

Date  
Name  
Address

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**Dr Matthew McDonnell**  
Centre for Quantum Dynamics  
School of Science  
Griffith University  
Nathan QLD 4111  
Australia  
+61 (0) 7 3735 5328  
matt@matt-mcdonnell.com  
Australian

Phone  
email  
Nationality

## Employment History

- **September 2006–Present** Research Fellow in the Hydrogen Cooling group (Griffith University)
- **July 2003–August 2006** Postdoctoral Research Assistant in the Ion Trap Quantum Information Processor group (University of Oxford)
- **January 1999–July 1999** Research Engineer at Special Research Centre for Advanced Mineral and Material Processing (University of Western Australia)

## Education

- **October 1999–June 2003** **University of Oxford**  
DPhil in Atomic and Laser Physics  
Thesis title “Two-Photon Readout Methods for an Ion Trap Quantum Information Processor”
- **February 1993–November 1998** **University of Western Australia**  
BSc (Chemical Physics) (hons. 1st Class)  
BE (Materials) (hons. 1st Class)  
**Prizes:**
  - 1993: Lady James Prize in Chemistry (shared), Shell Prize in Science, Bradken Prize in Materials Engineering
  - 1994: UWA Graduates Association Prize in Science
  - 1995: Cape Bouvard Prize in Materials Engineering, Lady James Prize in Physical Science (shared)
  - 1996: Faculty of Science Medal for best Honours Science Student, J.A. Wood Memorial Prize for best Honours Student in the Faculties of Science, Engineering, Medicine, Agriculture and Dentistry
  - 1997: Centre for Water Research Prize
  - 1998: Rojan Advanced Ceramics Prize in Materials Engineering
  - 1999: Awarded a Commonwealth Scholarship to study for a DPhil at the University of Oxford

## Publications

- “ Long-lived mesoscopic entanglement outside the Lamb-Dicke regime”, McDonnell MJ, Home JP, Lucas DM, Imreh G, Keitch BC, Szwer DJ, Thomas NR, Webster SC, Stacey DN, Steane AM, *Phys. Rev. Lett.* **98** 063603 (2007)

- “Deterministic entanglement and tomography of ion spin qubits”, Home JP, McDonnell MJ, Lucas DM, Imreh G, Keitch BC, Szwer DJ, Thomas NR, Webster SC, Stacey DN, Steane AM, quant-ph/0603273 (2006) Published in New Journal of Physics
- “Laser linewidth effects in quantum state discrimination by electromagnetically induced transparency”, McDonnell MJ, Stacey DN, and Steane AM, *Phys. Rev. A* **70** 053802 (2004)
- “High-efficiency detection of a single quantum of angular momentum by suppression of optical pumping”, McDonnell MJ, Stacey JP, Webster SC, Home JP, Ramos A, Lucas DM, Stacey DN, Steane AM, *Phys. Rev. Lett.* **93** 153601 (2004)
- “Isotope-selective photoionization for calcium ion trapping”, Lucas DM, Ramos A, Home JP, McDonnell MJ, Nakayama S, Stacey JP, Webster SC, Stacey DN, Steane AM, *Phys. Rev. A* **69** 012711 (2004)
- “Oxford Ion Trap Quantum Computing Project”, Lucas DM, Donald CJS, Home JP, McDonnell M, Ramos A, Stacey DN, Stacey JP, Steane AM, Webster SC, *Phil. Trans. R. Soc. Lond. A* **361** 1401 (2003)
- “Search for correlation effects in linear chains of trapped  $\text{Ca}^+$  ions”, Donald CJS, Lucas DM, Barton PA, McDonnell MJ, Stacey JP, Stevens DA, Stacey DN, Steane AM, *Europhys. Lett.* **51** 388–394 (2000)
- “Magnetisation of thin films under oblique field conditions”, McDonnell M, Street R, Woodward RC, Chapman JN, *J. Magnetism and Magnetic Materials* **177** 1281–1282 (1998)
- “Photocurrent autocorrelation of femtosecond laser pulses in poly(p-phenylene vinylene)”, Samoc M, Samoc A, Luther-Davies B, Dowd A, McDonnell M, *J. Phys. D* **30** 895–899 (1997)

## Research Interests

- For the last 7 years I have been involved in an ion trap quantum information experiment at the University of Oxford. The goal of this research is to control and measure the quantum behaviour of individual ions of calcium trapped in an ion trap, in order to construct the fundamental building blocks of a quantum information processing system. The experimental work has involved laser cooling, computer control of experiments and the design and construction of optical systems. The theoretical side of the work has involved simulation of the atomic and optical systems using programming languages such as *Matlab* and *Mathematica*.

## Skills

- Experimental atomic physics, in particular frequency stabilisation of infrared and ultra-violet diode lasers, and ion trap experiments.
- Experience with a wide range of experimental techniques including TEM, SEM, AFM, Kerr microscopy, materials testing and analytical chemistry techniques.
- Numerical simulation of the evolution of atomic and quantum optical systems using *Matlab*.
- Teaching experience ranging from laboratory demonstrating for groups of 10-20 students to Oxford tutorial teaching for groups of 2-7 students.

- Excellent computer skills. Proficient in the use of Windows (95/98/2000/NT/XP) and UNIX (Solaris, Linux, FreeBSD) operating systems.
- Computer control of physics experiments.
- Document preparation:  $\text{\LaTeX}$ , Xfig, Word, Excel, Powerpoint, HTML.
- Programming languages: *Matlab*, *Mathematica*, Ocaml, Erlang, Lisp, C, *Labview*, Pascal, Perl, Java.