Dr. Robert J. Sewell

CONTACT INFORMATION

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08860, Castelldefels (Barcelona), Spain.

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CITIZENSHIP — Australia

RESIDENCY — Spain

LANGUAGES — English (native), Spanish (fluent), French (fair).

EXPERTISE — Experimental quantum optics & quantum metrology; spin squeezing & entanglement measures; atomic magnetometry; nonlinear optics; laser cooling & trapping; Bose-Einstein condensates; & microfabricated atom chip technology.

EDUCATION

Ph.D. in Physics. Imperial College London, UK. **2009**
Matter Wave Interference on an Atom Chip. Supervisor: Prof. E.A. Hinds
B.Sc. (1st Class Honors) in Physics. University of Melbourne, Australia. **2004**
B.A. (1st Class Honors) in Social Theory. University of Melbourne, Australia. **2002**

RESEARCH EXPERIENCE

Postdoctoral Researcher Group of Morgan Mitchell, ICFO, Spain. **2009-2013**
Postdoctoral Researcher Group of Ed Hinds, Imperial College London, UK. **2009**

TEACHING EXPERIENCE

Lectured, at Winter School, Olomouc, Czech Republic. **2014**
— gave lectures on quantum optics, quantum metrology & atomic magnetometry.
Assisted teaching Quantum Optics, M.Sc. in Photonics BCN, Barcelona, Spain. **2010-2011**
— developed course material & gave lectures atomic physics component of course.
M.Sc. & undergraduate supervision, ICFO, Barcelona, Spain. **2009-2013**
— supervised M.Sc. & final year undergraduate students' projects.
Physics Lab. Demonstrator, Imperial College London, London, UK. **2005-2009**
— taught in 1st year labs (2 years) & 3rd year labs (2 years).
Physics Lab. Demonstrator, University of Melbourne, Australia. **2004**
— taught in 2nd & 3rd year labs.
Tutor in Physics, Mathematics & Statistics, McGill University, Montreal, Canada. **2001-2002**
Tutor in Physics & Mathematics University of Melbourne, Australia. **1997-1998**

PUBLICATION SUMMARY — 16 refereed publications, including: 1 Nature, 1 Nature Photonics, 4 Physical Review Letters, 1 Physical Review X, 1 Physical Review A, 3 New Journal of Physics, 1 Applied Physics Letters & 1 Journal of Physics B. 8 publications as leading author, 2 as last author. h-index 5 (WOK), 6 (Google); i10 index 5 (Google). Citation data from ISI Web of Science as of 25 March 2014.

SELECTED PUBLICATIONS

[7] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana, & M.W. Mitchell. Ultra-sensitive atomic spin measurements with a nonlinear interferometer. Physical Review X (in press).

[6] N. Behbood, M. Napolitano, G. Colangelo, F. Martin Ciurana, **R.J. Sewell**, & M.W. Mitchell. Feedback-cooling of an atomic spin ensemble. *Physical Review Letters* 110(10):103601 (2013).

[5] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Collangelo & M.W. Mitchell. Certified quantum non-demolition measurement of a macroscopic material system. *Nature Photonics*, 7, 517 (2013).

[4] **R.J. Sewell**, M. Koschorreck, M. Napolitano, B. Dubost, N. Behbood, & M.W. Mitchell. Magnetic sensitivity beyond the projection noise limit by spin squeezing. *Physical Review Letters* 109(25):253605 (2012).

[3] B. Dubost, M. Koschorreck, M. Napolitano, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Efficient quantification of non-demolition Gaussian spin distributions. *Physical Review Letters* 108(18):183602 (2012).

[2] M. Napolitano, M. Koschorreck, B. Dubost, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Interaction-based quantum metrology showing scaling beyond the Heisenberg limit. *Nature* 471(7339):486 (2011).

[1] F. Baumgärtner, **R.J. Sewell**, S. Eriksson, I. Llorente-García, J. Dingjan, J. P. Cotter, & E. A. Hinds. Measuring Energy Differences by BEC Interferometry on a Chip. *Physical Review Letters* 105(24):243003 (2010).

AWARDS & FELLOWSHIPS

Marie Curie Research Training Network ER Fellowship	**2010**
EPSRC PhD Plus Postdoctoral Fellowship	**2009**
UK Overseas Research Students Awards Scheme Scholarship	**2006**

PROFESSIONAL ACTIVITIES

- Referee for Physical Review X, Physical Review Letters, Physical Review A, Optics Express, New Journal of Physics, Journal of Physics B, European Journal of Physics D, Journal of Visualized Experiments.
- Member of European Physical Society, American Physical Society & Optical Society of America.
- Organizer, "EMALI 2010 Conference", Barcelona.
- Development & implementation of laser safety protocols at ICFO.

PUBLICATIONS

REFEREED PUBLICATIONS

[16] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana, & M.W. Mitchell. Ultra-sensitive atomic spin measurements with a nonlinear interferometer. Physical Review X (in press).

[15] G. Puentes, G. Colangelo, **R.J. Sewell**, & M.W. Mitchell. Planar quantum squeezing via quantum non-demolition measurements in cold atomic ensembles. *New Journal of Physics* 15, 103031 (2013).

[14] N. Behbood, M. Napolitano, G. Colangelo, F. Martin Ciurana, **R.J. Sewell**, & M.W. Mitchell. Feedback-cooling of an atomic spin ensemble. *Physical Review Letters* 110(10):103601 (2013).

[13] G. Colangelo, **R.J. Sewell**, N. Behbood, F. Martin Ciurana, G. Triginer, & M.W. Mitchell. Quantum atom-light interfaces in the gaussian description for spin-1 systems. *New Journal of Physics* 15, 103007 (2013).

[12] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Collangelo & M.W. Mitchell. Certified quantum non-demolition measurement of a macroscopic material system. *Nature Photonics*, 7, 517 (2013).

[11] N. Behbood, F. Martin Ciurana, G. Colangelo, M.W. Mitchell & **R.J. Sewell**. Real-time vector field tracking with a cold-atom magnetometer. *Applied Physics Letters* 102(17):173504 (2013).

[10] P. Hauke, **R.J. Sewell**, M.W. Mitchell, & M. Lewenstein. Quantum control of spin-correlations in ultracold lattice gases. *Physical Review A* 87(2):021601(R) (2013).

[9] **R.J. Sewell**, M. Koschorreck, M. Napolitano, B. Dubost, N. Behbood, & M.W. Mitchell. Magnetic sensitivity beyond the projection noise limit by spin squeezing. *Physical Review Letters* 109(25):253605 (2012).

[8] M.W. Mitchell, M. Koschorreck, M. Kubasik, M. Napolitano, & **R.J. Sewell**. Certified quantum non-demolition measurement of material systems. *New Journal of Physics* 14(8):085021 (2012).

[7] B. Dubost, M. Koschorreck, M. Napolitano, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Efficient quantification of non-demolition Gaussian spin distributions. *Physical Review Letters* 108(18):183602 (2012).

[6] M. Napolitano, M. Koschorreck, B. Dubost, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Quantum Optics & the "Heisenberg Limit" of Measurement. *Optics & Photonics News* **22**, 40 (2011).

[5] **R.J.Sewell** & M.W. Mitchell. Collaboration & precision in quantum measurement. *Physics Today* 64(12):72 (2011).†

[4] F.A. Beduini, N. Behbood, Y. de Icaza, B. Dubost, M. Koschorreck, M. Napolitano, A. Predojević, **R.J. Sewell**, Sewell, F. Wolfgramm & M.W. Mitchell. Metrología cuántica con átomos y fotones. *Óptica pura y aplicada*, 44(2):315 (2011).

[3] M. Napolitano, M. Koschorreck, B. Dubost, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Interaction-based quantum metrology showing scaling beyond the Heisenberg limit. *Nature* 471(7339):486 (2011).§

[2] F. Baumgärtner, **R.J. Sewell**, S. Eriksson, I. Llorente-García, J. Dingjan, J. P. Cotter, & E. A. Hinds. Measuring Energy Differences by BEC Interferometry on a Chip. *Physical Review Letters* 105(24):243003 (2010).

[1] **R.J. Sewell**, J. Dingjan, F. Baumgärtner, I. Llorente-García, S. Eriksson, E. A. Hinds, G. Lewis, P. Srinivasan, Z. Moktadir, C. O. Gollasch & M. Kraft. Atom Chip for BEC Interferometry. *Journal of Physics B: Atomic, Molecular & Optical Physics.* 43(5):051003 (2010).⋆

§Highlighted in *Physics World* March 24, 2011.
†Translated & published in *Parity (Japanese Physics Magazine)* in 2012.
⋆Selected as one of the *Journal of Physics B Highlight Papers* in 2010.

POPULAR ARTICLES

[3] M. Campoy Quiles & **R.J. Sewell**. !Y Se Hizo La Luz!... Láser. *Ciencia, Publicatión Semestral de la Agrupación Astronómica Rias Baixas* 8:13 (2010).

[2] **R.J.Sewell** & M.W. Mitchell. Collaboration & precision in quantum measurement. *Physics Today* 64(12):72 (2011).

[1] **R.J. Sewell** & M.W. Mitchell. コラホて上かる測定精度. *Parity (Japanese Physics Magazine)* 27(10):50 (2012).

PREPRINTS

[1] N. Behbood, F. Martin Ciurana, G. Colangelo, M. Napolitano, G. Tóth, **R.J. Sewell**, & M.W. Mitchell. Generation of macroscopic singlet states in a cold atomic ensemble. arXiv:1403.1964 [quant-ph].

[2] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana, & M.W. Mitchell. Ultra-sensitive atomic spin measurements with a nonlinear interferometer. arXiv:1310.5889 [quant-ph].

CONFERENCE PRESENTATIONS

INVITED TALKS

[2] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Quantum–enhanced atomic magnetometry. *Información cuántica en España* (Zaragoza, Spain, 2014).

[1] **R.J. Sewell**, M. Koschorreck, M. Napolitano, B. Dubost, N. Behbood, & M.W. Mitchell. Quantum Metrology with Ultracold Atoms. *EMALI* (Barcelona, Spain, 2010).

CONTRIBUTED TALKS

[27] N. Behbood, G. Colangelo, F. Martin Ciurana, **R.J. Sewell** & M.W. Mitchell. Generation of macroscopic singlet states in a cold atomic ensemble. *Entanglement Detection & Quantification* (Bilbao, Spain, 2014).

[26] N. Behbood, G. Colangelo, F. Martin Ciurana, M. Napolitano, **R.J. Sewell** & M.W. Mitchell. Spin cooling via incoherent feedback in an ensemble of cold ^{87}Rb atoms. *Qauntum Information & Measurement* (Berlin, Germany, 2014).

[25] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Ultra-sensitive atomic spin measurements with a nonlinear interferometer. *Qauntum Information & Measurement* (Berlin, Germany, 2014).

[24] **R.J. Sewell**, P. Hauke, M.W. Mitchell & M. Lewenstein. Quantum control of spin-correlations in ultracold lattice gases. *Qauntum Simulators* (Benasque, Spain, 2013).

[23] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Simultaneous observation of super-Heisenberg scaling & spin squeezing in a nonlinear measurement of atomic spins. *QuAMP* (Swansea, UK, 2013).

[22] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Simultaneous observation of super-Heisenberg scaling & spin squeezing in a nonlinear measurement of atomic spins. *RSEF* (Valencia, Spain, 2013).

[21] G. Colangelo, N. Behbood, F. Martin Ciurana, G. Puentes, **R.J. Sewell** & M.W. Mitchell. Generation of planar quantum squeezing in an atomic ensemble. *ICSSUR* (Nuremberg, Germany, 2013).

[20] P. Hauke, **R.J. Sewell**, M.W. Mitchell & M. Lewenstein. Quantum control of spin-correlations in ultracold lattice gases. *CLEO:QELS* (San Jose, USA, 2013).

[19] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Simultaneous observation of super-Heisenberg scaling & spin squeezing in a nonlinear measurement of atomic spins. *CLEO:QELS* (San Jose, USA, 2013).

[18] N. Behbood, F. Martin Ciurana, **R.J. Sewell**, G. Colangelo, M. Napolitano & M.W. Mitchell. Spin cooling via incoherent feedback in an ensemble of cold ^{87}Rb atoms. *CLEO:QELS* (San Jose, USA, 2013).

[17] G. Colangelo, N. Behbood, F. Martin Ciurana, G. Puentes, **R.J. Sewell** & M.W. Mitchell. Generation of planar quantum squeezing in an atomic ensemble. *CLEO:QELS* (San Jose, USA, 2013).

[16] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Simultaneous observation of super-Heisenberg scaling & spin squeezing in a nonlinear measurement of atomic spins. *DAMOP* (Quebec, Canada, 2013).

[15] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Simultaneous observation of super-Heisenberg scaling & spin squeezing in a nonlinear measurement of atomic spins. *CLEO* (Munich, Germany, 2013).

[14] F. A. Beduini, N. Behbood, B. Dubost, Y. de Icaza, M. Napolitano, R.J.Sewell, F. Wolfgramm, J. Zielińska, & M.W. Mitchell. Quantum-enhanced magnetometry with photons & atoms. *QCMC* (Vienna, Austria, 2012).

[13] **R.J. Sewell**, M. Koschorreck, M. Napolitano, B. Dubost, N. Behbood, G. Colangelo, F. Martin, & M.W. Mitchell. Spin squeezing via QND measurement in an Optical Magnetometer. *QCMC* (Vienna, Austria, 2012).

[12] M. Napolitano, M. Koschorreck, B. Dubost, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Interaction-based spin measurements in a cold atomic ensemble. *ICAP* (Paris, France, 2012).

[11] **R.J. Sewell**, M.Koschorreck, M. Napolitano, B. Dubost, N. Behbood, & M.W. Mitchell. Spin Squeezing of Large-Spin Ensembles via Quantum Non-demolition Measurement. *QIM* (Berlin, Germany, 2012).

[10] N. Behbood, M. Napolitano, G. Colangelo, B. Dubost, S. Palacios Álvarez, **R.J. Sewell**, G. Tóth, & M.W. Mitchell. Generation of a macroscopic singlet state in an atomic ensemble. *QIM* (Berlin, Germany, 2012).

[9] **R.J. Sewell**, M.Koschorreck, M. Napolitano, B. Dubost, N. Behbood, & M.W. Mitchell. Spin-squeezing of a large-spin system via QND measurement. *CLEO:QELS* (San Jose, USA, 2012).

[8] N. Behbood, M. Napolitano, G. Colangelo, B. Dubost, S. Palacios Álvarez, **R.J. Sewell**, G. Tóth, & M.W. Mitchell.Generation of a macroscopic singlet state in an atomic ensemble. *CLEO:QELS* (San Jose, USA, 2012).

[7] G. Colangelo, **R.J. Sewell**, & M.W. Mitchell, The quantum limits of magnetometry in a cold atomic ensemble. *YAO* (Cracow, Poland, 2012).

[6] N. Behbood, B. Dubost, M. Napolitano, M. Koschorreck, **R.J. Sewell**, G. Tóth, & M.W. Mitchell. Generation of macroscopic singlet states in atomic ensembles. *CLEO* (Munich, Germany, 2011).

[5] M. Napolitano, M. Koschorreck, B. Dubost, N. Behbood, **R.J. Sewell**, & M.W. Mitchell. Interaction-based quantum metrology giving a scaling beyond the Heisenberg limit. *CLEO:QELS* (Baltimore, USA, 2011).

[4] N. Behbood, B. Dubost, M. Napolitano, M. Koschorreck, **R.J. Sewell**, G. Tóth, & M.W. Mitchell. Generation of a macroscopic singlet state in an atomic ensemble. *YAO* (Hannover, Germany, 2011).

[3] **R.J. Sewell**, M. Napolitano, M. Koschorreck, B. Dubost, N. Behbood, & M.W. Mitchell. Nonlinear Quantum Metrology of Atomic Spins. *, QCMC* (Briabane, Australia, 2010).

[2] M. Koschorreck, M. Napolitano, B. Dubost, N. Behbood & **R.J. Sewell** ,and M.W. Mitchell. Spin Squeezing via Quantum Non-Demolition Measurements in Cold ^{87}Rb Atomic Ensemble. *CLEO* (San Jose, USA, 2010).

[1] **R.J. Sewell**, F. Baumgärtner, **R.J. Sewell**, S. Eriksson, I. Llorente-García, J. Dingjan, & E. A. Hinds. Atom chip BEC Interferometer. *J2IFAM* (San Jose, USA, 2010).

POSTERS

[14] **R.J. Sewell**, M. Napolitano, N. Behbood, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Ultra-sensitive atomic spin measurements with a nonlinear interferometer. *Qauntum Information Processing* (Barcelona, Spain, 2014).

[13] N. Behbood, **R.J. Sewell**, M. Napolitano, G. Colangelo, F. Martin Ciurana & M.W. Mitchell. Spin cooling via incoherent feedback in an ensemble of cold Rb atoms. *Qauntum Simulators* (Barcelona, Spain, 2014).

[12] P. Hauke, **R.J. Sewell**, M.W. Mitchell & M. Lewenstein. Quantum control of spin-correlations in ultracold lattice gases.*CLEO* (Munich, Germany, 2013).

[11] N. Behbood, F. Martin Ciurana, **R.J. Sewell**, G. Colangelo, M. Napolitano & M.W. Mitchell. Spin cooling via incoherent feedback in an ensemble of cold ^{87}Rb atoms. *CLEO* (Munich, Germany, 2013).

[10] N. Behbood, F. Martin Ciurana, **R.J. Sewell**, G. Colangelo, M. Napolitano & M.W. Mitchell. Fast & non-distructive vector field magnetometry with cold atomic ensembles.*CLEO* (Munich, Germany, 2013).

[9] **R.J. Sewell**, M. Koschorreck, M. Napolitano, B. Dubost, N. Behbood, & M.W. Mitchell. Spin Squeezing in Broadband Atomic Magnetometry. *ICAP* (Cairns, Australia, 2010).

[8] **R.J. Sewell**, F. Baumgärtner, S. Eriksson, I. Llorente-García, J. Dingjan, J. P. Cotter, & E. A. Hinds. Atom Chip BEC Interferometer. *SQUINT* (Santa Fe, USA, 2010).

[7] F. Baumgärtner, **R.J. Sewell**, S. Eriksson, I. Llorente-García, J. Dingjan, & E. A. Hinds. Atom Chip BEC Interferometer. *QuAMP* (Leeds, UK, 2009).

[6] **R.J. Sewell**, F. Baumgärtner, S. Eriksson, I. Llorente-García, J. Dingjan, & E. A. Hinds. Atom Chip BEC Interferometer. *EPSRC* (London, UK, 2009).
[5] S. Eriksson, **R.J. Sewell**, F. Baumgärtner, J. Dingjan, & E. A. Hinds. Single & Double Well Potentials on an Atom Chip. *Interf* (Triest, Italy, 2008).
[4] **R.J. Sewell**, S. Eriksson, J. Dingjan, & E. A. Hinds. Single & Double Well Potentials on an Atom Chip. *QuAMP* (London, UK, 2007).
[3] **R.J. Sewell**, S. Eriksson, J. Dingjan, & E. A. Hinds. Single & Double Well Potentials on an Atom Chip. *PAQ* (London, UK, 2007).
[2] **R.J. Sewell**, S. Eriksson, J. Dingjan, & E. A. Hinds. Towards an Atom Chip Interferometer. *YAO* (Durham, UK, 2007).
[1] **R.J. Sewell**, S. Eriksson, & E. A. Hinds. Towards an Atom Chip Interferometer. *YAO* (Orsay, France, 2006).

LECTURES & SEMINARS

INVITED LECTURES

[1] **R.J. Sewell**. Strong atom-light interaction for quantum–enhanced sensors. *CFM & DIPC* (San Sebastian, Spain, 2014).
[2] **R.J. Sewell**. Atomic Physics. *Winter School on Quantum Physics & Quantum Information* (Olomouz University, Czech Republic, 2014).

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[10] **R.J. Sewell**. Quantum-enhanced optical magnetometry. *MIT* (Boston, USA, 2013).
[9] **R.J. Sewell** Quantum non-demolition measurement & quantum control of atomic spins. *Imperial College* (London, UK, 2013).
[8] **R.J. Sewell**. Certified quantum non-demolition measurement of ultracold atomic spins. *ICFO* (Barcelona, Spain, 2013).
[8] **R.J. Sewell**. Squeezing, entanglement & quantum control of atomic spins. *UPV* (Bilbao, Spain, 2012).
[7] **R.J. Sewell**. Nonlinear quantum metrology with atomic spins. *Imperial College London* (London, UK, 2011).
[6] **R.J. Sewell**. Spin Squeezing, Entanglement & Nonlinear Quantum Metrology with Ultracold Atoms. *Monash University* (Melbourne, Australia, 2010).
[5] **R.J. Sewell**. Spin Squeezing, Entanglement & Nonlinear Quantum Metrology with Ultracold Atoms. *Melbourne University* (Melbourne, Australia, 2010).
[4] **R.J. Sewell**. Spin Squeezing, Entanglement & Nonlinear Quantum Metrology with Ultracold Atoms. *ANU* (Canberra, Australia, 2010).
[3] **R.J. Sewell**. Atom–chip BEC interferometer. *ICFO* (Barcelona, Spain, 2009).
[2] **R.J. Sewell**. Atom–chip BEC interferometer. *IESL* (Heraklion, Greece, 2009).
[1] **R.J. Sewell**. Atom–chip BEC interferometer. *ANU* (Canberra, Australia, 2007).

REFERENCES

REFEREES

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