

Jonathan Pritchard
Reader
Physics
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Personal Statement

Jonathan Pritchard received his PhD from Durham University in 2011, studying cooperative optical non-linearities at the single photon level arising from strong atomic interactions. He then joined the Photonics group at the University of Strathclyde building a new apparatus for atom interferometry with a Bose-Einstein Condensate for inertial sensing. He then joined the hybrid quantum information group at the University of Wisconsin-Madison in 2013, developing a new project to trap a single atom close to a superconducting circuit for a hybrid quantum memory. Jonathan was recently awarded an EPSRC Quantum Technology Fellowship in July 2015 to start a new project at the University of Strathclyde using hybrid atom-superconductor devices to develop next generation hardware for quantum networking.

Qualifications

Doctor of Philosophy, Durham University
1 Sep 2007 → 30 Apr 2011
Award Date: 1 May 2011

Employment

Reader
Physics
University Of Strathclyde
United Kingdom
19 May 2015 → present

Research output

A spotlight on circular states

Pritchard, J., 24 Mar 2022, (E-pub ahead of print) In: *Nature Physics*. 2 p.

Strong coupling and active cooling in a finite temperature hybrid atom-cavity system

Keary, L. F. & Pritchard, J. D., 12 Jan 2022, In: *Physical Review A*. 105, 1, 6 p., 013707.

A practical compact source of heralded single photons for a simple detection LIDAR

Mrozowski, M. P., Jeffers, J. & Pritchard, J. D., 1 Aug 2021, In: *Proceedings of SPIE*. 11835, 10 p., 1183508.

Theoretical comparison of quantum and classical illumination for simple detection-based LIDAR

Murchie, R. J., Pritchard, J. D. & Jeffers, J., 1 Aug 2021, *Quantum Communications and Quantum Imaging XIX: Proceedings Volume 11835*. Deacon, K. S. & Meyers, R. E. (eds.). Bellingham, WA, 118350G. (Proceedings of SPIE - The International Society for Optical Engineering; vol. 11835).

Optimal state choice for Rydberg atom microwave sensors

Chopinard, A. & Pritchard, J., Aug 2021, In: *Physical Review Applied*. 16, 9 p., 024008.

Hybrid quantum devices: guest editorial

Chu, Y., Pritchard, J. D., Wang, H. & Weides, M., 15 Jun 2021, In: *Applied Physics Letters*. 118, 24, 3 p., 240401.

Gaussian state-based quantum illumination with simple photodetection

Yang, H., Roga, W., Pritchard, J. & Jeffers, J., 2 Mar 2021, In: *Optics Express*. 29, 6, p. 8199-8215 17 p.

Towards scalable quantum computing with neutral atoms

Pritchard, J. D., 15 May 2020, *CLEO: Science and Innovations 2020*. Washington, D.C.: Optical Society of America, STh4G.5

Quantum illumination with simple detection

Yang, H., Roga, W., Pritchard, J. & Jeffers, J., 30 Mar 2020, *Quantum Technologies 2020*. Diamanti, E., Ducci, S., Treps, N. & Whitlock, S. (eds.). Bellingham, WA, 5 p. 113470I. (Proceedings of SPIE - The International Society for Optical Engineering; vol. 11347).

Rydberg atom quantum technologies

Adams, C. S., Pritchard, J. D. & Shaffer, J. P., 3 Dec 2019, In: *Journal of Physics B: Atomic, Molecular and Optical Physics*. 53, 1, 13 p., 012002.

Entanglement of neutral-atom qubits with long ground-Rydberg coherence times

Picken, C. J., Legaie, R., McDonnell, K. & Pritchard, J. D., 3 Dec 2018, In: *Quantum Science and Technology*. 4, 1, 8 p., 015011.

Coherent control of addressable Rydberg atoms for hybrid quantum information processing

Picken, C. J., Legaie, R., McDonnell, K. & Pritchard, J. D., 25 Jul 2018. 1 p.

Free-induction-decay magnetometer based on a microfabricated Cs vapor cell

Hunter, D., Piccolomo, S., Pritchard, J. D., Brockie, N. L., Dyer, T. E. & Riis, E., 5 Jul 2018, (E-pub ahead of print) In: *Physical Review Applied*. 10, 10 p., 014002.

Sub-kilohertz excitation lasers for quantum information processing with Rydberg atoms

Legaie, R., Picken, C. J. & Pritchard, J. D., 22 Mar 2018, In: *Journal of the Optical Society of America B*. 35, 4, p. 892-898 7 p.

ARC: An open-source library for calculating properties of alkali Rydberg atoms

Šibalić, N., Pritchard, J. D., Adams, C. S. & Weatherill, K. J., 30 Nov 2017, In: *Computer Physics Communications*. 220, p. 319-331 13 p.

Detection of applied and ambient forces with a matter-wave magnetic gradiometer

Robertson, B. I., MacKellar, A. R., Halket, J., Gribbon, A., Pritchard, J. D., Arnold, A. S., Riis, E. & Griffin, P. F., 30 Nov 2017, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 96, 5, 7 p., 053622.

Single atom imaging with an sCMOS camera

Picken, C. J., Legaie, R. & Pritchard, J. D., 16 Oct 2017, In: *Applied Physics Letters*. 111, 16, 5 p., 164102.

Optimized coplanar waveguide resonators for a superconductor-atom interface

Beck, M. A., Isaacs, J. A., Booth, D., Pritchard, J. D., Saffman, M. & McDermott, R., 2 Sep 2016, In: *Applied Physics Letters*. 109, 9, 5 p., 092602.

Long working distance objective lenses for single atom trapping and imaging

Pritchard, J. D., Isaacs, J. A. & Saffman, M., 26 Jul 2016, In: *Review of Scientific Instruments*. 87, 7, 4 p., 073107.

Measurement of holmium Rydberg series through magneto-optical trap depletion spectroscopy

Hostetter, J., Pritchard, J. D., Lawler, J. E. & Saffman, M., 16 Jan 2015, In: *Physical Review A*. 91, 1, 7 p., 012507.

Microwave control of the interaction between two optical photons

Maxwell, D., Szwer, D. J., Paredes-Barato, D., Busche, H., Pritchard, J. D., Gauguier, A., Jones, M. P. A. & Adams, C. S., 16 Apr 2014, In: *Physical Review A*. 89, 4, 5 p., 043827.

Hybrid atom-photon quantum gate in a superconducting microwave resonator

Pritchard, J. D., Isaacs, J. A., Beck, M. A., McDermott, R. & Saffman, M., 16 Jan 2014, In: *Physical Review A*. 89, 1, 5 p., 010301.

Storage and control of optical photons using Rydberg polaritons

Maxwell, D., Szwer, D. J., Paredes-Barato, D., Busche, H., Pritchard, J. D., Gauguet, A., Weatherill, K. J., Jones, M. P. A. & Adams, C. S., 8 Mar 2013, In: *Physical Review Letters*. 110, 10, 5 p., 103001.

Nonlinear optics using cold Rydberg atoms

Pritchard, J. D., Weatherill, K. J. & Adams, C. S., Feb 2013, *Annual Review of Cold Atoms and Molecules*. Madison, K. W., Wang, Y., Rey, A. M. & Bongs, K. (eds.). Singapore, Vol. 1. p. 301-350 50 p.

Demonstration of an inductively coupled ring trap for cold atoms

Pritchard, J. D., Dinkelaker, A. N., Arnold, A. S., Griffin, P. F. & Riis, E., 30 Oct 2012, In: *New Journal of Physics*. 14, 13 p., 103047.

Cooperative Optical Non-Linearity in a Blockaded Rydberg Ensemble

Pritchard, J. D., 17 May 2012, Springer-Verlag. 158 p.

Fractional photon-assisted tunneling of ultra-cold atoms in periodically shaken double-well lattices

Esmann, M., Pritchard, J. D. & Weiss, C., Feb 2012, In: *Laser Physics Letters*. 9, 2, p. 160-168 9 p.

Correlated photon emission from multiatom Rydberg dark states

Pritchard, J. D., Adams, C. S. & Mølmer, K., 27 Jan 2012, In: *Physical Review Letters*. 108, 4, 5 p., 043601.

Microwave dressing of Rydberg dark states

Tanasittikosol, M., Pritchard, J. D., Maxwell, D., Gauguet, A., Weatherill, K. J., Potvliege, R. M. & Adams, C. S., 14 Sep 2011, In: *Journal of Physics B: Atomic, Molecular and Optical Physics*. 44, 18, 6 p., 184020.

Optical non-linearity in a dynamical Rydberg gas

Pritchard, J. D., Gauguet, A., Weatherill, K. J. & Adams, C. S., 14 Sep 2011, In: *Journal of Physics B: Atomic, Molecular and Optical Physics*. 44, 18, 6 p., 184019.

Quantum interference in interacting three-level Rydberg gases: coherent population trapping and electromagnetically induced transparency

Sevinçli, S., Ates, C., Pohl, T., Schempp, H., Hofmann, C. S., Günter, G., Amthor, T., Weidemüller, M., Pritchard, J. D., Maxwell, D., Gauguet, A., Weatherill, K. J., Jones, M. P. A. & Adams, C. S., 14 Sep 2011, In: *Journal of Physics B: Atomic, Molecular and Optical Physics*. 44, 18, 7 p., 184018.

Cooperative atom-light interaction in a blockaded Rydberg ensemble

Pritchard, J. D., Maxwell, D., Gauguet, A., Weatherill, K. J., Jones, M. P. A. & Adams, C. S., 5 Nov 2010, In: *Physical Review Letters*. 105, 19, 4 p., 193603.

Monitoring hydraulic processes with automated time-lapse electrical resistivity tomography (ALERT)

Kuras, O., Pritchard, J. D., Meldrum, P. I., Chambers, J. E., Wilkinson, P. B., Ogilvy, R. D. & Wealthall, G. P., 31 Oct 2009, In: *Comptes Rendus - Geoscience*. 341, 10-11, p. 868-885 18 p.

Light interactions in Rydberg ensembles

Weatherill, K. J., Pritchard, J. D., Able, R. P., Bason, M. G., Mohapatra, A. K. & Adams, C. S., 19 Jun 2009, *CLEO/Europe - EQEC 2009 - European Conference on Lasers and Electro-Optics and the European Quantum Electronics Conference*. IEEE, 1 p. 5194767

Laser frequency stabilization to excited state transitions using electromagnetically induced transparency in a cascade system

Abel, R. P., Mohapatra, A. K., Bason, M. G., Pritchard, J. D., Weatherill, K. J., Raitzsch, U. & Adams, C. S., 18 Feb 2009, In: Applied Physics Letters. 94, 7, 3 p., 071107.

A versatile and reliably reusable ultrahigh vacuum viewport

Weatherill, K. J., Pritchard, J. D., Griffin, P. F., Dammalapati, U., Adams, C. S. & Riis, E., Feb 2009, In: Review of Scientific Instruments. 80, 2, 3 p., 026105.

Electromagnetically induced transparency of an interacting cold Rydberg ensemble

Weatherill, K. J., Pritchard, J. D., Abel, R. P., Bason, M. G., Mohapatra, A. K. & Adams, C. S., 1 Oct 2008, In: Journal of Physics B: Atomic, Molecular and Optical Physics. 41, 20, 5 p., 201002.

Activities

EPSRC (External organisation)

Jonathan Pritchard (Member)
27 Jul 2021

EPSRC (External organisation)

Jonathan Pritchard (Member)
19 Jan 2021

Internal PhD Examiner, University of Strathclyde

Jonathan Pritchard (Examiner)
29 Sep 2020

Applied Physics Letters (Journal)

Jonathan Pritchard (Editor)
31 Aug 2020

External PhD Examiner, CQT, National University of Singapore

Jonathan Pritchard (Examiner)
12 Aug 2020

BBC Article on neutral atom quantum computing

Jonathan Pritchard (Interviewee) & Andrew Daley (Interviewee)
7 Aug 2020

Towards scalable quantum computing with neutral atoms

Jonathan Pritchard (Speaker)
14 May 2020

Intelligent Computational Engineering quantum computing event

Jonathan Pritchard (Invited speaker) & Andrew Daley (Invited speaker)
4 Feb 2020

EPSRC (External organisation)

Jonathan Pritchard (Advisor)
3 Dec 2019 → 4 Dec 2019

EPSRC (External organisation)

Jonathan Pritchard (Member)
2 Dec 2019

Quantum Technology Showcase 2019

Paul Griffin (Participant), Erling Riis (Participant), Stuart Ingleby (Participant), Terry Dyer (Participant), Oliver Burrow (Participant), Gregory Hoth (Participant), Jonathan Pritchard (Participant), John Jeffers (Participant), Araceli Venegas-Gomez (Participant) & Jeremy Stuart Ward (Participant)

15 Nov 2019

William Dawber

Jonathan Pritchard (Host) & John Jeffers (Host)

15 Oct 2019

Scottish Centre for Innovation in Quantum Computing and Simulation Industry Workshop

Andrew Daley (Organiser), Jonathan Pritchard (Organiser) & Jeremy Stuart Ward (Organiser)

29 Aug 2019

Rydberg atom quantum information

Jonathan Pritchard (Speaker)

8 Jun 2019

Demonstration of a mesoscopic quantum gate

Jonathan Pritchard (Speaker)

30 May 2019

Scottish Centre for Innovation in quantum computing and simulation (External organisation)

Andrew Daley (President), Elham Kashefi (Vice President), Jonathan Pritchard (Member), Stefan Kuhr (Member), Erling Riis (Member), Jeremy Stuart Ward (Member), Martin Weides (Member) & Petros Wallden (Member)

7 May 2019 → ...

Quantum Information Processing and Networking with Rydberg atoms

Jonathan Pritchard (Speaker)

20 Mar 2019

External PhD Examination, UCL

Jonathan Pritchard (Examiner)

24 Jan 2019

External PhD Examination, University of Birmingham

Jonathan Pritchard (Examiner)

18 Dec 2018

Progress towards a hybrid atom-superconductor quantum interface

Jonathan Pritchard (Speaker)

18 Oct 2018

Progress towards a hybrid Atom- Superconductor Interface for Quantum Networking

Jonathan Pritchard (Speaker)

1 Oct 2018

Quantum Lidar/Radar Meeting

Jonathan Pritchard (Organiser) & John Jeffers (Organiser)

11 Jun 2018

External PhD Examination, University of Durham

Jonathan Pritchard (Examiner)

7 Jun 2018

Progress towards a hybrid atom-superconductor interface for Quantum Networking

Jonathan Pritchard (Speaker)
21 May 2018

Progress Towards A Hybrid Atom-Superconductor Interface for Quantum Networking

Jonathan Pritchard (Speaker)
22 Feb 2018

Progress towards a hybrid atom-superconductor interface for quantum networking

Jonathan Pritchard (Speaker)
13 Sep 2017

QUAMP 2017

Jonathan Pritchard (Organiser)
4 Sep 2017 → 7 Sep 2017

Time for a Cold one

Jonathan Pritchard (Speaker)
11 Jun 2017 → 12 Jun 2017

External examiner for Emanuele Distante at IFCO, Barcelona

Jonathan Pritchard (External Examiner)
24 Mar 2017

Hybrid quantum information processing with atoms, photons and superconducting circuits

Jonathan Pritchard (Speaker)
24 Mar 2017

Hybrid quantum information processing with Atoms and superconductors

Jonathan Pritchard (Invited speaker)
13 Feb 2017

Hybrid quantum information processing with atoms, photons and superconducting circuits

Jonathan Pritchard (Speaker)
2 Dec 2016

DOQS2016 - Workshop on Many-body Dynamics and Open Quantum Systems.

Jonathan Pritchard (Participant)
30 Aug 2016 → 2 Sep 2016

Hybrid quantum information processing with atoms, photons and superconducting circuits

Jonathan Pritchard (Speaker)
22 Jul 2016

Strathclyde symposium on Quantum Information, Simulation and Metrology

Jonathan Pritchard (Participant)
22 Jun 2016

HybridQuantumInterface

Jonathan Pritchard (Speaker)
23 Nov 2015

Hybrid quantum information processing with atoms, photons and superconducting circuits

Jonathan Pritchard (Speaker)

21 Oct 2015

Physical Review A (Journal)

Jonathan Pritchard (Peer reviewer)

1 Jul 2011 → ...

Physical Review Letters (Journal)

Jonathan Pritchard (Peer reviewer)

1 Mar 2011 → ...

Journal of Physics B: Atomic, Molecular and Optical Physics (Journal)

Jonathan Pritchard (Peer reviewer)

1 Aug 2010

Awards

Quantum Computing & Simulation Hub: Academic Partnership Resource Fund

Pritchard, J. & Daley, A.

EPSRC (Engineering and Physical Sciences Research Council): £98,162.00

1/02/22 → 30/04/23

Projects

A Hybrid Atom-Photon-Superconductor Quantum Interface

Pritchard, J.

EPSRC (Engineering and Physical Sciences Research Council)

1/07/15 → 30/06/20

DISCOVERY: Developing UK Industrial Supply for Commercial Quantum Computing (IUK Technology project)

Riis, E., Griffin, P., Pritchard, J. & Ward, J. S.

Innovate UK

1/08/20 → 31/07/23

Microwave and Terahertz Field Metrology and Imaging using Rydberg Atoms

Pritchard, J.

EPSRC (Engineering and Physical Sciences Research Council)

1/03/19 → 28/05/22

QuDOS II: Quantum technologies using Diffractive Optical Structures (Phase II)

Griffin, P., Arnold, A. & Pritchard, J.

EPSRC (Engineering and Physical Sciences Research Council)

1/03/17 → 28/02/18

Quantum Computing & Simulation Hub: Academic Partnership Resource Fund

Pritchard, J. & Daley, A.

EPSRC (Engineering and Physical Sciences Research Council)

1/02/22 → 30/04/23

QuDOS II: Quantum technologies using Diffractive Optical Structures (Phase II)

Griffin, P., Arnold, A. & Pritchard, J.

Technology Strategy Board TSB

1/03/17 → 1/03/18

Scalable Qubit Arrays for Quantum Computation and Optimisation (M Squared Prosperity Partnership)

Pritchard, J., Daley, A. & Riis, E.

M Squared Lasers Ltd, EPSRC (Engineering and Physical Sciences Research Council)
5/02/20 → 4/02/25

UCL CDT Studentship L Keary
Pritchard, J.
University College London
1/10/18 → 31/03/22