




Gordon McDonald

physics | data science | statistics | mathematics | chemistry | teaching

contact

+61 424 344 560
mail@gordonmcd.com
www.gordonmcd.com

 gordonmcd
 gdmcdonald
 gdmcdonald

math

statistics+probability
bayesian models
advanced calculus
optimization
non-linear fitting
principal component
analysis

physics

electromagnetism
quantum mechanics
waves and optics
laboratory work

coding+data analysis

R
Matlab
Python
Tableau
Excel

interests

engineering
web design
climbing
photography



I am a quantum physicist, data scientist and teacher, currently working at the Centre for Translational Data Science, at the University of Sydney. I have extensive laboratory technical knowledge, theoretical knowledge, simulation and computational data analysis experience developed during 7 years of cutting-edge physics research and two years of statistical consulting, and a passion for informative data visualization techniques. I have taught university level physics and data analysis courses in Australia and Indonesia, as well as tutoring students in Statistics, Mathematics, Physics and Chemistry. My public speaking abilities have been demonstrated while presenting my research at other universities and conferences in Australia, Indonesia, the US, and Europe; and I have co-authored 18 peer-reviewed papers in academic journals, as well as writing my honours and doctoral theses. I am experienced in working in a small team environment using agile management techniques; I have supervised two honours students and assisted in training three other PhD students, and have project management roles at the University of Sydney.

experience

- 2016–Now **Sydney Informatics Hub / Centre for Translational Data Science** The University of Sydney
Data Science Research Engineer
- 2015 **Quantum Sensors and Atom Laser Group** Australian National University
Postdoctoral Researcher
- 2010–2015 **PhD in Experimental Quantum Physics** Australian National University
Thesis: “*Cold Atom Interferometry in Optical Potentials*”
Worked in a small team to develop and prototype the next generation of quantum sensors for fundamental science and industrial applications.
- 2009 **First class Honours with University Medal in Physics,** Australian National University
Thesis: “*Detecting Atomic Shot Noise On Ultra-cold Atom Clouds*”
- 2006–2008 **Bachelor of Science** Australian National University
Majoring in Physics and Chemistry, minor in Mathematics. High Distinction average of 90% (Grade point average of 6.87 out of 7).

teaching experience

- 2017 **Certified Software Carpentry Instructor** Software Carpentry
Teaching workshops on basic data analysis and reproducible research
- 2017 **Introduction to data analysis in R** University of Sydney
Course Coordinator
- 2013–2014 **Foundation of Physics** (first year physics course) Australian National University
Lab Demonstrator
- 2013 **International Engineering Program** University of Indonesia
Guest Lecturer
- 2012–2015 **ANU Dance and Salsabor Dance Studio** Canberra, Australia and Washington DC, USA
Dance Teacher
- 2010–2011 **Advanced Physics Tutor** Australian National University
I tutored Honours Electromagnetism and Advanced Theoretical Physics
- 2006–2011 **Private Tutor** Canberra
Year 10–12 and university Mathematics, Statistics, Physics and Chemistry.

awards

2014	Vice Chancellor's Award for Outstanding Contribution to Student Learning	ANU
2014	Editor's choice for a publication in Europhysics Letters	Europhysics Letters
2010–2015	Australian Postgraduate Award+Research Supplementary Scholarship	ANU
2009	University Medal	ANU
2006-2009	PhB scholarship	ANU
2006, 2008	Summer Scholarship	ANU
2006	ANUTECH Chemistry Scholarship	ANU

publications

My work at the University of Sydney has resulted in three papers which are still in preparation, and I gave a talk at the Health Data Analytics conference in Brisbane in October 2017. My doctoral research resulted in 18 scientific publications in peer-reviewed journals from 2011 to 2017; as well as 12 presentations delivered around the world, in addition to my doctoral thesis, all of which are available upon request. My honours thesis is also available. Six selected publications are highlighted below.

2017	Observation of a modulational instability in Bose-Einstein condensates	Physical Review A
	We compare theory to experiment in the breakup of an attractive quantum gas in an optical waveguide. This is analogous to water on a surface breaking up and forming droplets. Phys. Rev. A 96 041601(R) (2017)	
2016	Simultaneous Precision Gravimetry and Magnetic Gradiometry with a Bose-Einstein Condensate: A High Precision, Quantum Sensor	Physical Review Letters
	We measure local gravity to a part per billion, and measure the local magnetic gradient to 0.1 nT/m, using a Bose-Einstein Condensate based atom interferometer. Phys. Rev. Lett. 117 138501 (2016)	
2015	Fast machine-learning online optimization of ultra-cold-atom experiments	Scientific Reports
	We use machine learning to optimize laboratory production and tuning of Bose-Einstein Condensates. Scientific Reports 6 25890 (2016)	
2014	A Bright Solitonic Matter-Wave Interferometer	Physical Review Letters
	A soliton is a non-dispersive cloud of atoms. We present the first soliton-based matter-wave interferometer, and show that using a soliton increases the visibility of the interference fringe. Phys. Rev. Lett. 113 013002 (2014)	
2014	A faster scaling in acceleration-sensitive atom interferometers	Europhysics Letters
	The signal in an atom-optic accelerometer scales at best with the square of the time it is measured for, until now. We demonstrate a signal which scales with the cube (and higher powers) of the time it is measured for. This paper was highlighted as an Editor's Choice. Europhysics Letters 105 63001 (2014)	
2013	Optically guided linear Mach-Zehnder atom interferometer	Physical Review A
	Cold atoms held along a horizontal tube, an optical waveguide, were used to make an acceleration sensor by interfering them with one another. Phys. Rev. A 87 , 013632 (2013)	