JACQUES CAROLAN

Wolfson Biomedical Institute
University College London
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Born: November 22, 1988
Nationality: British

POSITIONS

1/2021– **Research Fellow, Lab: Neural Computation Lab**
University College London, Wolfson Institute for Biomedical Research
Advisor: Michael Hausser
Themes: neuroscience, neurotechnology, all-optical control, imaging

10/2019–12/2020 **Postdoctoral Fellow, Lab: Quantum Photonics**
University of Copenhagen, Niels Bohr Institute
Advisor: Peter Lodahl
Award: Marie Skłodowska-Curie Global Fellowship
Themes: quantum emitter spectroscopy, single photon nonlinearities, optimal control

3/2016–10/2019 **Postdoctoral Fellow, Lab: Quantum Photonics Group**
Massachusetts Institute of Technology, Research Laboratory of Electronics
Advisor: Dirk Englund
Award: Marie Skłodowska-Curie Global Fellowship
Themes: silicon photonics, nonlinear optics, quantum machine learning, neural networks

11/2015–3/2016 **Postdoctoral Researcher, Lab: Centre for Quantum Photonics**
University of Bristol, Physics
Advisor: Anthony Laing

EDUCATION

2011–2015 **Ph.D. Physics**, *University of Bristol*, Bristol, UK
Advisor: Jeremy O'Brien, Anthony Laing, Centre for Quantum Photonics
Title: Universal Linear Optics: Characterisation, Verification and Computation
Award: EPSRC DTA Scholarship

2007–2011 **M.Sci. Physics & Philosophy**, *University of Bristol*, Bristol, UK
Graduated with First Class Honors
MSci Physics Advisor: Jeremy O'Brien
MSci Philosophy Advisor: James Ladyman

TEACHING

01/2019 **MIT IAP 2019 How to Program a Quantum Computer**
Devised and delivered three-part interactive lecture series for MITs independent activities period, attended by over 35 students and alumni. The course explored fundamental concepts in quantum computing through a series of hands-on tutorials, where participants interactively learn by programming a real life quantum computer.

AWARDS

04/2017   Marie Skłodowska-Curie Global Fellowship ($300,000)
10/2016   Quantum Innovators 2016
06/2016   66th Lindau Nobel Laureates Meeting
04/2016   Institute of Physics QEP Doctoral Research Prize Special Commendation
04/2016   UoB Faculty of Science PhD Commendation
06/2014   EPSRC ICT Pioneer
06/2011   EPSRC DTC Scholarship ($75,000)

PUBLICATIONS

2021   R. Uppu, L. Midolo, X. Zhou, **J. Carolan**, P. Lodahl
Quantum-dot-based deterministic photon–emitter interfaces for scalable photonic quantum technology
Nature Nanotechnology

2020   U. Chakraborty, **J. Carolan**, G. Clark, D. Bunandar, G. Gilbert, J. Notaros, M. Watts, D. Englund
Cryogenic operation of silicon photonic modulators based on DC Kerr effect *Optica* **7**, 1385-1390

2020   J. Kim, S. Aghaeimeibodi, **J. Carolan**, D. Englund, E. Waks
Hybrid integration method for on-chip quantum photonics *Optica* **7**, 291-308 (2020)

2020   **J. Carolan**, M. Mohseni, J. P. Olson, M. Prabhu, C. Chen, D. Bunandar, M.Y. Niu, N. C. Harris, F. N. C. Wong, M. Hochberg, S. Lloyd, D. Englund
Variational Quantum Unsampling on a Quantum Photonic Processor *Nature Physics* **16**, 322-327 (2020)

2019   M. Prabhu, C. Roques-Carmes, Y. Shen, N Harris, L. Jing, **J. Carolan**, R. Hamerly, T. Baehr-Jones, M. Hochberg, V Ceperic, J. D. Joannopoulos, D. Englund, M. Soljacic
A Recurrent Ising Machine in a Photonic Integrated Circuit arXiv:1909.13877

2019   **J. Carolan**, U. Chakraborty, N. C. Harris, M. Pant, T. Baehr-Jones, M. Hochberg, D. Englund
Scalable feedback control of single photon sources for photonic quantum technologies *Optica* **6**, 335 (2019)

2019   I. Alonso Calafell, T. Strömberg, D. R. M. Arvidsson-Shukur, L. A. Rozema, V. Saggio, C. Greganti, N. C. Harris, M. Prabhu, **J. Carolan**, M. Hochberg, T. Baehr-Jones, D. Englund, C. H. W. Barnes, P. Walther
Trace-free counterfactual communication with a nanophotonic processor *npj Quantum Information* **5**, 61 (2019)

2019   G. R. Steinbrecher, J. P. Olson, D. Englund, **J. Carolan**
Quantum optical neural networks *npj Quantum Information* **5**, 60 (2019)

2018   N. C. Harris, **J. Carolan**, D. Bunandar, M. Prabhu, M. Hochberg, T. Baehr-Jones, M. L. Fanto, A. M. Smith, C. C. Tison, P. M. Alsing, D. Englund
Linear programmable nanophotonic processors *Optica* **5**, 1623 (2018)

2018   C. Sparrow, E. Martín-López, N. Maraviglia, A. Neville, C. Harrold, **J. Carolan**, Y. N. Joglekar, T. Hashimoto, N. Matsuda, J. L. O'Brien, D. P. Tew, A. Laing
Simulating the vibrational quantum dynamics of molecules using photonics *Nature* **557**, 660 (2018)

2017   D. Hangleiter, **J. Carolan**, K. Thébault
Analogue Quantum Simulation: A Philosophical Prospectus arXiv:1712.05809 (accepted Springer)

2017   M. Gimeno-Segovia, H. Cable, G. J. Mendoza, P. Shadbolt, J. W. Silverstone, **J. Carolan**, M. G. Thompson, J. L. O'Brien and T. Rudolph
Relative multiplexing for minimising switching in linear-optical quantum computing NJP **19**, (2017)

2015   **J. Carolan**, C. Harrold, C. Sparrow, E. Martín López, N. J. Russell, J. W. Silverstone, P. J. Shadbolt, N. Matsuda, M. Oguma, M. Itoh, G. D. Marshall, M. G. Thompson, J. C. F. Matthews, T. Hashimoto, J. L. O'Brien, A. Laing
Universal linear optics, *Science* **349**, 711 (2015)

2014   **J. Carolan**, J. D. A. Meinecke, P. J. Shadbolt, N. J. Russell, N. Ismail, K. Wörhoff, T. Rudolph, M. G. Thompson, J. L. O'Brien, J. C. F. Matthews, A. Laing
On the experimental verification of quantum complexity in linear optics Nat. Photon. **8**, 621 (2014)

INVITED TALKS

06/2021   Applied Biotechnology Seminar *Francis Crick Institute, UK*
10/2020   Neural Computation Seminar *UCL, UK [remote]*
08/2020   Q-FARM Seminar *Stanford, USA [remote]*
08/2020   Neurotechnology Seminar *Columbia, USA [remote]*
07/2020   Neurotechnology and Biophysics Seminar *Rockefeller, USA [remote]*
07/2020   IEEE Photonics Chapter Webinar *Ottawa, Canada [remote]*
06/2020   Photonics For Quantum 2 *Rochester Institute of Technology, USA [remote]*
05/2020   Photonics North *Niagara Falls, USA [remote]*
03/2020   ECE Seminar *Boston University, USA*
03/2020   ECE Seminar *University of Maryland, USA*
02/2020   EECS Seminar *Berkeley, USA*
02/2020   EE & Physics Seminar *Columbia, USA*
02/2020   ECE Seminar *University of Pennsylvania, USA*
12/2019   Complex Photonic Systems Seminar *University Twente, Netherlands*
10/2019   Quantum Techniques in Machine Learning *KAIST, Korea*
09/2019   SPIE Security + Defense *Strasbourg, France*
08/2019   Neurotechnology and Biophysics Seminar *Rockefeller, USA*
05/2019   Applied Physics Seminar *Stanford, USA*
04/2019   ITAMP Seminar *Harvard, USA*
01/2019   Photonics For Quantum *Rochester Institute of Technology, USA*
11/2018   MIT Centre for Ultracold Atoms Seminar Series *Harvard, USA*
11/2018   USTC Quantum Seminar *Shanghai, China*
11/2018   2018 International Young Scientists Forum on Optics and Photonics *Wuhan, China*
11/2018   Nature Conference on Nanophotonics and Integrated Photonics *Nanjing, China*
07/2018   Analogue Experimentation Workshop *Bristol University, UK*
07/2018   Quantum Optics Seminar *Imperial College, UK*
06/2018   Nils Bohr Institute Quantum Optics Seminar *University of Copenhagen, Denmark*
06/2018   DTU Fotonik Seminar *Danish Technical University, Denmark*
03/2018   Bristol Quantum Information Technologies *Bristol University, UK*
09/2017   PICQUE Integrated Quantum Photonics *Sapienza Università di Roma, Italy*
06/2017   iQuISE Seminar *Massachusetts Institute of Technology, USA*
10/2016   Quantum Innovators *Institute for Quantum Computing, Canada*
08/2016   Semi-Quantum Computing workshop *Institute for Quantum Computing, Canada*
11/2015   Optics and Quantum Electronics Seminar *Massachusetts Institute of Technology, USA*
11/2015   Processing for Quantum Computing Workshop *TU Delft, Netherlands*
03/2015   University of Mainz Colloquium *Universität Mainz, Germany*
03/2015   University of Bonn Physics Colloquium *Universität Bonn, Germany*
11/2015   Quantum Simulation and Quantum Walks 2014 *KwaZulu University, South Africa*

PATENTS

2021   Scalable integration of hybrid optoelectronic and quantum optical systems into photonic circuits, *US11054590B1*

2020   Quantum Optical Neural Networks, *US2020037234A1*

2020   Scalable Feedback Control of Single-Photon Sources for Photonic Quantum Technologies, *US2020015051A1*

2019   Apparatus and methods for optical neural network, *US20190294199A1*