Benjamin M. Roberts

School of Mathematics and Physics, The University of Queensland, Brisbane, QLD 4072, Australia

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- Theoretical atomic and astroparticle physics: atomic structure calculations, violation of fundamental symmetries, precision laboratory and astrophysical tests of the Standard Model, searches for dark matter and exotic physics
- Programming (C++, Fortran, Python, Mathematica), experience in parallel computing and statistical data analysis
- High-impact publications, including *Nature Communications*, *Physical Review Letters*, and two Editors' Suggestions
- Work covered in several popular science media publications (*Science*, *Cosmos*, *MIT Tech. Review*, and others)
- Research profiles: ORCID: 0000-0002-0345-6375, Inspire: inspirehep.net/author/profile/B.M.Roberts.1

Academic Positions

May 2021 –
ARC DECRA Fellow, University of Queensland
- Tests of fundamental physics at low-energy, and searches for dark matter
- Lecturer: Computational Physics, Quantum Field Theory, Astrophysics

2019 – 2021
Postdoctoral Researcher, University of Queensland
- Working with Dr. Jacinda Ginges on atomic structure theory, high-precision calculations
- Supervision of several honours and undergraduate students

2018 – 2019
Postdoctoral Researcher, SYRTE, Observatoire de Paris, France
- Working with Prof. Peter Wolf and Dr. Pacome Delva
- Developed methods for dark matter detection using networks of atomic clocks
- Calculations of atomic ionisation rates due to WIMP scattering

2016 – 2018
Postdoctoral Fellow, University of Nevada, Reno, Nevada, USA
- Working with Prof. Andrei Derevianko and Prof. Geoffrey Blewitt
- Using GPS atomic clock data to search for macroscopic dark matter candidates
- Assisted in supervision of several graduate and undergraduate students

Prizes & Awards

2021: ARC Discovery Early Career Researcher Award, $439K
2018: University of Nevada, Reno Award for Professional Development (Postdoctoral)
2018: U. Nevada, Reno *Exceptional Postdoctoral Mentoring award* honourable mention
2017: Nominated by UNSW and the Australian Institute of Physics (NSW branch) for the *Bragg Gold Medal for Excellence in Physics*
2013-16: Australian Postgraduate Award
2012: Spruson & Ferguson Award for Innovation in Science

Education

2013 – 2015
Doctor of Philosophy in Physics
Department of Theoretical Physics, University of New South Wales, Sydney, Australia
- Thesis: *Low-energy atomic phenomena: probing fundamental physics and searching for dark matter.* (Supervisors: Prof. Victor Flambaum and Dr. Vladimir Dzuba).
- Nominated for the *Bragg Gold Medal for Excellence in Physics*
- Several publications: *Physical Review Letters, Physical Review A & D* (including an Editors' Suggestion), *Annual Review of Nuclear and Particle Science*
- Invited to the Perimeter Institute for Theoretical Physics, Canada, to collaborate

2009 – 2012
Bachelor of Science (Advanced) with Class 1 Honours in Physics
University of New South Wales, Sydney, Australia
- Thesis: *Parity nonconservation in atomic transitions and tests of Unification Theories*
- Work published in *Physical Review Letters*

Teaching & Supervision

2021 – current
University of Queensland, Australia
Lecturer for: Computational Physics (4th year), Advanced Quantum Field Theory (special topics course), and Frontiers in Astrophysics (4th year)

2019 – current
University of Queensland, Australia
Supervision of several honours and undergraduate students

2016 – 2018
University of Nevada, Reno, NV, USA
Assisted in supervision of several graduate and undergraduate students
- Received award recognising *Exceptional Postdoctoral Mentoring*

2012 – 2015
University of New South Wales, Sydney, Australia
- Teaching Assistant and Demonstrator in Charge, first year physics teaching laboratory
  - Supervision of up to three demonstrators and forty-five students
- Ran tutorial classes of forty students for the Physics Bridging Course
- Involved in implementation of *Mechanics: Motion, Forces, Energy and Gravity,* a Massive Open Online Course designed and run by Prof. Joe Wolfe.

Other Positions

2014 – current
Referee for peer-reviewed journals including *Physical Review Letters*, *Physical Review A*

2012 – 2015
Physoc: the UNSW physics student society.
- Coordinated the *Student Research Lectures*. Presented by graduate students, these talks provided a friendly atmosphere for young researchers to gain experience
- Initiated and organised the *Climate Science* lecture series. Researchers from the UNSW Climate Change Research Centre presented talks to physics students

Selected Publications

- *Nuclear magnetic moments of francium 207–213 from precision hyperfine comparisons*, B. M. Roberts and J. S. M. Ginges, **Phys. Rev. Lett. 125, 063002 (2020)**
- *Variation of the Fine Structure Constant around the Supermassive Black Hole in Our Galactic Center*, A. Hees, T. Do, B. M. Roberts, Andrea M. Ghez, S. Nishiyama *et al.*, **Phys. Rev. Lett. 124, 081101 (2020)**
- *Search for domain wall dark matter with atomic clocks on board GPS satellites*, B. M. Roberts, G. Blewitt, C. Dailey, M. Murphy, M. Pospelov, A. Rollings, J. Sherman, W. Williams, and A. Derevianko, **Nature Comm. 8, 1195 (2017)**
- *Ionization of Atoms by Slow Heavy Particles, Including Dark Matter*, B. M. Roberts, V. V. Flambaum, and G. F. Gribakin, **Phys. Rev. Lett. 116, 023201 (2016)**
- *Dark matter scattering on electrons: Accurate calculations of atomic excitations and implications for the DAMA signal*, B. M. Roberts, V. A. Dzuba, V. V. Flambaum, M. Pospelov, and Y. V. Stadnik, **Phys. Rev. D 93, 115037 (2016)**
- *Limiting P-Odd Interactions of Cosmic Fields with Electrons, Protons, and Neutrons*, B. M. Roberts, Y. V. Stadnik, V. A. Dzuba, V. V. Flambaum, N. Leefer, and D. Budker, **Phys. Rev. Lett. 113, 081601 (2014)**
- *Revisiting Parity Nonconservation in Cesium*, V. A. Dzuba, J. C. Berengut, V. V. Flambaum, and B. M. Roberts, **Phys. Rev. Lett. 109, 203003 (2012)**
- Full publication list included separately (also: roberts999.com/cv)

Selected Invited Talks

- *Frontiers in Quantum Matter Workshop: Electric Dipole Moments*, Australian National University (ANU), Canberra, Australia, 2019
- 7^{th} *International Colloquium on Scientific and Fundamental Aspects of GNSS*, ESA (European Space Agency), ETH Zürich, Switzerland, 2019
- 15^{th} *Marcel Grossmann Meeting*, University of Rome (La Sapienza), Italy, 2018
- *New Directions in Dark Matter and Neutrino Physics*, Perimeter Institute for Theoretical Physics, Canada, 2017
- *The Ultra-Light Frontier*, Mainz Institute for Theoretical Physics, Johannes Gutenberg University, Mainz, Germany, 2015

Selected Coverage in Popular Press

- APS Physics Synopsis, *Constants Still Constant Near Black Holes*, M. Stephens, 26 Feb 2020
- Quanta, *Ultra-Accurate Clocks Lead Search for New Physics*, G. Popkin, 16 Apr 2018
- Cosmos Mag., *GPS satellites "largest dark matter detector ever built"*, R. Lovett, 10 Nov 2017
- NBC News, *The search for dark matter just took a big step forward*, B. Bergan, 3 Nov 2017
- MIT Tech. Review, *Astrophysicists turn GPS into giant dark matter detector*, 4 May 2017
- Science, *Hunting dark matter with GPS data*, A. Cho, 30 Jan 2017