

John M. Donohue

Quantum & Ultrafast Optics

Department of Physics
Integrated Quantum Optics Group
Paderborn University
Paderborn, Germany
☎ +49 (174) 844-6963
✉ donohjm@gmail.com
www.johnmdonohue.com



Education

2011–2016 **PhD, Physics (Quantum Information).**

Institute for Quantum Computing, University of Waterloo, Waterloo, Canada
Ultrafast manipulation of single photons using dispersion and sum-frequency generation
Research advisor: Prof. Kevin J. Resch

2007–2011 **BSc, Physics and High Technology Co-op, University of Windsor, Windsor, Canada.**

Graduated on President's List, Minor in Mathematics

Research Positions

2017–present **Postdoctoral Researcher, Department Physik, Paderborn University, Germany.**

Integrated quantum optics and ultrafast mode-selective temporal measurement
Research supervisor: Prof. Christine Silberhorn

Publication highlights

13 peer-reviewed publications, including five as first author and four in Phys. Rev. Lett.
Work cited by over 100 independent articles, h-index of 8 (Google Scholar).

2016 **J.M. Donohue**, M. Mastrovich, and K.J. Resch, *Spectrally engineering photonic entanglement with a time lens*. Phys. Rev. Lett. **117**, 243602 (2016).

2013 **J.M. Donohue**, M. Agnew, J. Lavoie, and K.J. Resch, *Coherent ultrafast measurement of time-bin encoded photons*. Phys. Rev. Lett. **111**, 153602 (2013).

2013 J. Lavoie, **J.M. Donohue**, L.G. Wright, A. Fedrizzi, and K.J. Resch, *Spectral compression of single photons*. Nature Photonics **7**, 363 (2013).

Awards and scholarships

2017–present **NSERC Postdoctoral Fellowship** (Post-doc).

2014–2016 **NSERC Alexander Graham Bell Canada Graduate Scholarship (CGS D)** (PhD).

2015 **IQC Achievement Award** (PhD).

2014 **IQC David Johnston Award for Scientific Outreach** (PhD).

2012–2013 **Queen Elizabeth II Scholarship in Science & Technology** (MSc/PhD).

2007–2011 **Spectra Energy Undergraduate Scholarship** (BSc).

2007–2011 **University of Windsor Outstanding Scholars Award** (BSc).

Publications (In reverse chronological order)

- 2018 J.P.W. MacLean, **J.M. Donohue**, and K.J. Resch, *Direct characterization of ultrafast energy-time entangled photon pairs*. Phys. Rev. Lett. **120**, 053601 (2018).
Editor's Suggestion. Highlighted with a Viewpoint in *Physics*. arXiv:1710.11541.
- 2018 V. Ansari, E. Roccia, M. Santandrea, M. Doostdar, C. Eigner, L. Padberg, I. Gianani, M. Sbroscia, **J.M. Donohue**, L. Mancino, M. Barbieri, and C. Silberhorn, *Heralded generation of high-purity ultrashort single photons in programmable temporal shapes*. Optics Express **26**, 2764 (2018).
arXiv:1711.09678.
- 2018 M. Allgaier, V. Ansari, C. Eigner, V. Quiring, R. Ricken, **J.M. Donohue**, T. Czerniuk, M. Afmann, M. Bayer, B. Brecht, and C. Silberhorn, *Streak-camera imaging of single photons at telecom wavelength*. Appl. Phys. Lett **112**, 031110 (2018).
arXiv:1704.04129.
- 2016 **J.M. Donohue**, M. Mastrovich, and K.J. Resch, *Spectrally engineering photonic entanglement with a time lens*. Phys. Rev. Lett. **117**, 243602 (2016).
arXiv:1604.03588.
- 2016 B. Fenker, J.A. Behr, D. Melconian, R.M.A. Anderson, M. Anholm, D. Ashery, R.S. Behling, I. Cohen, I. Craiciu, **J.M. Donohue**, C. Farfan, D. Friesen, A. Gorelov, J. McNeil, M. Mehlman, H. Norton, K. Olchanski, S. Smale, O. Theriault, A.N. Vantyghem, and C.L. Warner, *Precision measurement of the nuclear polarization in laser-cooled, optically pumped ^{37}K* . New J. Phys. **18**, 073028 (2016).
arXiv:1602.04526.
- 2015 **J.M. Donohue** and E. Wolfe, *Identifying nonconvexity in the sets of limited-dimension quantum correlations*. Phys. Rev. A **92**, 062120 (2015).
arXiv:1506.01199.
- 2015 **J.M. Donohue**, M.D. Mazurek, and K.J. Resch, *Theory of high-efficiency sum-frequency generation for single-photon waveform conversion*. Phys. Rev. A **91**, 033809 (2015).
arXiv:1412.5516.
- 2014 **J.M. Donohue**, J. Lavoie, and K.J. Resch, *Ultrafast time-division demultiplexing of polarization-entangled photons*. Phys. Rev. Lett. **113**, 163602 (2014).
arXiv:1410.4524.
- 2014 M. Hildebrand, H. Hamaed, A.M. Namespetra, **J.M. Donohue**, R. Fu, I. Hung, Z. Gan, and R.W. Schurko, *^{35}Cl Solid-State NMR of HCl Salts of Active Pharmaceuticals Ingredients: Structural Prediction, Spectral Fingerprinting and Polymorph Recognition*. CrystEngComm **16**, 7334-7356 (2014).
- 2013 **J.M. Donohue**, M. Agnew, J. Lavoie, and K.J. Resch, *Coherent ultrafast measurement of time-bin encoded photons*. Phys. Rev. Lett. **111**, 153602 (2013).
Editor's Suggestion. Highlighted with a Viewpoint in *Physics*. arXiv:1306.1250
- 2013 J.M. Arrazola, O. Gittsovich, **J.M. Donohue**, J. Lavoie, K.J. Resch, and N. Lütkenhaus, *Reliable Entanglement Verification*. Phys. Rev. A **87**, 062331 (2013).
arXiv:1302.1182

- 2013 J. Lavoie, **J.M. Donohue**, L.G. Wright, A. Fedrizzi, and K.J. Resch, *Spectral compression of single photons*. *Nature Photonics* **7**, 363 (2013).
Highlighted with a News and Views in *Nature Photonics*. arXiv:1308.0069
- 2013 L. Vermeyden, M. Bonsma, C. Noel, **J.M. Donohue**, E. Wolfe, and K.J. Resch, *Experimental violation of three new families of Bell's inequalities*. *Phys. Rev. A* **87**, 032105 (2013).

Submitted manuscripts and arXiv preprints

- 2018 V. Ansari, **J.M. Donohue**, B. Brecht, and C. Silberhorn, *Tailoring nonlinear processes for quantum optics with pulsed temporal-mode encodings*.
arXiv:1803.04316. Accepted at Optica.
- 2018 J.P.W. MacLean, **J.M. Donohue**, and K.J. Resch, *Ultrafast quantum interferometry with energy-time entangled photons*.
arXiv:1803.04398. Submitted to Physical Review Letters.
- 2018 V. Ansari, **J.M. Donohue**, M. Allgaier, L. Sansoni, B. Brecht, J. Roslund, N. Treps, G. Harder, and C. Silberhorn, *Tomography and purification of the temporal-mode structure of quantum light*.
arXiv:1607.03001. Submitted to Physical Review Letters.

Conference presentations (selected)

- 2017 **J.M. Donohue**, V. Ansari, M. Allgaier, J. Gil-Lopez, C. Eigner, R. Ricken, V. Quiring, L. Sansoni, G. Harder, B. Brecht, and C. Silberhorn, *Accessing photonic temporal modes with nonlinear waveguide devices*. New Frontiers in Quantum Imaging, Glasgow, Scotland, 2017 Sept 25-26. **Invited.**
- 2017 V. Ansari, M. Allgaier, **J.M. Donohue**, C. Eigner, R. Ricken, V. Quiring, L. Sansoni, G. Harder, B. Brecht, and C. Silberhorn, *Ultrafast Mode-Selection, Purification and Manipulation of Quantum Light with Nonlinear Waveguide Devices*. International Laser Physics Workshop (LPHYS), Kazan, Russia, 2017 July 17-21.
- 2016 **J.M. Donohue**, M. Mastrovich, M. Agnew, J. Lavoie, and K.J. Resch, *Temporal imaging of entangled photons with an upconversion time lens*. Spectral and Spatial Engineering of Quantum Light (SSEQL), Warsaw, Poland, 2016 March 30-April 1. **Invited.**
- 2015 **J.M. Donohue**, J. Lavoie, and K.J. Resch, *Ultrafast time-to-frequency demultiplexing of polarization-entangled photons*. Single-Photon Workshop (SPW) 2015, Geneva, Switzerland, 2015 July 13-17.
- 2015 **J.M. Donohue**, J. Lavoie, and K.J. Resch, *Ultrafast time-to-frequency demultiplexing of polarization-entangled photons*. CLEO 2015, San Jose, CA, USA, 2015 May 10-15.
- 2013 **J.M. Donohue**, J. Lavoie, M. Agnew, and K.J. Resch, *Coherent ultrafast time-bin measurement via spectral compression*. Single-Photon Workshop (SPW) 2013, Oak Ridge National Laboratory, Oak Ridge, TN, USA, 2013 October 18.
- 2013 **J.M. Donohue**, M. Agnew, J. Lavoie, and K.J. Resch, *Ultrafast coherent measurement of time-bin qubits using chirped-pulse upconversion*. Coherence & Quantum Optics X and Quantum Information & Measurement 2. University of Rochester, Rochester, NY, USA, 2013 June 19. Poster.

Seminars and Public Lectures

- 2017 *The Quantum Revolution is More than Schrödinger's Cat*, Public Seminar for Berlin Science Week, Paul Drude Institute, Berlin, 2017 Nov 04.
- 2014 *Exploring the Fantastic World of Quantum Mechanics*, High-School Shad Valley Workshop, Waterloo, Canada.
- 2013 *Dividing Photons: Manipulations of single-photon systems and entanglement generation*, PHYS10 Seminar for Undergraduates, Department of Physics, University of Waterloo, Waterloo, Canada.

Outreach, Committees, and Services

- 2013–2016 President (2015-2016), Executive Member (2013-2015)
Institute for Quantum Computing Graduate Students Association (IQC GSA)
- 2012–2015 Elementary school science outreach volunteer
Let's Talk Science, Waterloo, Canada.
- 2013 Local Organizing Committee member
Canadian-American-Mexican Graduate Student Physics Conference (CAM2013)
Waterloo, Canada.
- 2009–2011 Volunteer tutor/instructor for first-year calculus and linear algebra
Students Offering Support, University of Windsor Chapter, Windsor, Canada.

Teaching experience

- Fall 2012 Teaching assistant for third-year quantum mechanics (PHYS 334).
University of Waterloo, Instructor: Dr. Kevin Resch.
- Fall 2011 Teaching assistant for second-year quantum mechanics (PHYS 234).
University of Waterloo, Instructor: Dr. Norbert Lütkenhaus.

Undergraduate research positions

- 2008–2011 **Undergraduate research assistant**, *Department of Physics*.
University of Windsor, Windsor, Canada
Quantum control with adiabatic passage, Supervisor: Prof. Chitra Rangan
- Fall 2010 **Co-op student**, *Department of Chemistry and Biochemistry*.
University of Windsor, Windsor, Canada
SSNMR characterization of pharmaceutical polymorphs, Supervisor: Prof. Robert W. Schurko
- Winter 2010 **Co-op student**, *TRINAT Neutral Atom Trap*.
TRIUMF, Vancouver, Canada
Laser cooling of neutral atoms, Supervisor: Dr. John A. Behr