Prof. Andrew J. Daley

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Born: 24 October 1978, Auckland, New Zealand
Citizenship: New Zealand
Languages Spoken: English (Native), German

1. Education / Qualifications

2002 – 2005 Doctorate in Physics [Dr. rer. nat.], Supervisor: Prof. Peter Zoller
Institute for Theoretical Physics, University of Innsbruck, Austria (Conferred 6th September 2005)

2000 – 2002 Master of Science with first class honours, University of Auckland, New Zealand (Conferred September 2002)

1997 – 1999 Bachelor of Science, University of Auckland, New Zealand (conferred May 2000)

1992 – 1996 Secondary School education, Macleans College, Howick, Auckland, New Zealand

2. Employment History

2013 – Professor (Chair of Theoretical Quantum Optics)
Department of Physics, University of Strathclyde, Glasgow, Scotland, UK

2011 – 2014 Assistant Professor
Department of Physics and Astronomy, University of Pittsburgh, Pennsylvania, USA

2009 – 2010 Senior Scientist
Institute for Quantum Optics and Quantum Information of the Austrian Academy of Sciences, Innsbruck, Austria.

2007 – 2009 Wissenschaftlicher Mitarbeiter Kategorie I
(University position with lecturing and research responsibilities)
Institute for Theoretical Physics, University of Innsbruck, Austria

2005 – 2007 Wissenschaftlicher Mitarbeiter Kategorie I (50%) and Postdoctoral researcher (50%), Institute for Theoretical Physics, University of Innsbruck, Austria

3. Research Interests

My research bridges fundamental research in quantum optics and many-body physics to the design and real-world applications of quantum technologies. An important part of the work in our team focusses on developing new implementations of quantum computing and quantum simulation, as well as exploring applications of these devices to other fields in science and engineering or to industry. In recent years, I have been particularly involved in developing interdisciplinary connections around the implementation and applications of quantum computing and simulation, especially in leading the Quantum Computing Applications Cluster, as well as my software leadership role in the EU Flagship project PASQuanS in quantum simulation, and as PI of the EPSRC programme grant DesOEQ.

On the basic science side, we have been heavily involved in the development of numerical techniques for out of equilibrium dynamics, and in the theory of open many-body quantum systems (understanding state engineering, continuous measurement and driven systems). We have also had a particular interest in the verification of quantum devices. Our theory connects with experiments with neutral atoms, trapped ions, and solid state devices (especially superconducting devices and transport systems, including in oxide heterostructures), and we have extensively collaborated with experimental groups across all of these systems.

4. Publications and presentations

- Over 110 publications, including in Science, Nature, Proceedings of the National Academy of Sciences, 2 in Nature Physics, 3 in Physical Review X and 30 in Physical Review Letters.
- h-index 36, over 5400 citations (Web of Science, July 2022), ResearcherID: F-5366-2014; h-index 42, over 8000 citations (Google Scholar, July 2022)
- Over 80 invited seminars and colloquia at universities.
- Over 40 invited talks at international conferences and workshops, including 4 invited talks at the American Physical Society March Meeting (Los Angeles 2018, Baltimore 2016, Denver 2014, Boston 2012); International Conference of Laser Spectroscopy (Queenstown, July 2019), and the Bose-Einstein Condensation meeting in Sant Feliu de Guixols (September 2019)

5. Awards and Fellowships

2021	Fellow of the American Physical Society
2012	US National Science Foundation CAREER Award
2009	Ludwig Boltzmann Price of the Austrian Physical Society

6. Grant Income

Over £3M in research funding for my research group in the past five years, including:

2020 – 2024	(CI) EPSRC Prosperity Partnership (£600k for my group) *Scalable Qubit Arrays for Quantum Computing and Optimisation*
2018 – 2021	(CI) EU FETFLAG project - Quantum Simulation pillar of QT Flagship (£620k for my group) *Programmable Atomic Large-Scale Quantum simulation*
2017 – 2022	(PI) US Air Force Office of Scientific Research (£600k), *Engineering many-body quantum states and dissipative dynamics in quantum simulators*
2017 – 2022	(PI) EPSRC Programme grant (£1.3M for my group, £5.8M total EPSRC funding) Designing Out-of-Equilibrium many-body quantum systems

7. Leadership

- Founding co-ordinator of the Quantum Computing Application Cluster (2020 – present), bringing together Quantum Computing researchers at the Universities of Edinburgh, Glasgow, and Strathclyde, to enhance interdisciplinary quantum computing research and accelerate the applications of quantum computing to real-world applications (http://qca-cluster.org)
- Leadership roles in major collaborative projects, including:
    - PI of an EPSRC programme grant "Designing out-of-equilibrium many-body quantum systems" (2017-2023)
    - Executive committee of the EU Quantum Technologies Flagship project "Programmable Atomic Large-Scale Quantum Simulation" (2018-2022)
    - Workpackage leader for cold atoms in the UK Quantum Technologies Hub for Computing and Simulation (2019-2024)
- Organiser of major scientific conferences, workshops and programmes in our field (>100 participants):
    - Lead organiser of QSIM19: Open Quantum System Dynamics: Quantum Simulators and Simulations Far from Equilibrium program, Kavli Institute for Theoretical Physics, Santa Barbara, California, (1/4/2019 – 7/6/2019)
    - Scientific committee chair for Finite Temperature and Non-equilibrium superfluid systems (FINESS) conference series, co-chair of meetings in Queenstown 2013, Sopot 2015, and Wanaka 2018
    - Co-chair of Many-body dynamics and open quantum systems (DOQS) meetings, Glasgow 2014, 2016, and 2018
    - Scientific committee of the Bose-Einstein Condensation conference series held biannually in Sant Feliu de Guixols, Spain (2017 – present)
    - Program committee for the American Physical Society (APS) March meeting [Division of Atomic, Molecular, and Optical Physics (DAMOP) committee] (2014 – 16), the APS DAMOP meeting (2014 – 16)
- Research Director, Department of Physics, University of Strathclyde (2014-18)

- Editorial board member for Quantum Science and Technology (2016 – present), Physical Review A (2016 – 2021), and Journal of Physics A (2017 – present); Guest editor for New Journal of Physics focus issue, 2013-2014
- Executive board member of the Pittsburgh Quantum Institute (2013 – present);

8. Researcher Supervision and external examinations

- Supervisor for a total of 14 Postdoctoral Fellows
- 9 Graduated PhD Students as 1st supervisor, 6 current PhD students
- Service on external thesis committees or as external examiner at the University of Oxford, University of Cambridge, University College London, Stony Brook University, Carnegie Mellon University, Herriot Watt University, University of St. Andrews, University of Stellenbosch, Aalto University, Aarhus University, University of Innsbruck, University of Montana, University of Nottingham, and École Polytechnique.

9. Teaching (high-level summary)

2020 – 2021 Teaching coordinator for year 2, Department of Physics, University of Strathclyde

2017 – Course coordinator for MPhys with Advanced Research, University of Strathclyde

2015 – University of Strathclyde, Lecture Courses (with tutorials) including:

- 4th Year Topics in Quantum Physics
- 3rd Year Mathematical Physics
- 3rd year undergraduate condensed matter physics
- 2nd year Mathematics for Physicists (Probability and Statistics, Complex analysis)
- Some lectures for 5th year Advanced Quantum Optics and SUPA Quantum Technologies Quantum Theory Course
- Advanced tutorials covering all elements of undergraduate physics for the MPhys with Advanced Research course

2011 – 2014 University of Pittsburgh, Lecture Courses including:

- 2nd year graduate Advanced topics in solid state physics (Quantum Optics)
- 1st year undergraduate Introduction to Physics (Algebra-based) parts 1 and 2
- 3rd year undergraduate Statistical Mechanics

2006 – 2010 University of Innsbruck: Lecture and problem-solving courses, including:

- Physics of Cold Atoms
- Numerical Methods for Quantum Mechanics
- Problem solving classes for Quantum Mechanics (2nd/3rd year and 4th year)