 2007 – **Graduated**  
**2007 CSSM Doctoral Prize**  
 Vacuum Response to Colour Sources

Correlation Matrix Analysis of Nucleon Resonance Spectrum  
Pentaquark Baryon Spectroscopy

**Postdoctoral Position:** Research Scientist, Grinham Managed Funds, Crows Nest, NSW

- **Marco Bartolozzi** – PhD Program – 2003 to 2006 – **Graduated**  
**2006 Woolhouse Prize**  
**2006 SA AIP Bragg Gold Medal Nomination**  
Econophysics: Self-Organized Criticality and Stock Market Dynamics  
**Postdoctoral Position:** Research Scientist, Grinham Managed Funds, Crows Nest, NSW
- **Sharada Boinepalli** – PhD Program – 2003 to 2006 – **Graduated**  
Covariance Matrix Analyses of Electromagnetic Form Factors  
**Postdoctoral Position:** Surface Ship Combat Systems, Maritime Operations, DSTO.
- **Ian Cloet** – PhD Program – 2003 to 2006 – **Graduated**  
Finite Range Regularised Chiral Perturbation Theory  
Open Chanel Physics in Delta Magnetic Form Factors  
**Postdoctoral Position:** Argonne National Laboratory, Argonne, IL, USA
- **Maria Parappilly** – PhD Program – 2003 to 2006 – **Graduated**  
Nonperturbative Gluon and Quark Propagators in Full QCD  
**Postdoctoral Position:** Lecturer, Flinders University, SA
- **Ross Young** – PhD Program – 2001 to 2004 – **Graduated**  
**2004 Woolhouse Prize**  
**2004 SA AIP Bragg Gold Medal Nomination**  
Finite Range Regularized Chiral Effective Field Theory  
Quenched Chiral Perturbation Theory  
Unquenching Baryon Masses and Magnetic Form Factors  
**Postdoctoral Position:** Jefferson Lab, Newport News, VA, USA with Tony Thomas.
- **Jon Ashley** – MSc Program – 2002 to 2004 – **Graduated**  
Chiral Extrapolation of Electromagnetic Form Factors  
**Post-MSc Position:** Musician, Melbourne, VIC, Australia.
- **Waseem Kamleh** – PhD Program – 2000 to 2003 – **Graduated**  
**2003 SA AIP Bragg Gold Medal Nomination**  
FLIC-Overlap Fermions  
Mass and Renormalisation Functions of the FLIC-Overlap Propagator  
Dynamical FLIC-Fermion Simulations via the Hybrid Monte Carlo (HMC) Algorithm  
**Postdoctoral Position:** School of Mathematics, Trinity College, Dublin 2, Ireland with Mike Pardon.
- **James Zanotti** – PhD Program – 1999 to 2002 – **Graduated**  
**2002 SA AIP Bragg Gold Medal Nomination**  
Novel Fat-Link Fermion Actions  
Nucleon Resonances from Lattice QCD  
Off-Axis Anisotropic Static Quark Potential in HPF  
Study of Two-Loop Scaling in Nonperturbative QCD  
**Postdoctoral Position:** John von Neumann-Institut für Computing NIC/DESY, 15738 Zeuthen, Germany, with Gerrit Schierholz.

- **Frederic Bonnet** – PhD Program – 1998 to 2002 – **Graduated**  
Pseudo-heatbath  $\mathcal{O}(a^2)$ -Improved Anisotropic Gauge Field Generation in HPF  
APE Smearing and Cooling in HPF  
Overlap Fermion Quark Propagator  
**Postdoctoral Position:** University of Regina, Regina, SA, Canada with Randy Lewis.
- **Sundance Bilson-Thompson** – PhD Program – 1998 to 2002 – **Graduated**  
Derivation of  $\mathcal{O}(a^4)$ -Improved QCD Operators  
Highly-Improved Cooling and Smearing in High Performance Fortran (HPF)  
Nahm Transform on the Lattice  
**Postdoctoral Position:** Seoul National University, South Korea with Weonjong Lee.
- **Stewart Wright** – PhD Program – 1998 to 2002 – **Graduated**  
Chiral Behavior of the Rho Meson in Lattice QCD  
The Sigma Commutator from Lattice QCD  
Baryon Masses from Lattice QCD: Beyond the Perturbative Chiral Regime  
**Postdoctoral Position:** University of Liverpool, UK with Chris Michael.
- **Daniel Kusterer** – Masters Program – 2001 – **Exchange Student**  
Eigenmode Correlations of the Hermitian Wilson Dirac Operator  
**Diploma Thesis Student:** Universität Tübingen, Germany with Kurt Langfeld.
- **Emily Hackett-Jones** – Masters Program – 2000 to 2001 – **Graduated**  
Chiral Extrapolations of Octet Baryon Magnetic Moments and Charge Radii  
**Postgraduate Student:** Cambridge University, UK.
- **Patrick Bowman** – PhD Program – 1998 to 2000 – **Graduated**  
 $\mathcal{O}(a^2)$ -Improved Conjugate-Gradient-Accelerated Landau-Gauge Fixing  
 $\mathcal{O}(a^2)$ -Improved Gluon Propagator in Coordinate and Momentum Space  
**Postdoctoral Position:** Florida State University, USA with Urs Heller.

## Honours Research Supervision and Mentoring

- **Helen Geng** – full time 2016  
Novel Stochastic Noise methods for All-to-All Baryon Correlation Functions
- **Henry Anderson** – full time 2015  
Overlap-Dirac Eigenmodes and Centre Vortex Vacuum Structure
- **Ryan Bignell** – full time 2015  
Hadron Spectroscopy with Exotic Interpolating Fields
- **Joshua Charvetto** – full time 2015  
Correlations in the Vacuum Structure of QED+QCD Lattice Gauge Fields
- **Zachary Koumi** – full time 2014  
Matrix Hamiltonian Eective Field Theory
- **Karl Asenstorfer** – full time 2013  
Variational Approach to the Nucleon Spectrum in Lattice QCD
- **Finn Stokes** – full time 2012  
Visualisations of coherent center domains in local Polyakov loops

- **Jack Dragos** – full time 2012  
Nucleon Axial Charge from Lattice QCD Using Correlation Matrix Techniques
- **Ben Owen** – full time 2010  
Meson Electromagnetic Transitions in Lattice QCD
- **Sam Thomas** – full time 2010  
Hadron Mass Spectrum in an Instanton Dominated Vacuum
- **Elyse O'Malley** – full time 2009  
Hadron Mass Spectrum in Centre Vortex Free QCD
- **Dale Roberts** – full time 2008  
Nucleon Wave Function in an External Magnetic Field
- **Thomas Primer** – full time 2008  
Magnetic Polarizability of the Nucleon
- **Jonathan Hall** – full time 2007  
Quenched and Unquenched Chiral Effective Field Theory of Vector Mesons
- **Peter Moran** – full time 2006  
Influence of Dynamical Fermions on the Topological Structure of QCD
- **Sebastian Wende** – full time 2005  
Wavelet Transform Analysis of the Multi-fractal Nature of Time Series
- **James Chappell** – full time 2005  
Superstatistics Distributions Underlying Financial Time Series
- **Ryan Coad** – full time 2003  
Nonperturbative Quark Propagator in Laplacian Gauge
- **Mariuz Hoppe** – full time 2003  
Baryon Mass Spectrum of FLIC-Overlap Fermions
- **Ian Cloet** – full time 2002  
Delta Baryon Magnetic Moments in Padé-Improved Chiral Perturbation Theory
- **Ben Lassoock** – full time 2002  
Lattice Scale Determinations via the Static Quark Potential Sommer Scale
- **Ben Crouch** – full time 2001  
Meson-Baryon Couplings for Nucleon Resonances
- **John Hedditch** – full time 2001  
Parallel Tree-Code for the N-Body Problem

### **Affiliated Postdoctoral Research Fellows**

- **Dr Waseem Kamleh** – Senior Research Fellow – 2012 to present  
Co-Leader of CSSM Lattice Collaboration

- **Dr Jiajun Wu** – full time 2014 to present  
Hamiltonian Effective Field Theory  
Novel Stochastic Noise Methods in Lattice QCD
- **Dr Zhan-Wei Liu** – full time 2014 to present  
Hamiltonian Effective Field Theory  
Baryon Excitation Spectrum of Lattice QCD
- **Dr Jonathan Hall** – full time 2011 to 2013  
Matrix Hamiltonians in Chiral Effective Field Theory  
Graded Symmetry Approach to Partially Quenched Chiral Effective Field Theory
- **Dr Selim Mahbub** – full time 2010 to 2013  
Nucleon Mass Spectrum in Lattice QCD
- **Dr Ahmed El Bakry Mahmoud** – full time 2011 to 2012  
Confining String in Finite Temperature Lattice QCD
- **Dr Ben Lasscock** – full time 2006 to 2007  
Magnetic Polarizabilities in the Background Field Formalism  
Centre Vortex Phenomenology
- **Dr Alan O’Cais** – full time 2006 to 2008  
All-to-all propagator techniques  
Centre Vortex Phenomenology
- **Dr Andre Sternbeck** – full time 2006 to 2008  
Quark, gluon and ghost propagators
- **Dr Ping Wang** – full time 2003 to 2005  
Partially-quenched finite-range regularised chiral effective field theory  
Chiral SU(3) Quark Mean-Field Model  
Liquid-Gas Phase Transition of Strange Hadronic Matter
- **Dr Waseem Kamleh** – full time 2003 to 2004  
FLIC-Overlap Fermions  
Dynamical FLIC-Fermion Simulations via the Hybrid Monte Carlo (HMC) Algorithm
- **Dr Danielle Morel** – full time 2002 to 2004  
Chiral Extrapolation of Baryon Resonance Masses
- **Dr Patrick Bowman** – full time 2002 to 2003  
Laplacian and Landau Gauge Quark and Gluon Propagators
- **Dr James Zanotti** – full time 2002 to 2003  
Chiral Properties of Baryon Electromagnetic Form Factors via FLIC Fermions
- **Dr Jianbo Zhang** – full time 2000 to 2005  
Baryon Electromagnetic Form Factors Correlation Functions  
Overlap Fermion Quark Propagator and Topology  
Nonperturbative Renormalization
- **Dr Jon Ivar Skullerud** – full time 1997 to 1999  
Baryon Electromagnetic Form Factors Correlation Functions  
Overlap Fermion Quark Propagator and Topology

## Learning and Teaching Experience

### Physics 1A – Thermodynamics – Presented 2016

- Year level:** First year, first semester.
- Duties:** Create and present eleven one-hour lectures and four one-hour tutorials. Prepare MyUni quizzes, assignment questions, tutorial problems and associated solutions. Set and mark the final exam.
- Material:** Ideal gas temperature, Zeroth law, expansion of materials, specific heat, latent heat, heat transfer, radiation, First law, kinetic theory,  $P$ - $V$ - $T$  & thermodynamic processes.
- Innovations:** Increased relevance through real-life demonstrations of thermodynamics. Explored unfamiliar territory with liquid nitrogen experiments. Stimulated interest by linking thermodynamic convection to Chaos and illustrating the Lorenz attractor via [advanced computer visualization techniques](#). Created an ideal-gas simulator to present and reinforce kinetic theory concepts. See <https://youtu.be/RF-RHTWSxN8> for an example simulation.

### Physics 1B – Special Relativity and Quantum Physics – Presented 2016

- Year level:** First year, second semester.
- Duties:** Create and present eleven one-hour lectures and four one-hour tutorials. Prepare MyUni quizzes, assignment questions, tutorial problems and associated solutions. Set and mark the final exam.
- Material:** Postulates, relativity of simultaneity, time dilation, length contraction, ladder-garage paradox, twin paradox, Lorentz transformations, adding velocities, relativistic dynamics, antimatter, tomography, x-ray diffraction, photoelectric effect, Compton scattering, diffraction of matter, Heisenberg uncertainty principle, Schrödinger's cat, models of the atom, particle physics.
- Innovations:** Stimulated interest via discussions of realism, determinism and Schrodinger's cat. Extensive use of YouTube videos in Lectures to reinforce concepts. Creation of new YouTube videos to bring research-level concepts into first year. (See the Science Promotion section).

### Electromagnetism II – Electromagnetism – Presented 2016

- Year level:** Second year, second semester.
- Duties:** Subject coordinator. Present three one-hour lectures each week. Present two one-hour tutorials weekly. Prepare and grade assignments, tests and the final exam.
- Material:** Index notation, line, surface and volume integration, curvilinear coordinates, Gauss and Stokes' theorem, Laplace and Poisson equations, boundary-value problems, generalized functions, tensors, magnetostatics.
- Innovations:** Introduced "Conceptual Mediation" techniques to improve students' adoption of new concepts such as index notation. Stimulated interest and understanding in gradients and isosurfaces using [visualizations of vacuum fields](#) from Quantum Chromodynamics.

## Computational Physics III – High-Performance Fortran – Presented 2016

- Year level:** Third year, first semester.
- Duties:** Course Coordinator. High-Performance Fortran Curriculum creator.  
Create and present 24 one-hour lectures and 12 three-hour workshops.  
Create novel projects each year and establish model-program solutions.  
Prepare and grade tests and the final exam.
- Material:** Computational physics coding tactics in Fortran-95, numerical integration via Quadpack, data interpolation, integration of ordinary differential equations via 5th-order Runge-Kutta, Lorenz attractor,  $N$ -body problem, optimization of functions, data fitting, Monte-Carlo simulations, Ising spin system, Message Passing Interface (MPI) techniques for parallel programming.
- Innovations:** Real-time simulations with visualization via the PL-Plot library.  
 $N$ -body simulations of solar-system and black-hole formation, gases in gravitational fields, and gravitational wave emission via post-Newtonian corrections.  
See [https://youtu.be/xHgfFZ\\_SW2g](https://youtu.be/xHgfFZ_SW2g) for a galaxy collision example.  
See <https://youtu.be/XJkB9fikLes> for gravitational wave emission.

## Quantum Mechanics III

- Year level:** Third year, first semester.
- Duties:** Subject coordinator. Present 36 one-hour lectures and 24 tutorials.  
Prepare and grade assignments and the final exam.
- Material:** Postulates of Q.M., Dirac bra-ket notation, Symmetry and conservation, Angular momentum, Schrodinger equation in 3 dimensions, Perturbation theory and the Fine structure of hydrogen.
- Innovations:** Stimulated interest via discussions of determinism, measurement and Schrodinger's cat. Introduced computer generated animations of 3D volume-rendered plots of wave functions to increase understanding.

## Relativistic Quantum Mechanics & Particle Physics – Particle Physics – Presented 2016

- Year level:** Honours (fourth) year, first semester.
- Duties:** Present 12 one-hour lectures  
Prepare and grade assignments and the final exam.
- Material:** Dirac equation, Lorentz transformations, Antimatter, Parity, Charge conjugation, Gyromagnetic ratio, Klein-Gordon and Dirac central potential solutions, Symmetry and conservation in Particle Physics, Standard model of the universe
- Innovations:** Incorporate recent developments at the cutting-edge of particle physics including neutrino oscillations, Higgs boson, lattice QCD, dynamical mass generation, exotic hadrons and strangeness in the proton.

## Science Promotion Events

- “Empty Space is NOT Empty” <http://www.youtube.com/watch?v=J3xLuZnKh1Y>
  - Collaboration with Derek Muller, creator of *Veritasium* a popular YouTube science video blog with over 3.7 million subscribers.

- We discuss how the empty vacuum of space is unstable to the formation of quark and gluon field fluctuations which generate mass in our universe.
- Video released 30 April 2013 has over **1,063,000 views** and more than **17,600 likes**.
- **“Your Mass is NOT from Higgs Boson”** <http://www.youtube.com/watch?v=Ztc6QPNUqls>
  - Collaboration with Derek Muller, creator of *Veritasium*.
  - We explain quark confinement by digging “flux-tube” trenches in a sandy beach near Sydney. Derek’s time-lapse photography works well.
  - Released 8 May 2013, this video has over **1,327,000 views** and more than **26,500 likes**.
- **“Soccer Science”**
  - Introduced as Australia’s Soccer Scientist for World Cup Soccer events in 2006, 2010 and 2014.
  - Bring the physics behind soccer ball aerodynamics to the general public.
  - Predict how the new ball will fly and why.
  - Connecting surface defects and texture to flow-dependent drag and lift coefficients and using computational physics techniques to solve for the ball’s trajectory, predictions of the new ball’s behaviour as a function of velocity, spin, air pressure, etc. are made.
  - My video animations showed how the Jabulani soccer ball would bend better than any previous soccer ball while the Brazuca was best described as predictable.

Some significant media results have come out of this research, notably:

- News coverage on every major Australian TV station - 10, 9, 7, ABC and SBS,
- The Australian page 3, and The Advertiser news stories,
- National syndication for the stories on 10 (syndicated to One HD sports report), 9 and ABC TV and radio,
- Coverage on the PM program on Radio National,
- Follow up interviews on 3AW (Melbourne) and 6PR (Perth)
- Inclusion of the computer simulation video in [AdelaideNow](#)

A month after the announcement, over 380 stories were published in 49 countries and a Google search of “Leinweber Jabulani” returned the order of 7,740 internet articles.

- **“2006 Ashes Banquet” Cricket DVD Production**
  - Assisted Neil Smith of tav Productions with the creation of a DVD video to entertain 1,400 guests at the 2006 Ashes Banquet in Adelaide, SA on 29 November 2006.
  - Provided expert advice on the research of cricket-ball aerodynamics.
  - Contributed to concept design, writing and presented in video.
  - Advised SA Cricket Association Bowlers, Sean Tait and Greg Blewett on the science of reverse swing.
- **“Veer it like Viduka” Soccer DVD Production**

- Assisted Linda Cooper with the SA Government Science Outside the Square project to create a DVD on Soccer Science.
- Designed to entertain 6,000 guests at Hindmarsh Stadium on the eve of Australia's first game in the 2006 World Cup series on 12 June 2006.
- Provided expert advice on the science of soccer-ball aerodynamics.
- Contributed to concept design and presented in video.

## Research in the Popular Media

- **“A new discovery in Quantum Chromodynamics”**

The subatomic particle Lambda 1405 has been of interest to physicists for more than 50 years, with the scientific community speculating about what it looks like . . .

”Sound of Science” 101.5 fm Radio Adelaide interview with Sarah Martin.

Broadcast 22 April 2015

The 23 minute podcast is available at

<https://radio.adelaide.edu.au/wp-content/uploads/2015/04/Derek-Leinweber-Quantum-Chromodynamics.mp3>

- **“Baryons Innards Have Molecular Structure”**

The Lambda baryon, in its excited state, behaves like a molecule, according to new lattice chromodynamics simulations of the particles magnetic structure.

Synopsis by Jessica Thomas, Editor, *Physics*, providing daily online-only news and commentary about a selection of papers from the APS journal collection.

1 April 2015

<http://physics.aps.org/synopsis-for/10.1103/PhysRevLett.114.132002>

- **“Exotic particle turns out to be quark molecule”**

Simulations suggest Lambda (1405) is meson-baryon combo

News in Brief, Particle Physics article by Andrew Grant, published 11:04am, 3 April 2015 in *Science News*, Magazine of the Society for Science & the Public

Vol. **187** No. 9, May 2, 2015, p. 18.

<https://www.sciencenews.org/article/exotic-particle-turns-out-be-quark-molecule>

- **“Mysterious baryon resonance is a subatomic molecule, say physicists”**

Physicists in Australia have produced further evidence that an excited state of the lambda baryon is a “subatomic molecule” . . .

by Hamish Johnston, editor of physicsworld.com

7 April 2015

<http://physicsworld.com/cws/article/news/2015/apr/07/mysterious-baryon-resonance-is-a-subatomic-molecule-say-physicists>

- **“Altmetric: Overview of Attention”**

for the article “Lattice QCD Evidence that the  $\Lambda(1405)$  Resonance is an Antikaon-Nucleon Molecule” published in *Physical Review Letters*, 1 April 2015

As of the 22 June 2015, Altmetric has tracked 3,922,965 articles across all sources. Compared to these this article has done particularly well and is in the 97th percentile: it's in the **top 5% of all articles** ever tracked by Altmetric. Ranked 589 of 12,641 articles in PRL, it's in the **top 5% of PRL articles**.

<https://aps.altmetric.com/details/2886627>

- **“Bowled Warnie! Scientists reveal the secrets of spin”**  
Discussion of the cricket spin-bowling research of Garry and Ian Robinson.  
Article in *The Guardian* by Nick Evershed  
5 July 2013  
<http://www.theguardian.com/sport/2013/jul/05/cricket-spin-bowling-scientists-workings>
- **“Aussie boffins reveal the science of spin bowling”**  
Discussion of the cricket spin-bowling research of Garry and Ian Robinson.  
Article in the UK’s *The Week with the First Post*  
5 July 2013  
<http://www.theweek.co.uk/sport/53992/aussie-boffins-reveal-science-spin-bowling>
- **“Particle research recognised in physics award”**  
News release on the award of the Australian Institute of Physics 2007 Walter Boas Medal to Associate Professor Derek Leinweber, for original research making the “most important contribution to physics.”  
By Robyn Mills, Media and Corporate Communications Officer, University of Adelaide  
19 October 2007  
<http://www.adelaide.edu.au/news/print22417.html>
- **“Original Research Makes Big Impact”**  
News release: Derek Leinweber has made world-leading contributions to quantum chromodynamics, the quantum field theory of the strong force. . .  
Australian Institute of Physics  
12 October 2007  
<http://aip.org.au/medals-awards-and-prizes/walter-boas-medal/>
- **“A Quantum Leap”**  
Quote in article on advances in Loop Quantum Gravity and the “Big Bounce” by David Derbyshire and Maria Moscaritolo.  
The Advertiser Newspaper  
3 July 2007
- **“‘Quark’ research sheds light on matter”**  
Article exploring the strange-quark charge-distribution radius within the proton.  
ABC News Online: sci-tech  
7 September 2006  
[http://www.abc.net.au/science/news/scitech/SciTechRepublish\\_1734952.htm](http://www.abc.net.au/science/news/scitech/SciTechRepublish_1734952.htm)
- **“Strange Quark Reveals Its Secrets”**  
Article discussing the role of strange-quarks within the nucleon.  
Photonics News and Features article  
7 September 2006  
<http://www.photonics.com/Article.aspx?PID=6&VID=27&IID=196&AID=26735>
- **“Dissecting the atom”**  
Article probing the strange-quark contribution to proton structure.  
Advertiser Newspaper article, page 14, by Cara Jenkin  
6 September 2006
- **“Physicists charged over strange quarks”**  
Article examining our precise determination of the strange-quark charge-distribution radius within

the proton.

ABC Science Online: News in Science article by Stephen Pincock  
6 September 2006

<http://www.abc.net.au/science/news/stories/2006/1734251.htm>

[http://www.fnal.gov/pub/today/archive\\_2006/today06-09-07.html](http://www.fnal.gov/pub/today/archive_2006/today06-09-07.html)

- **“Leap towards Holy Grail of particle physics”**

Article presents our precise determination of the strange-quark charge-distribution radius within the proton.

Adelaidean September 2006 Issue: News from the University of Adelaide by Robyn Mills  
6 September 2006

<http://www.adelaide.edu.au/adelaidean/binary1781/September.pdf>

<http://www.adelaide.edu.au/adelaidean/issues/14381/news14390.html>

- **“Particle physics calculations improved”**

Article announces our precise determination of the strange-quark charge-distribution radius within the proton.

5 September 2006

United Press International article

[http://www.upi.com/Science\\_News/2006/09/05/Particle-physics-calculations-improved/26011157480336/](http://www.upi.com/Science_News/2006/09/05/Particle-physics-calculations-improved/26011157480336/)

<http://news.webindia123.com/news/Articles/Science/20060906/441869.html>

- **“New clue to world’s tiniest particles”**

Article announces our precise determination of the strange-quark charge-distribution radius within the proton.

Research Story, Media Release: News from the University of Adelaide by Robyn Mills  
4 September 2006

<http://www.adelaide.edu.au/news/news14502.html>

<http://www.newswise.com/articles/view/523208/>

Australian Physics, **43**, 176 (2006)

- **“Cure or Killer - The Nuclear Future”**

Advertiser Newspaper Round Table discussion on uranium enrichment and the nuclear industry with

- Foreign Affairs Minister Alexander Downer
- Mineral Resources Development Minister Paul Holloway
- SA Chamber of Mines Chief Executive Phillip Sutherland
- University of Adelaide Physicist Assoc Prof Derek Leinweber
- Australian Conservation Foundation campaign officer David Noonan
- Chris Russell, Advertiser Business Editor
- Paul Starick, Advertiser Chief Reporter
- Cameron England, Advertiser Chief Business Reporter

The Advertiser Newspaper, Pages 42–45.

29 August 2006

- **“Aerodynamics of the New 2006 World Cup Soccer Ball, the Teamgeist”**

Radio interview featuring “Australia’s Soccer Scientist,” Derek Leinweber.

ABC National News Radio interview, Australia.

12 June 2006

- **“World Cup ball to bend more: scientist”**  
Article discusses the aerodynamics of the new World Cup soccer ball, the Teamgeist  
The Age, The Sydney Morning Herald and Yahoo! 7 Sport, by Tim Dornin  
10 June 2006  
<http://www.theage.com.au/news/Sport/World-Cup-ball-to-bend-more-scientist/2006/06/10/1149815348622.html>  
<http://www.smh.com.au/news/Sport/World-Cup-ball-to-bend-more-scientist/2006/06/10/1149815348622.html>
- **“World Cup ball to bend more says SA scientist”**  
Article discusses the aerodynamics of the new World Cup soccer ball, the Teamgeist  
Australian Associated Press - Sports News, by Tim Dornin  
9 June 2006
- **“Veer it like Viduka”**  
Article highlights the Science Outside the Square event at Hindmarsh Stadium on 12 June focusing  
on soccer science and the launch of the DVD “Veer it like Viduka.”  
The Advertiser, Page 3, by soccer writer Daniel Lato  
1 June 2006
- **“Elementary Findings that Matter”**  
Article features the research of the CSSM  
The Independent Weekly by Karen Phillips.  
15 January 2006
- **“How Einstein’s dead wrong, relatively speaking”**  
Quote in article on the research of Prof Reg Cahill  
The Australian by Verity Edwards.  
7 November 2005
- **“Strange particles a quark of nature”**  
Article examines the role of strange quarks in proton structure  
Adelaidean Issue 6, August 2005: News from the University of Adelaide by Ben Osborne.  
18 August 2005  
<http://www.adelaide.edu.au/adelaidean/issues/6201/news6227.html>
- **“Adelaide Physics Link to Nobel Prize Lecture”**  
Article highlights the inclusion of QCD Vacuum Structure animations in the Nobel Prize acceptance  
speech of Prof David Wilczek.  
University of Adelaide News Room by David Ellis.  
17 December 2004  
<http://www.adelaide.edu.au/news/news3281.html>
- **“Gluon Vacuum Structure and the Connection of QCD to Cosmology.”**  
Radio interview with Fritz Thorgessln of PM Magazine, Munich, Germany.  
10 January 2001

## Newspaper Article Publications

In 2005 the University of Adelaide’s Faculty of Sciences teamed up with Jamie Seidel of *The Advertiser* newspaper to create a weekly column featuring engaging science articles in which one asks *Can you believe it?* Articles appeared on the inside cover of the *Review* section of the Saturday paper on page 2. It was a pleasure to bring fascinating aspects of physics to the readers of The Advertiser. The articles are available

today at

<http://www.physics.adelaide.edu.au/theory/staff/leinweber/Advertiser/>

16. **“Screaming Magnets”**

Derek Leinweber

Could renowned physicist Michael Faraday - as he played around with magnets and coils of wire in his 1831 laboratory - have anticipated the wild screams of Jimi Hendrix’s distorted guitar revolutionising the music scene of the ’60s?

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 24 November 2007.

15. **“Probably Certain”**

Derek Leinweber

Yes, the logic behind the universe is fuzzy. . . Article connects humour writer Douglas Adam’s *Infinite Improbability Drive* to the multiple paths a particle explores in quantum mechanics.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 1 July 2007.

14. **“Carbon Fading”**

Derek Leinweber

The world needs to drive a wedge into greenhouse emissions. Here are seven ways to clean up.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 19 May 2007.

13. **“Time to Ponder”**

Derek Leinweber

We all know it’s Einstein’s greatest idea. But what actually is it?

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 31 March 2007.

12. **“Wired For Quality”**

Derek Leinweber

Sometimes it does take a rocket scientist to figure out how to connect the DVD.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 17 February 2007.

11. **“Cricket in Full Swing”**

Derek Leinweber

There’s a third way to make a cricket ball move in the air. It’s called Contrast Swing.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 2 December 2006.

10. **“Turbulent Times”**

Derek Leinweber

Have you seen the new 2006 World Cup soccer ball? It’s called the “Teamgeist” and represents a radical departure from classic soccer-ball design.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 10 June 2006.

9. **“Surprise attack”**

Derek Leinweber

Explores soccer-ball aerodynamics with an emphasis on “the dip” induced by the turbulent to laminar flow transition at the critical speed.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 27 May 2006.

8. **“Food for thought”**

Derek Leinweber

Explains the link between greenhouse gases and the Antarctic ozone hole and their effects on Australia's multibillion-dollar fishing and wine industries.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 6 May 2006.

7. **“Feelin’ Hot Hot Hot”**

Derek Leinweber

Links issues of global warming to recent changes in ocean thermohaline circulation.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 25 March 2006.

6. **“Swinger’s Delight”**

Derek Leinweber

Probes the mystery of cricket ball swing with an emphasis on the role of humidity.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 31 December 2005.

5. **“To be or not to be. The weird, ghostly worlds of Einstein’s mind.”**

Derek Leinweber

Describes, in an engaging manner, the essential idea of non-locality in quantum mechanics and the challenges to realism that Einstein pondered extensively during the emergence of quantum mechanics.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 24 December 2005.

4. **“Striving for Gold”**

Derek Leinweber

Reviews the ancient Alchemist’s dream to turn lead into gold and reveals the manner in which it is done with modern-day nuclear physics.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 8 October 2005.

3. **“Behind the Seams”**

Derek Leinweber

Explores the aerodynamics behind cricket ball swing, including reverse swing.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 10 September 2005.

2. **“Need for Speed”**

Derek Leinweber

Describes what makes a modern supercomputer super.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 23 July 2005.

1. **“Explosive Origins”**

Derek Leinweber

Reveals the origin of the elements of the periodic table. We are made of star dust.

In the column *Can you Believe it?*, Adelaide Advertiser, Saturday 2 July 2005.

## **Public Lecture Presentations**

- **“Turbulent Times - Exploring the Science of Sports-ball Aerodynamics”**

Australian Institute of Physics Public Lecture. 9 June 2010.

Explores the aerodynamics of sports balls including cricket-ball swing, golf-ball lift and the new 2010 World Cup soccer ball the “Jabulani.” With small “aero grooves” the Jabulani represents a radical departure from the ultra-smooth “Teamgeist” unveiled for the last World Cup event.

- **“Microscopic Matter”**

SA Museum’s “Munch on Science for Lunch” National Science Week Event

South Australian Museum, North Terrace, Adelaide, SA. 15 August 2006.

Features animations of proton structure revealed in state of the art supercomputer simulations of Quantum Chromodynamics on a space-time lattice.

- **“Turbulent Times”**

SA Museum’s “Munch on Science for Lunch” National Science Week Event

South Australian Museum, North Terrace, Adelaide, SA. 15 August 2006.

Describes the aerodynamics of sports balls including cricket-ball swing, golf-ball lift and the smooth 2006 World Cup soccer ball, the “Teamgeist.”

- **“Turbulent Times”**

SA Government’s “Science outside the square” launch of the DVD “Veer it like Viduka.”

Hindmarsh Stadium, Adelaide, SA. 12 June 2006.

Describes the aerodynamics of the 2006 World Cup ball, the “Teamgeist,” representing a radical departure from classic soccer-ball design.

- **“Veer it like Viduka”**

Public lecture at the South Australian Government’s “Science Outside the Square” launch of the DVD “Veer it like Viduka.”

Held at Hindmarsh Stadium, Adelaide, SA for 6,000 attendees. 12 June 2006.

Talk describes the aerodynamics of the 2006 World Cup ball, the “Teamgeist,” representing a radical departure from classic soccer-ball design.

- **“The Origin of Mass”**

South Australian Virtual Reality Centre (SAVRC), University of Adelaide, SA. 14 August 2005.

Features animations of proton structure revealed in state of the art supercomputer simulations of Quantum Chromodynamics on a space-time lattice.

## Professional Service

### Service to Discipline – International

<b>Organizing Committee</b>	International Conference on Nuclear Physics (INPC2016) Adelaide Convention Centre, Australia. 11–16 Sept. 2016	2015–present
<b>International Advisory Committee</b>	Asia-Pacific Conference on Few-Body Problems in Physics	2004–present
<b>Organizing Committee</b>	Workshop on Lattice Hadron Physics (LHP2015) Cairns, Australia. 20 – 24 July 2015	2015
<b>International Advisory Committee</b>	International Symposium on Lattice Field Theory	2007–2014
<b>Organizing Committee</b>	Sixth Asia-Pacific Conference on Few-Body Problems in Physics, Hahndorf, SA, Australia, 7–11 April 2014.	2014
<b>Chair Lattice 2012</b>	30th International Symposium on Lattice Field Theory Cairns Convention Centre, Cairns, Australia	2010–2012
<b>International Advisory Subcommittee</b>	Ken Wilson Lattice Award Committee International Symposium on Lattice Field Theory	2012
<b>Board Member</b>	International Lattice DataGrid (ILDG)	2006–2012
<b>Organizing Committee</b>	T(r)opical QCD International Workshop II Cairns, Australia. September 26 – October 1, 2010	2010
<b>Organizing Committee</b>	T(r)opical QCD International Workshop Cairns, Australia. July 27 – August 2, 2010	2008
<b>Chair ILDG Board</b>	International Lattice DataGrid (ILDG) Board	2007
<b>Organizing Committee</b>	QCD and the Strong Interactions Adelaide Australia. 25–29 September 2006	2006
<b>International Advisory Committee</b>	International Light Cone Advisory Committee (ILCAC)	2005–2006
<b>Chair LC2005 Organizing Committee</b>	Light-Cone QCD and Nonperturbative Hadron Physics 2005 Cairns, Australia. July 7 – 15, 2005	2004–2005
<b>Organizing Committee</b>	Workshop on Lattice Hadron Physics (LHP2003) Cairns, Australia. July 22 – 30, 2003	2002–2003
<b>Organizing Committee</b>	Workshop on Lattice Hadron Physics (LHP2001) Cairns, Australia. July 9 – 18, 2001	2000-2001
<b>Organizing Committee</b>	International Conference on Quark Nuclear Physics University of Adelaide, February, 2000	1999-2000
<b>Chief Organizer</b>	International Workshop on Lattice QCD University of Adelaide, December 7–18, 1998	1998

<b>Referee</b>	Physical Review Letters	2001–present
	Physical Review C, D	1991–present
	Physics Letters B	2000–present
	Nuclear Physics B	2001–present
	Physica A	2005–present
	European Physical Journal A	2007–present
<b>Referee</b>	Australian Research Council	1998–present
	US Department of Energy	1992–present
	US National Science Foundation	1992–present

### **Service to Discipline – National**

<b>Committee Member</b>	National Computational Infrastructure Merit Allocation Committee, Australian National University	2016–2020
<b>Associate Director</b>	ARC Special Research Centre for the Subatomic Structure of Matter (CSSM) University of Adelaide	2004–present
<b>Board Member</b>	Australian Institute for High Energy Physics (AUSHEP)	2007–2010
<b>Topic Chair</b>	Nuclear and Particle Physics (NUPP) Australian Institute of Physics (AIP) 2008 Congress	2007–2008
<b>Invited Presenter</b>	Convention of Australian Science Teachers Association (CONASTA) “Virtual Reality Up Close”	2006
<b>Management Committee</b>	National Computing Facility for Lattice Gauge Theory	2000–2004
<b>Thesis Examiner</b>	University of New South Wales	2000, 2003
<b>Organizing Committee</b>	14th National Congress of the Australian Institute of Physics University of Adelaide, December	2000
<b>Branch Executive Chair</b>	Australian Institute of Physics South Australia Branch	1999–2000
<b>Referee</b>	Australian Research Council	1997–present

## Administration, Service, and Leadership in the University

<b>University Committee</b>	Research and Teaching Needs ICT Advisory Committee University of Adelaide	2015–present
<b>Level III Coordinator</b>	Department of Physics, University of Adelaide	2014–present
<b>University Selection Panel</b>	Appointment of the Director ARC Centre of Excellence in Nanoscale BioPhotonics University of Adelaide	2014–2015
<b>University Selection Panel</b>	Appointment of the Head of the School of Physical Sciences University of Adelaide	2014
<b>University Committee</b>	ICT Research Steering Committee University of Adelaide	2012–2014
<b>University Committee</b>	eResearch Strategy Steering Group University of Adelaide	2013
<b>University Committee Chair</b>	University ICT Architecture Committee Information, Communications and Technology (ICT) University of Adelaide	2012–2013
<b>Institute Executive</b>	Institute for Photonics and Advanced Sensing (IPAS) Executive University of Adelaide	2011–2013
<b>University Committee</b>	<i>illumina8</i> Building (The Braggs) Project Control Group University of Adelaide	2010–2013
<b>Head of School</b>	School of Chemistry & Physics University of Adelaide	2008–2013
<b>University Board</b>	Academic Board University of Adelaide	2008–2013
<b>Faculty Committee</b>	Faculty Research Committee Faculty of Sciences University of Adelaide	2008–2013
<b>School Executive Chair</b>	School Executive Committee School of Chemistry & Physics University of Adelaide	2008–2013
<b>School Committee Chair</b>	Health Safety and Well-being (HS&W) Committee School of Chemistry & Physics University of Adelaide	2008–2013
<b>School Board Chair</b>	School of Chemistry & Physics Board University of Adelaide	2008–2013
<b>Faculty Board</b>	Faculty of Sciences Board University of Adelaide	2006–2013
<b>University Committee</b>	University ICT Committee University of Adelaide	2012

## Administration, Service, and Leadership in the University (Cont.)

<b>University Committee</b>	University Authorship Policy Development Committee University of Adelaide	2011–2012
<b>Faculty Committee Chair</b>	Faculty Marketing and Outreach Committee Faculty of Sciences University of Adelaide	2010–2011
<b>School Committee Chair</b>	Marketing and Outreach Committee School of Chemistry & Physics University of Adelaide	2011
<b>University Committee</b>	Research ICT Review Committee University of Adelaide	2011
<b>University Committee</b>	Researcher Experience ICT Strategic Plan Working Parties University of Adelaide	2011
<b>University Committee</b>	Quality Enhancement Committee University of Adelaide	2010–2011
<b>Program Coordinator</b>	High-Performance Computational Physics HPCP(Hons) University of Adelaide	2005–2011
<b>University Committee</b>	Sustainable Research Excellence (SRE) Implementation University of Adelaide	2010
<b>Seminar Coordinator</b>	Revealing Every ALgorithm (REAL) Lattice Gauge theory Centre for the Subatomic Structure of Matter (CSSM) University of Adelaide	2003–2010
<b>Public Lecture Series Chair</b>	Keys to the Universe School of Chemistry & Physics University of Adelaide	2009
<b>School Committee</b>	School Research Committee School of Chemistry & Physics University of Adelaide	2009
<b>Founding Deputy Director (Visualization)</b>	South Australian Partnership for Advanced Computing (SAPAC) Serving the University of Adelaide, Flinders University, and the University of South Australia	2002–2009
<b>Faculty Committee</b>	Strategic Thinking Advisory Group Faculty of Sciences University of Adelaide	2008
<b>University Committee</b>	eResearch SA Director Search Committee University of Adelaide	2008

## Administration, Service, and Leadership in the University (Cont.)

<b>Associate Dean (ICT)</b>	Faculty of Sciences University of Adelaide	2006–2008
<b>University Committee</b>	Executive Steering Committee for IT (ESCIT) Strategic Directions University of Adelaide	2006–2008
<b>University Committee</b>	IT Facilitation Committee University of Adelaide	2006–2008
<b>University Committee</b>	Technology in Education Committee University of Adelaide	2007–2008
<b>SAPAC Workshop</b>	Scientific Data Visualization with AVS/Express South Australian Partnership for Advanced Computing (SAPAC)	2007
<b>School Coordinator</b>	Research Quality Framework (RQF) Coordinator Matter and Its Interactions School of Chemistry & Physics	2007
<b>University Panel</b>	Research Quality Framework (RQF) Panel Mathematical & Information Sciences & Tech. University of Adelaide	2007
<b>Faculty Science Writer</b>	The Advertiser Newspaper Column: <i>Can You Believe It?</i> Faculty of Sciences University of Adelaide	2005–2007
<b>Student Liaison Committee Chair</b>	Discipline of Physics University of Adelaide	2006
<b>Strategic Marketing Committee</b>	Faculty of Sciences University of Adelaide	2005–2006
<b>Curriculum Committee</b>	Department of Physics University of Adelaide	2005–2006
<b>School Committee</b>	School of Chemistry & Physics Library Committee University of Adelaide	2004–2006
<b>Chief Organizer</b>	CSSM Open Day Exhibits Centre for the Subatomic Structure of Matter (CSSM) University of Adelaide	1999–2011
<b>Research Liaison</b>	Bringing CSSM Physics to High School Groups Approximately 100 students each year Centre for the Subatomic Structure of Matter (CSSM) University of Adelaide	1999–2008
<b>Chief Examiner</b>	Foundation Studies Program Eynesbury College, Adelaide, SA	1998–2008
<b>Invited Presenter</b>	Siemens Science Experience “Virtual Reality Up Close”	2006–2007

## Administration, Service, and Leadership in the University (Cont.)

<b>Vertical Structuring Committees</b>	Electromagnetism and Quantum Mechanics Discipline of Physics University of Adelaide	2005
<b>Named Degree Co-founder</b>	High-Performance Computational Physics HPCP(Hons) School of Chemistry & Physics University of Adelaide	2003
<b>Level II Coordinator</b>	Department Physics and Mathematical Physics University of Adelaide	2001–2003
<b>Curriculum Committee</b>	Department Physics and Mathematical Physics University of Adelaide	2001–2003
<b>Web Page Developer</b>	Department Physics and Mathematical Physics University of Adelaide	1998–2003
<b>Deputy Director</b>	Centre for High-Performance Computing and Applications (CHPCA), University of Adelaide	2001
<b>Liaison Committee</b>	Faculty of Science Communication and Promotions University of Adelaide	2001
<b>Invited Presenter</b>	Siemens Science Experience	2000 and 2001
<b>University Committee</b>	Visual Identity Reference Group University of Adelaide	2000
<b>Invited Presenter</b>	National Youth Science Forum	2000
<b>Invited Presenter</b>	Physics Olympians	2000
<b>Invited Presenter</b>	Country Teacher Campus Visit	1999–2000
<b>Invited Presenter</b>	Science Scholars Program	1999
<b>Invited Presenter</b>	Switched on to Science	1998–1999
<b>Chief Organizer</b>	Workshop on Scientific Parallel Computing October 14, 1997 University of Adelaide	1997

## Research Grant Funding

### Overview

- Continuous ARC Discovery Project funding following CSSM funding conclusion in 2005.
- Awarded 8 ARC Discovery Project grants since 2002.
- Granted \$2.86 million in ARC Discovery Project funds for theoretical nuclear/particle physics.
- Awarded 4 sole chief investigator ARC Discovery Project grants.
- Granted \$1.75 million in ARC Discovery Project funds on a per chief investigator basis.

- Awarded 5 ARC Linkage/Research Infrastructure Equipment and Facilities grants (LIEF/RIEF) to support South Australian (SA) supercomputing needs.
- Granted \$2.67 million in ARC LIEF/RIEF funds for investment in SA supercomputing infrastructure.
- Awarded \$6.65 million in ARC LIEF funds over seven years to strengthen merit-based access to the National Computing Infrastructure (NCI) petascale supercomputing facility.
- Awarded continuous National Supercomputing Time grants over past 15 years from 2002.
- Granted National Supercomputing Time allocations with an ARC in-kind value of \$7.34 million through the national Merit Allocation System (MAS), having an average annual value of \$490,000.
- Currently allocated 16.6 million CPU-hours/year through the NCI National Merit Allocation Scheme.

## Research Grant Funding

- **ARC Linkage Infrastructure (LIEF) Grant: LE160100051 – Funded 2016–2018 at \$3,000,000.**  
CIs: Lindsay Botten, Andrew Pitman, Dietmar Muller, Michelle Coote, Derek Leinweber, *et al.*  
“Maintaining and enhancing merit-based access to the national computational infrastructure facility”
- **ARC Discovery Grant: DP150103164 – Funded 2015 through 2017 at \$355,100.**  
CI: Derek B. Leinweber  
“Structure of hadronic excitations from lattice quantum chromodynamics”
- **ARC Discovery Grant: DP140103067 – Funded 2014 through 2016 at \$375,000.**  
CIs: Ross D. Young, James M. Zanotti and Derek B. Leinweber  
“Elucidating the role of quantum electrodynamics in hadron properties”
- **ARC Discovery Grant: DP120104627 – Funded 2012 through 2014 at \$345,000.**  
CI: Derek B. Leinweber  
“Electromagnetic structure of hadronic excitations from lattice quantum chromodynamics”
- **ARC Linkage Infrastructure (LIEF) Grant: LE120100181 – Funded 2012–2015 at \$3,650,000.**  
CIs: Lindsay C Botten, Derek B Leinweber, *et al.*  
“Strengthening merit-based access and support at the new National Computing Infrastructure petascale supercomputing facility”
- **ARC Linkage Infrastructure (LIEF) Grant: LE110100234 – Funded 2011 at \$430,000.**  
CIs: D. B. Leinweber, D. L. Adelson, C. J. Bradshaw, A. Cooper, J. Denier, J. F. Roddick  
“Enhancement of South Australian high-performance computing facilities”
- **ARC Discovery Grant: DP110101265 – Funded 2011 through 2013 at \$300,000.**  
CIs: Ross D. Young and Derek B. Leinweber  
“Excitation Spectra of Quantum Chromodynamics”
- **ARC Discovery Grant: DP0988941 – Funded 2009 through 2011 at \$556,000.**  
CIs: Derek B. Leinweber, Lorenz von Smekal and Anthony G. Williams  
“Strong Interaction Physics from Lattice QCD”
- **ARC Linkage International Grant: LX0776452 – Funded 2007 through 2009 at \$93,000.**  
CIs: Anthony G. Williams, Ayse Kizilersu, Derek B. Leinweber, *et al.*  
“Advances in Nonperturbative Studies of Subatomic Physics”

- **ARC Discovery Grant: DP0666129 – Funded 2006 through 2008 at \$232,000.**  
CI: Derek B. Leinweber  
“The Essence of QCD Vacuum Structure”
- **ARC Discovery Grant: DP0666383 – Funded 2006 through 2008 at \$510,000.**  
CIs: Anthony G. Williams, Derek B. Leinweber and Lorenz von Smekal  
“Advanced Studies of QCD and the Strong Interaction”
- **ARC Linkage Infrastructure (LIEF) Grant: LE0668520 – Funded 2006 at \$560,000.**  
CIs: A. G. Williams, M. Buntine, P. Coddington, D. B. Leinweber, F. Vaughan, *et al.*  
“South Australian Supercluster Facility”
- **University of Adelaide Strategic Research Scheme – Funded 2005 at \$ 12,500**  
CI: Derek B. Leinweber  
“QCD Vacuum Structure: Symmetry Breaking and Confinement”
- **ARC Linkage Infrastructure (LIEF) Grant: LE0452650 – Funded 2004 at \$696,005.**  
CIs: A. Khurana, *et al.*  
“South Australian Virtual Reality Centre (SAVRC)”
- **ARC Linkage Infrastructure (LIEF) Grant: LE0347582 – Funded 2003 at \$500,000.**  
CIs: A. G. Williams, M. Buntine, P. Coddington, D. B. Leinweber, F. Vaughan, *et al.*  
“South Australian Supercomputing Facility”
- **ARC Discovery Grant: DP0211034 – Funded 2002 through 2004 at \$184,239.**  
CI: Derek B. Leinweber  
“Novel Fermion Actions for Lattice QCD”
- **University of Adelaide Small Grant – Funded 2002 at \$11,400.**  
CI: Derek B. Leinweber  
“Chiral Perturbation Theory for the Quenched Approximation of QCD”
- **University of Adelaide Small Grant – Funded 2001 at \$10,000.**  
CI: Derek B. Leinweber  
“Novel Efficient Fermion Actions for Lattice QCD”
- **Sun Microsystems Educational Grant (SEIP) – Funded 2000 at \$2.9 million**  
CIs: A. G. Williams, D. B. Leinweber, A. W. Thomas, C. Hamer, and B. McKellar  
“National Computing Facility for Lattice Gauge Theory”
- **ARC Research Infrastructure Equipment and Facilities (RIEF) Grant: R00002749 – Funded 2000 at \$480,000\***  
CIs: A. G. Williams, D. B. Leinweber, A. W. Thomas, C. Hamer, and B. McKellar  
“National Computing Facility for Lattice Gauge Theory”  
\*Additional support from Universities is provided at \$207,000.00
- **ARC Small Grant – Funded 2000 at \$15,500.**  
CI: Derek B. Leinweber  
“Lattice QCD Simulations of Nucleon Resonances”
- **ARC Small Grant – Funded 1998 at \$10,000 and 1999 at \$10,000.**  
CI: Derek B. Leinweber  
“Exploring the Nonperturbative Properties of Quantum Chromodynamics (QCD) and their Impact on Modern Nuclear Physics”

## Supercomputer Time Grants

The approximate monetary values reported in the following are based on advice from the National Computational Infrastructure and Australian Partnership for Advanced Computing. They represent an amount which can be stated as an in-kind contribution to research granting bodies such as the ARC.

- **NCI National Merit Allocation Supercomputer Time Grant**  
**Funded 2017 at 16,574,900 CPU Hours.** Approximate monetary value: **\$ 663,000.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young, James Zanotti  
“Electromagnetic Structure of Matter”
- **NCI National Merit Allocation Supercomputer Time Grant**  
**Funded 2016 at 11,726,800 CPU Hours.** Approximate monetary value: **\$ 469,000.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young, James Zanotti  
“Electromagnetic Structure of Matter”
- **Pawsey Centre Galaxy Supercomputing Time Grant**  
**Funded 2015 at 4,000,000 CPU Hours.** Approximate monetary value: **\$ 160,000.**  
CIs: Waseem Kamleh, Derek B. Leinweber, James Zanotti  
“Form Factors, Chiral Symmetry and Dynamical Fermions in Lattice QCD”
- **NCI National Merit Allocation Supercomputer Time Grant**  
**Funded 2015 at 9,900,000 CPU Hours.** Approximate monetary value: **\$ 396,000.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young, James Zanotti  
“Electromagnetic Structure of Matter”
- **iVEC Petascale Pioneers Program Supercomputer Time Grant**  
**Funded 2014 at 7,300,000 CPU Hours.** Approximate monetary value: **\$ 292,000.**  
CIs: Waseem Kamleh, Derek B. Leinweber, James Zanotti  
“Electromagnetic Structure of Matter”
- **NCI National Merit Allocation Supercomputer Time Grant**  
**Funded 2014 at 7,525,000 CPU Hours.** Approximate monetary value: **\$ 301,000.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young, James Zanotti  
“Electromagnetic Structure of Matter”
- **NCI National Merit Allocation Supercomputer Time Grant**  
**Funded 2013 at 6,593,000 CPU Hours.** Approximate monetary value: **\$ 329,650.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young, James Zanotti  
“Electromagnetic Structure of Matter”
- **NCI National Facility Supercomputer Time Grant**  
**Funded 2012 at 3,667,000 CPU Hours.** Approximate monetary value: **\$ 366,700.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young, James Zanotti  
“Electromagnetic Structure of Matter”
- **NCI National Facility Supercomputer Time Grant**  
**Funded 2011 at 2,400,000 CPU Hours.** Approximate monetary value: **\$ 288,000.**  
CIs: Derek B. Leinweber, Waseem Kamleh, Anthony Thomas, Ross Young  
“Electromagnetic Structure of Matter”

- **NCI National Facility Supercomputer Time Grant**  
**Funded 2010 at 1,250,000 CPU Hours.** Approximate monetary value: \$ 150,000.  
 CIs: Derek B. Leinweber, Waseem Kamleh  
 “Electromagnetic Structure of Matter”
- **NCI National Facility Supercomputer Time Grant**  
**Funded 2009 at 920,000 CPU Hours.** Approximate monetary value: \$ 368,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of Matter”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2008 at 1,000,000 CPU Hours.** Approximate monetary value: \$ 500,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of Matter”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2007 at 737,000 CPU Hours.** Approximate monetary value: \$ 368,500.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of Matter”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2006 at 600,000 CPU Hours.** Approximate monetary value: \$ 300,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of the Proton”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2005 at 700,000 CPU Hours.** Approximate monetary value: \$ 350,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of the Proton”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2004 at 339,000 CPU Hours.** Approximate monetary value: \$ 678,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of the Proton”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2003 at 480,000 CPU Hours.** Approximate monetary value: \$ 960,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of the Proton”
- **Australian Partnership for Advanced Computing (APAC) Supercomputer Time Grant**  
**Funded 2002 at 200,000 CPU Hours.** Approximate monetary value: \$ 400,000.  
 CI: Derek B. Leinweber  
 “Electromagnetic Structure of the Proton”

## Publications Overview

- Editor of 5 refereed international conference proceedings.
- Published 4 refereed book chapters.
- Published 157 articles in refereed journals.

- Published 150 articles as refereed conference proceedings.
- Published 11 articles as conference proceedings.
- Published 16 newspaper articles.
- Currently 4 manuscripts are under review at refereed journals.
- Articles have 7,991 citations in the inSPIRE High Energy Physics information system.
- 34 articles are classified as *well-known* with 50–99 citations.
- 21 articles are *very well-known* with more than 100 citations.
- Hirsch’s h-index is 53.

### Very Well Known Refereed Publications (100+ Citations)

21. **“Scaling behavior and positivity violation of the gluon propagator in full QCD”**  
Patrick O. Bowman, Urs M. Heller, Derek B. Leinweber, Maria B. Parappilly, Andre Sternbeck, Lorenz von Smekal, Anthony G. Williams, Jianbo Zhang  
Phys. Rev. D **76**, 094505 (2007) 7 pp.  
[arXiv:hep-lat/0703022]
20. **“Strange electric form-factor of the proton”**  
D. B. Leinweber, S. Boinepalli, A. W. Thomas, P. Wang, A. G. Williams, R. D. Young, J. M. Zanotti and J. B. Zhang.  
Phys. Rev. Lett. **97**, 022001 (2006) 4 pp.  
[arXiv:hep-lat/0601025]
19. **“Unquenched quark propagator in Landau gauge”**  
P. O. Bowman, U. M. Heller, D. B. Leinweber, M. B. Parappilly, A. G. Williams and J. Zhang  
Phys. Rev. D **71**, 054507 (2005) 7 pp.  
[arXiv:hep-lat/0501019]
18. **“Precise determination of the strangeness magnetic moment of the nucleon”**  
D. B. Leinweber *et al.*  
Phys. Rev. Lett. **94**, 212001 (2005) 4 pp.  
[arXiv:hep-lat/0406002]
17. **“Unquenched gluon propagator in Landau gauge”**  
P. O. Bowman, U. M. Heller, D. B. Leinweber, M. B. Parappilly and A. G. Williams.  
Phys. Rev. D **70**, 034509 (2004) 4 pp.  
[arXiv:hep-lat/0402032]
16. **“Physical nucleon properties from lattice QCD”**  
D. B. Leinweber, A. W. Thomas and R. D. Young  
Phys. Rev. Lett. **92**, 242002 (2004) 4 pp.  
[arXiv:hep-lat/0302020]
15. **“Excited baryons in lattice QCD”**  
W. Melnitchouk, S. O. Bilson-Thompson, F. D. R. Bonnet, J. N. Hedditch, F. X. Lee, D. B. Leinweber, A. G. Williams and J. M. Zanotti *et al.*  
Phys. Rev. D **67**, 114506 (2003) 17 pp.  
[arXiv:hep-lat/0202022]

14. **“Convergence of Chiral Effective Field Theory”**  
R. D. Young, D. B. Leinweber and A. W. Thomas  
Prog. Part. Nucl. Phys. **50** 399-417 (2003) 19 pp.  
[arXiv:hep-lat/0212031]
13. **“Chiral analysis of quenched baryon masses”**  
R. D. Young, D. B. Leinweber, A. W. Thomas and S. V. Wright  
Phys. Rev. D **66**, 094507 (2002) 10 pp.  
[arXiv:hep-lat/0205017]
12. **“Hadron masses from novel fat link fermion actions”**  
J. M. Zanotti *et al.* [CSSM Lattice Collaboration].  
Phys. Rev. D **65**, 074507 (2002) 6 pp.  
[arXiv:hep-lat/0110216]
11. **“Infinite volume and continuum limits of the Landau-gauge gluon propagator”**  
F. D. R. Bonnet, P. O. Bowman, D. B. Leinweber, A. G. Williams and J. M. Zanotti  
Phys. Rev. D **64**, 034501 (2001) 10 pp.  
[arXiv:hep-lat/0101013]
10. **“Infrared behavior of the gluon propagator on a large volume lattice”**  
F. D. Bonnet, P. O. Bowman, D. B. Leinweber and A. G. Williams.  
Phys. Rev. **D62**, 051501 (2000) 4 pp.  
[arXiv:hep-lat/0002020]
9. **“Baryon masses from lattice QCD: Beyond the perturbative chiral regime”**  
D. B. Leinweber, A. W. Thomas, K. Tsushima and S. V. Wright.  
Phys. Rev. D **61**, 074502 (2000) 10 pp.  
[arXiv:hep-lat/9906027]
8. **“Asymptotic scaling and infrared behavior of the gluon propagator”**  
D. B. Leinweber, J. I. Skullerud, A. G. Williams and C. Parrinello.  
Phys. Rev. D **60**, 094507 (1999) 17 pp.  
[arXiv:hep-lat/9811027]
7. **“Nucleon magnetic moments beyond the perturbative chiral regime”**  
D. B. Leinweber, D. H. Lu and A. W. Thomas  
Phys. Rev. D **60**, 034014 (1999) 6 pp.  
[arXiv:hep-lat/9810005]
6. **“Gluon propagator in the infrared region”**  
D. B. Leinweber, J. I. Skullerud, A. G. Williams and C. Parrinello  
Phys. Rev. D **58**, 031501 (1998) 5 pp.  
[arXiv:hep-lat/9803015]
5. **“QCD sum rules for skeptics”**  
Derek B. Leinweber  
Annals Phys. **254**, 328 (1997) 69 pp.  
[arXiv:nucl-th/9510051]
4. **“Decuplet baryon structure from lattice QCD”**  
D. B. Leinweber, T. Draper and R. M. Woloshyn

Phys. Rev. D **46**, 3067 (1992) 19 pp.  
[arXiv:hep-lat/9208025]

3. **“Electromagnetic structure of octet baryons”**

D. B. Leinweber, R. M. Woloshyn and T. Draper  
Phys. Rev. D **43**, 1659 (1991) 20 pp.

2. **“Comparing SU(2) to SU(3) gluodynamics on large lattices”**

A. Sternbeck, L. von Smekal, D. B. Leinweber and A. G. Williams.  
PoS LAT **2007**, 340 (2007) 7 pp.  
[arXiv:0710.1982 [hep-lat]]

1. **“Nonperturbative structure of the quark gluon vertex”**

J. I. Skullerud, P. O. Bowman, A. Kizilersu, D. B. Leinweber and A. G. Williams.  
JHEP **0304**, 047 (2003) 15 pp.  
[hep-ph/0303176]

## Presentations at International Conferences and Workshops

### Plenary Presentations

- **Baryons 2016:** International Conference on the Structure of Baryons  
Florida State University, Tallahassee, FL, USA. 16–20 May 2016.  
“The Spectrum and Structure of Baryon Excitations from Lattice QCD”
- **NSTAR 2015:** 10th International Workshop on the Physics of Excited Nucleons  
Icho Kaikan, Suita Campus, Osaka University, Osaka, Japan. 25–28 May 2015.  
“ $N^*$  Spectroscopy from Lattice QCD”
- **QNP 2015:** Seventh International Conference on Quarks and Nuclear Physics  
Universidad Técnica Federico Santa María, Valparaiso, Chile. 02–06 March 2015.  
“Meson and Baryon Spectra from the Lattice”
- **APFB 2014:** Sixth Asia-Pacific Conference on Few-Body Problems in Physics  
Hahndorf, SA, Australia. 7–11 April 2014.  
“The Lambda 1405 is an Anti-Kaon–Nucleon Molecule”
- **Lattice 2012:** 30th International Symposium on Lattice Field Theory  
Cairns Convention Centre, Cairns, Australia. 24–29 June 2012.  
Opening presentation highlighting the “Nontrivial structure of the QCD Vacuum” underlying many of the presentations to be made at the conference.
- **AIP 2007 Boas Medal Lecture:** University of Melbourne  
Awarded the Boas Medal for original research making the “most important contribution to physics.”  
Melbourne, Victoria, Australia. 15 November 2007.  
“Visually Revealing the Secrets of QCD”
- **YKIS 2006:** Yukawa International Seminar on “New Frontiers in QCD – Exotic Hadrons and Hadronic Matter”  
Kyoto University, Kyoto, Japan. 20–24 November 2006.  
“Exotic Hadrons on the Lattice”
- **Gordon Research Conference:** Photonuclear Interactions  
Tilton, NH, USA. 30 July – 4 August 2006.  
“Strange Quark Form Factor Results from the Lattice”
- **Econophysics Colloquium:** International Conference on Econophysics  
Australian National University, Canberra, Australia. 14–18 November 2005.  
“Scale-Free Avalanche Dynamics in the Stock Market”
- **Baryons '04:** International Conference on the Structure of Baryons  
Ecole Polytechnique, Palaiseau, France. 25–29 October 2004.  
“Chiral Extrapolations of Lattice QCD Results”
- **PAVI '04:** International Conference on Parity Violation and Hadronic Structure  
Laboratoire de Physique Subatomique et de Cosmologie, Grenoble, France. 8–11 June 2004.  
“Precise Determination of the Strangeness Magnetic Moment of the Nucleon”
- **Gordon Research Conference:** Photonuclear Interactions  
Tilton, NH, USA. 18–23 August 2002.  
“Real Hadron Phenomenology from Lattice QCD”

- **LATTICE 2002:** 20th International Symposium on Lattice Field Theory  
MIT, Cambridge, Massachusetts, USA. 24–29 June 2002.  
“Panel Discussion on Chiral Extrapolation of Physical Observables”
- **QNP 2002:** International Conference on Quarks and Nuclear Physics  
Julich, Germany. 9–14 June 2002.  
“FLIC Fermions and Hadron Phenomenology”
- **Few Body 2000:** XVIth International Conference on Few-Body Problems in Physics  
National Taiwan University, Taipei, Taiwan. 6–10 March 2000.  
“Lattice QCD Calculations of Hadron Structure: Constituent Quarks and Chiral Symmetry”
- **QNP 2000:** International Conference on Quarks and Nuclear Physics  
Adelaide, Australia. 21–25 February 2000.  
“Theoretical Perspective on the Strangeness Magnetic Form Factor”
- **Gordon Research Conference:** Photonuclear Interactions  
Tilton, NH, USA. 26–30 July 1998  
“Odd-Parity Baryon Resonances on the Lattice”
- **ELSA and MAMI Conference** on Electromagnetic Interactions  
Bosen, Germany. 1–6 September 1996.  
“The Electromagnetic Structure of Baryons from Lattice QCD”

### Keynote Presentations at National and International Conferences

- **INPC 2016:** International Nuclear Physics Conference  
Invited QCD: Hadron Structure and Spectroscopy Keynote Address  
Adelaide Convention Centre, Adelaide, SA, Australia. 11–16 September 2016.  
“New Results on the Structure of Baryons and their Excitations from Lattice QCD”
- **Australian Institute of Physics National Congress 2014**  
Invited Keynote Address  
Australia National University, Canberra, Australia. 8 December 2014.  
“Strange matter discovery: The Lambda 1405 is an anti-kaon–nucleon molecule”
- **Australian Institute of Physics National Congress 2005**  
Invited Keynote Address  
Australia National University, Canberra, Australia. 1 February 2005.  
“Visually Revealing the Secrets of QCD”
- **17th International Conference on Few-Body Problems in Physics (Few-Body 2003)**  
Duke University/TUNL, Durham, NC, USA. 5–10 June 2003.  
“Observing Chiral Nonanalytic Behavior with FLIC Fermions”

### Invited Workshop Presentations

- **ANPhA Board:** Asian Nuclear Physics Workshop  
CSSM, University of Adelaide, Australia. 3 August 2012.  
Opening presentation highlighting “The Lattice QCD Program in Adelaide”

- **T(r)opical QCD 2010:** CSSM International Workshop  
Cairns, Queensland, Australia. 26 September – 1 October 2010.  
“Excited States of The Nucleon in 2+1 Flavour QCD”
- **INT Program 10-1:** Simulations and Symmetries: Cold Atoms, QCD, Few-hadron Systems  
Institute for Nuclear Theory (INT), University of Washington, WA, USA. 3–7 May 2010.  
“Excited states of the nucleon in 2+1 flavour QCD”
- **Achievements and New Directions in Subatomic Physics**  
University of Adelaide, Australia. 15–19 February 2010.  
“Chiral behavior of baryon magnetic moments”
- **QCD Bound States: Methods and Properties**  
Argonne National Laboratory, Argonne IL, USA. 15–19 June 2009.  
“Sifting the sand of the QCD vacuum”
- **ILDG:** International Lattice Data Grid Workshop on “Perspectives on light quark simulations through machines, algorithms and the ILDG.”  
Center for Computational Sciences (CCS), Univ. of Tsukuba, Japan. 10–12 March 2009.  
“Light-Quark Physics from the CSSM Lattice Collaboration”
- **T(r)opical QCD 2008:** CSSM International Workshop  
Port Douglas, Queensland, Australia. 27 July – 2 August 2008.  
“Search for an Intrinsic Scale in Chiral Effective Field Theory”
- **QCD Downunder II:** International Workshop on QCD  
Massey University, Albany, New Zealand. 17–19 January 2008.  
“Aspects of QCD Vacuum Structure”
- **CSSM:** Workshop on QCD and the Strong Interactions  
University of Adelaide, SA 5005, Australia. 25–29 September 2006.  
“The QCD Vacuum, Centre Vortices and Gluon Flux Tubes”
- **LHP 2006:**, 3rd International Workshop on Lattice Hadron Physics  
Jefferson Lab (TJNAF) Workshop, Newport News, VA. 31 July – 3 August 2006.  
“The QCD Vacuum, Centre Vortices and Gluon Flux Tubes”
- **LC 2005:**, International Workshop on Light-Cone QCD and Nonperturbative Hadron Physics  
Joint CSSM, NITP and International Light Cone Advisory Committee (ILCAC) Workshop, Cairns, Australia. 7–15 July 2005.  
“Role of Centre Vortices in Dynamical Mass Generation”
- **QCD Down Under**  
Joint CSSM and NITP Workshop, Barossa Valley & Adelaide, Australia. 11–19 March 2004.  
“Precise Determination of the Strangeness Magnetic Moment of the Nucleon”
- **LHP 2003:**, 2nd International Workshop on Lattice Hadron Physics  
Joint CSSM, NITP, and Jefferson Lab (TJNAF) Workshop, Cairns, Australia. 22–30 July 2003.  
“Strange Magnetic Moment of the Nucleon from FLIC Fermions”
- **Tokyo-Adelaide Joint Workshop on Quarks, Astrophysics and Space Physics**  
Tokyo, Japan. 6–10 January 2003.  
“FLIC Fermions”

- **Workshop on Physics at the Japan Hadron Facility**  
Joint CSSM / JHF / NITP Workshop, Adelaide, Australia. 14–21 March 2002.  
“Hadron Resonance Phenomenology from Lattice QCD”
- **LHP2001: 1st International Workshop on Lattice Hadron Physics**  
Joint CSSM, NITP, and Jefferson Lab (TJNAF) workshop, Cairns, Australia. 9–18 July 2001.  
“Quenched Chiral Perturbation Theory for Baryon Electromagnetic Form Factors”
- **Workshop on Lepton Scattering, Hadrons and QCD**  
Joint CSSM and NITP workshop, Adelaide, Australia. 26 March – 6 April 2001.  
“Meson Cloud Considerations in the Strange Magnetic Moment of the Nucleon from Lattice QCD”
- **International Workshop on Parity Violation in Atomic, Nuclear and Hadronic Systems**  
Trento, Italy. 5–17 June 2000.  
“Lattice QCD Calculations of the Strange Magnetic Form Factor of the Nucleon”
- **Workshop on Hadronic Physics with Photon Beams**  
Joint CSSM, NITP, and Jefferson Lab (TJNAF) workshop, Adelaide, Australia. 16–18 February 2000.  
“Glueballs,” “Hybrids,” “Four-Quark” Mesons and “Molecular” Hadrons
- **Light-Cone ’99: Workshop on Light-Cone QCD and Nonperturbative Hadron Physics**  
CSSM, Adelaide, Australia. 13–22 December 1999.  
“Visualizations of the QCD Vacuum”
- **Workshop on Lattice QCD**  
CSSM, University of Adelaide, Australia. 7–18 December 1998.  
“Nucleon Strangeness with Improved Uncertainties”
- **Workshop on Scientific Parallel Computing**  
CSSM, University of Adelaide, Australia. 14 October 1997.  
“Numerical Simulations of Quantum Chromodynamics”
- **Workshop on Symmetries in the Strong Interaction**  
CSSM, University of Adelaide, Australia. 14–25 April 1997.  
“Improved Lattice Actions”  
“Strangeness in the Nucleon from Lattice QCD”  
“QCD Sum Rules for Skeptics”
- **Argonne Theory Institute: QCD Based Studies of Hadron Spectroscopy and Interactions**  
Argonne, IL, USA. 22–26 July 1996.  
“QCD Sum Rules: From *Art* to Science”
- **Institute for Nuclear Theory: University of Washington.**  
Workshop on “QCD Sum Rules for Nuclear Systems at Finite Density and Temperature.”  
Seattle, WA, USA. 30 September – 1 October 1994.  
“Testing QCD Sum Rule Techniques on the Lattice”
- **Institute for Nuclear Theory: Crystal Mountain Resort.**  
Workshop on “Probing Nucleon Structure by Real and Virtual Compton Scattering.”  
Crystal Mountain Resort, WA, USA. 24–30 September 1994.  
“First Thoughts on Lattice QCD Investigations of Compton Scattering”

- **Institute for Nuclear Theory:** University of Washington.  
Seattle, WA, USA. 25 July – 13 August 1993.  
Workshop on “Phenomenology and Lattice QCD.”

## Conference Presentations

- **Lattice 2014:** 32nd International Symposium on Lattice Field Theory  
Columbia University, New York, NY, USA. 23–28 June, 2014.  
“On the Structure of the Lambda 1405”
- **Lattice 2011:** 29th International Symposium on Lattice Field Theory  
Squaw Valley, Lake Tahoe, California, USA. 11-16 July 2011.  
“Nucleon Mass Spectrum in Full QCD” and  
“SU(3) centre vortices underpin both confinement and dynamical chiral symmetry breaking”
- **NSTAR 2011:** 8th International Workshop on the Physics of Excited Nucleons  
Thomas Jefferson National Accelerator Facility, Newport News, Virginia USA. 17–20 May 2011.  
“Excited States of the Nucleon in 2+1 flavour QCD”
- **Lattice 2010:** 28th International Symposium on Lattice Field Theory  
Tanka Village Resort, Villasimius, Sardinia, Italy. 14–19 June 2010.  
“Excited states of the nucleon in 2+1 flavour QCD”
- **Lattice 2009:** 27th International Symposium on Lattice Field Theory  
Beijing, China. 25–31 July 2009.  
“Stout-link smearing in lattice fermion actions”
- **Lattice 2005:** 23rd International Symposium on Lattice Field Theory  
Trinity College, Dublin, Ireland. 25–30 July 2005.  
“Power Counting Regime of Chiral Extrapolation and Beyond”
- **Lattice 2002:** 20th International Symposium on Lattice Field Theory  
Boston, Massachusetts, USA. 24-29 June 2002.  
“FLIC Overlap Fermions and Topology”
- **Australian Institute of Physics Congress**  
Adelaide, Australia. 30 November – 5 December 2001.  
“Quantum Monte Carlo Studies in Lattice Gauge Theory”
- **Lattice '99:** International Conference on Lattice Field Theory.  
Pisa, Italy. 29 June – 3 July 1999.  
“Hadron Properties Beyond the Chiral Perturbative Regime”
- **Lattice '98:** International Conference on Lattice Field Theory.  
Boulder, Colorado, USA. 13–18 July 1998.  
“Modeling the Gluon Propagator”
- **PANIC '96:** 14th International Conference on Particles and Nuclei.  
Williamsburg, VA, USA. 22–28 May 1996.  
“Light Hadron Masses on Coarse Lattices with Improved Actions” and  
“QCD Equalities for Baryon Current Matrix Elements”

- **Baryons '95:** 7<sup>th</sup> International Conference on the Structure of Baryons.  
Santa Fe, NM, USA. 3–7 October 1995.  
“New QCD Sum Rules for In-Medium Nucleons”
- **HYP '94:** International Conference on Hypernuclear and Strange Particle Physics.  
Vancouver, BC, Canada. 4–8 July 1994.  
“Essential Strangeness in Nucleon Magnetic Moments”
- **Lattice '93:** International Conference on Lattice Field Theory.  
Dallas, TX, USA. 12–16 October 1993.  
“A Few Points on Point-to-Point Correlation Functions” and  
“Baryon Electromagnetic Structure:  
Shedding Light on Models and their Mechanisms”
- **Canadian Association of Physicists Congress.**  
Simon Fraser University, Burnaby, BC, Canada. 13–16 June 1993.  
“New Insights into Baryon Electromagnetic Structure from Lattice QCD”
- **Baryons '92:** Yale University.  
New Haven, CT, USA. 1–4 June 1992.  
“Baryon Electromagnetic Structure from Lattice QCD”
- **1992 Joint April Meeting of the APS and the AAPT.**  
Washington, DC, USA. 20–24 April 1992.  
“Highlights of a Lattice QCD Analysis of Decuplet Baryon Structure”
- **Lattice '90:** International Conference on Lattice Field Theory.  
Tallahassee, FL, USA. 8–12 October 1990.  
“On the Electromagnetic Properties of the Baryon Octet”

## Conference Organisation

- Please see the section entitled Service to Discipline – International.

## Departmental Colloquia and Seminars

### Departmental Colloquia

- **Argonne National Laboratory**, Physics Division Colloquium  
Argonne IL, USA. 19 June 2009.  
“Sifting the Sand of the QCD Vacuum”
- **Johannes Gutenberg-Universität**, Institut für Kernphysik Colloquium  
Mainz, Germany. 28 September 2004.  
“Visually Revealing the Secrets of QCD”
- **George Washington University**, Department of Physics Colloquium  
Washington DC, USA. 20 September 2004.  
“Visually Revealing the Secrets of QCD”

- **Jefferson Laboratory**, Physics Division Colloquium  
Newport News, VA, USA. 27 August 2004.  
“Visually Revealing the Secrets of QCD”
- **Massey University**, Department of Physics Colloquium  
Palmerston North, New Zealand. 26 November 2003.  
“Visualizations of Quantum Chromodynamics”
- **University of Melbourne**, Department of Physics Colloquium  
Melbourne, Victoria, Australia. 13 August 2003.  
“Visualizations of Quantum Chromodynamics”
- **Centre for Quantum Computer Technology, The University of Queensland**, Department of Physics Colloquium  
St. Lucia, Queensland, Australia. 27 June 2003.  
“Visualizations of Quantum Chromodynamics”
- **McMaster University**, Department of Physics Colloquium.  
Hamilton, Ontario, Canada. 21 February 2001.  
“Visualizations of Proton Structure”
- **Rensselaer Polytechnic Institute**, Department of Physics Colloquium.  
Troy, NY, USA. 31 January 2000.  
“Visualizations of Quantum Chromodynamics”
- **Flinders University**, Department of Physics Colloquium.  
Adelaide, SA, Australia. 21 June 1999.  
“Visualizations of Quantum Chromodynamics”
- **Florida International University**, Department of Physics Colloquium.  
Miami, Florida, USA. 3–4 April 1997.  
“Unlocking the Secrets of Nonperturbative QCD”
- **University of Regina**, Department of Physics Colloquium.  
Regina, SK, Canada. 24–25 March 1997.  
“QCD Sum Rules: From “Art” to Science.”  
“Unlocking the Secrets of Nonperturbative QCD”
- **Indiana University**, Department of Physics Colloquium.  
Bloomington, Indiana, USA. 10–12 March 1997.  
“Unlocking the Secrets of Nonperturbative QCD”
- **North Carolina Central University**, Department of Physics Colloquium.  
Durham, North Carolina, USA. 12–13 February 1997.  
“Unlocking the Secrets of Nonperturbative QCD”
- **York University**, Department of Physics Colloquium.  
North York, Ontario, Canada. 15 February 1994.  
“Shedding Light on the Structure of the Proton.”
- **Carnegie-Mellon University**, Department of Physics Colloquium.  
Pittsburgh, PA, USA. 7 February 1994.  
“Shedding Light on the Structure of the Proton.”

- **University of Western Ontario**, Applied Mathematics and Physics Colloquium.  
London, Ontario, Canada. 27 January 1994.  
“Shedding Light on the Structure of the Proton.”
- **University of Guelph**, Department of Physics Colloquium.  
Guelph, Ontario, Canada. 25 January 1994.  
“Shedding Light on the Structure of the Proton.”
- **McMaster University**, Department of Physics Colloquium.  
Hamilton, Ontario, Canada. 19 January 1994.  
“Shedding Light on the Structure of the Proton.”
- **Dalhousie University**, Department of Physics Colloquium.  
Halifax, Nova Scotia, Canada. 13 November 1991.  
“Where are the Quarks in the Proton and What are They Doing There?”
- **University of Ohio**, Department of Physics Colloquium.  
Athens, OH, USA. 1 November 1991.  
“Where are the Quarks in the Proton and What are They Doing There?”
- **TRIUMF**, Colloquium.  
Vancouver, BC, Canada. 4 October 1990.  
“A Pedagogical Overview of Lattice QCD”

### Invited Seminars and Collaborations

- **TRIUMF**, Theory Group Seminar and Collaboration  
Vancouver BC, Canada. 13–14 February 2012.  
“Mass Spectrum of the Nucleon and Lambda in Lattice QCD”
- **Johannes Gutenberg-Universität**, Institut für Kernphysik Seminar.  
Mainz, Germany. 30 September 2004.  
“Precise Determination of the Strangeness Magnetic Moment of the Nucleon”
- **University of Maryland**, Theory Group Seminar.  
College Park, MD, USA. 16 September 2004.  
“Visually Revealing the Secrets of QCD”
- **Jefferson Laboratory**, Theory Seminar.  
Newport News, VA, USA. 30 August 2004.  
“Precise Determination of the Strangeness Magnetic Moment of the Nucleon”
- **University of Melbourne**, Department of Physics Seminar.  
Melbourne, Australia. 12 August 2003.  
“Chiral Physics Phenomenology from Lattice QCD”
- **Florida State University**, Department of Physics Seminar.  
Tallahassee, Florida, USA. 14 February 2001.  
“Visualizations of the QCD Vacuum”
- **Rensselaer Polytechnic Institute**, Department of Physics Seminar.  
Troy, New York, USA. 1 February 2000.  
“Hadron Structure from Lattice QCD”

- **University of Colorado**, Nuclear Physics Laboratory Seminar.  
Boulder, Colorado, USA. 5–12 February 1997.  
Collaborative visit with Frank Lee. Presentation of:  
“Strangeness in the Nucleon from Nonperturbative QCD”
- **York University**, Physics Seminar Series.  
Toronto, Ontario, Canada. 16–19 April 1996.  
“QCD Sum Rules: From “Art” to Science” Parts 1 and 2; and  
“Strangeness in the Nucleon”
- **University of Pittsburgh**, Nuclear Physics Seminar.  
Pittsburgh, PA, USA. 1 February 1996.  
“The Truth About QCD Sum Rules for the Nucleon”
- **Argonne National Laboratory**, Nuclear Theory Seminar.  
Argonne, IL, USA. 25 January 1996.  
“The Truth About QCD Sum Rules for the Nucleon”
- **University of Washington**, Nuclear Theory Group.  
Seattle, WA, USA. 13–15 February 1995.  
“The Predictive Ability of QCD Sum Rules”
- **Saint Mary’s University**, Collaborative meeting with Malcolm Butler  
and Roxanne Springer.  
Halifax, NS, Canada. 1–5 August 1994.  
“Exploring chiral nonanalyticities in baryon magnetic moments”
- **University of Washington**, Nuclear Theory Group.  
Seattle, WA, USA. 21 April 1994.  
“The Physics of QCD Correlation Functions”
- **University of Kentucky**, Theory Group Seminar.  
Lexington, KY, USA. 1–4 November 1993.  
“QCD Sum Rules and Short Time Correlation” and  
“QCD Sum Rule Technology and its Limits”
- **Argonne National Laboratory**, Nuclear Theory Seminar.  
Argonne, IL, USA. 1 April 1993.  
“The Inquisition of the Untouchables: A Lattice QCD Inquiry of the Quark  
Substructure of Baryons”
- **Duke University**, Nuclear Theory Seminar.  
Durham, NC, USA. 4 March 1993.  
“What can Lattice QCD teach us about Baryon Structure?”
- **Ohio State University**, Nuclear Theory Seminar.  
Columbus, OH, USA. 1 February 1993.  
“New Insights into Baryon Electromagnetic Structure from Lattice QCD”
- **Indiana University Cyclotron Facility**, Nuclear Theory Seminar.  
Bloomington, IN, USA. 27–29 July 1992.  
“Baryon Electromagnetic Structure from Lattice QCD”

- **University of Kentucky**, Collaborative meeting with K. Liu, T. Draper, B. Li and R. Woloshyn.  
Lexington, KY, USA. 13–24 July 1992.
- **CEBAF**, Theory Group Seminar.  
Newport News, VA, USA. 11–13 May 1992.  
“Baryon Electromagnetic Structure from Lattice QCD”
- **University of Maryland**, Nuclear Theory Group Seminar.  
College Park, MD, USA. 15 March 1991.  
“The Electromagnetic Structure of Baryons”
- **Simon Fraser University**, Theory Group Seminar.  
Burnaby, BC, Canada. 1 March 1991.  
“The Quark Substructure of Baryons”
- **University of British Columbia**, Theoretical Physics Seminar.  
Vancouver, BC, Canada. 13 November 1990.  
“The Electromagnetic Structure of Octet Baryons”
- **TRIUMF**, Theory Group Seminar.  
Vancouver, BC, Canada. February 1989.  
“QCD Sum Rule Analysis of Spin-Orbit Splitting in Baryons”