
Quantum Physics and Optics Research and Teaching Interests

- Quantum Optics
- Quantum Entanglement
- Foundations of Quantum Mechanics
- Information Theory
- Classical Mechanics
- Quantum Mechanics
- Statistical Mechanics

Quantum Physics and Optics Education and Honors

University of Rochester**Rochester, New York USA***Ph.D. in Physics*

August 2015

- Thesis: "On Position-Momentum Entanglement, Nonlocality, and Measurement".
- Advisor: Professor John C. Howell
- Doctoral studies focused on quantum entanglement, information theory and Quantum Optics as well as teaching expertise
- AAPT (American Association of Physics Teachers) Teaching Prize (2011)

M.A. in Physics

Spring 2011

- Masters degree received for completion of courses and passing of comprehensive examinations

University of Massachusetts at Amherst**Amherst, Massachusetts, USA***B.S. in Physics with Math Minor Summa Cum Laude*

May 2009

- Thesis: "On the Optical Properties of Cadmium Sulfide Nanocrystals".
- Advisors: Professor Marc Achermann and Prof. Anthony Dinsmore.
- *Phi Beta Kappa* (2008) Hasbrouck Scholarship (2008), and John and Abigail Adams Scholarship (2005)

Research and Teaching Achievements

Air Force Research Laboratory, Information Directorate**Rome, New York, USA***National Research Council Postdoctoral Research Associate*

Fall 2015-Present

- Developed novel methods of quantifying quantum resources in large-scale systems
- Broke world record in entanglement quantification (7.11 ebits between 2 photons)
- Authored comprehensive experimental and theoretical treatment of Spontaneous Parametric Down Conversion for chip-scale integrated quantum optics.

University of Rochester**Rochester, New York, USA***Howell Research Group Graduate Research Assistant*

2012-2015

- Researched in quantum information and experimental/theoretical quantum optics
- Worked with entangled photon optics from Spontaneous Parametric Down-Conversion
- Developed new techniques for experimental demonstration of entanglement and the EPR paradox
- Independently explored new avenues of research into quantum uncertainty relations and quantum measurement

Graduate Teaching Assistant for Newtonian Mechanics Workshops

2009-2011

- After intensive training in problem-based and cooperative learning pedagogy facilitated weekly workshops complementing and supplementing lecture material
- Performed as a substitute lecturer on multidimensional kinematics and center-of-mass motion

Graduate Teaching Assistant for Lagrangian/Hamiltonian Mechanics

Fall 2011

- Facilitated weekly workshops complementing and supplementing lecture material
- Graded homeworks and exams

Graduate Teaching Assistant for Thermodynamics, and Statistical Mechanics

Spring 2012

- Facilitated weekly workshops complementing and supplementing lecture material
- Performed as substitute lecturer on subject including the statistical mechanics of ideal gases and chemical potential

University of Massachusetts at Amherst**Amherst, Massachusetts, USA***Undergraduate Teaching Assistant for "Einstein's Dice"*

Spring 2008

- Assisted students with material in office hours
- Graded homework assignments and exams
- Liaised between professor and students

Senior Collaborators

- Paul M. Alsing
- Eric G. Cavalcanti
- John C. Howell
- Jeffrey H. Shapiro
- Stephen P. Walborn

Air Force Research Laboratory, Information Directorate
University of Sydney, Australia
University of Rochester
Massachusetts Institute of Technology
Universidad Federal do Rio de Janeiro

Refereed Publications

"Scalable controlled-NOT gate for linear optical quantum computing using microring resonators". R. E. Scott, P. M. Alsing, A. M. Smith, M. L. Fanto, C. C. Tison, J. Schneeloch, and E. E. Hach III, *Phys Rev. A* **100**, 022322 (2019).

"Maximum advantage of quantum illumination". S. Ray, [J. Schneeloch](#), C. C. Tison, and P. M. Alsing; *Phys. Rev. A* **100**, 012327 (2019)

"Quantifying entanglement in a 68-billion dimensional quantum state space". [J. Schneeloch](#), C. C. Tison, M. L. Fanto, P. M. Alsing, and G. A. Howland; *Nat. Commun.* **10**, 2785 (2019).

"Introduction to the Absolute Brightness and Number Statistics in Spontaneous Parametric Down-Conversion". [J. Schneeloch](#), S. H. Knarr, D. F. Bogorin, M. L. Levangie, C. C. Tison, R. Frank, G. A. Howland, M. L. Fanto, and P. M. Alsing; *J. Opt.* **21**, 043501 (2019).

"Compressive Direct Imaging of Billion-Dimensional Optical Phase Space". S. H. Knarr, D. J. Lum, [J. Schneeloch](#), and J. C. Howell; *Phys. Rev. A* **98**, 023854 (2018).

"Quantifying high-dimensional entanglement with Einstein-Podolsky-Rosen correlations". [J. Schneeloch](#), and G. A. Howland; *Phys. Rev. A* **97**, 042338 (2018).

"Compressively Characterizing High-Dimensional Entangled States with Complementary, Random Filtering". G.A. Howland, S. H. Knarr, [J. Schneeloch](#), D.J. Lum, and J. C. Howell; *Phys. Rev. X* **6**, 021018 (2016).

"Introduction to the Transverse Spatial Correlations in Spontaneous Parametric Down-Conversion through the Biphoton Birth Zone". [J. Schneeloch](#), and J. C. Howell; *J. Opt.* **18**, 053501 (2016).

"Position-Momentum Bell-Nonlocality with Entangled Photon Pairs". [J. Schneeloch](#), S. H. Knarr, D. J. Lum, and J. C. Howell; *Phys. Rev. A* **93**, 012105 (2016).

"Demonstrating Continuous Variable EPR Steering in spite of Finite Experimental Capabilities using Fano Steering Bounds". [J. Schneeloch](#), S. H. Knarr, G. A. Howland, and J. C. Howell; *Jour. Opt. Soc. Am. B* **32**, 4 (2015).

"Uncertainty Relation for Mutual information". [J. Schneeloch](#), C. J. Broadbent, and J. C. Howell. *Phys. Rev. A* **90**, 062119 (2014).

"Simultaneous Measurement of Complementary Observables with Compressive Sensing". G. A. Howland, [J. Schneeloch](#), D. J. Lum, and J. C. Howell. *Phys. Rev. Lett.* **112**, 253602 (2014).

"Improving Einstein-Podolsky-Rosen Steering with State Information". [J. Schneeloch](#), C. J. Broadbent, and J. C. Howell. *Phys. Lett. A* **378**, 766-769 (2014).

"Einstein-Podolsky-Rosen Steering Inequalities from Entropic Uncertainty Relations". [J. Schneeloch](#), C. J. Broadbent, S. P. Walborn, E. G. Cavalcanti, and J. C. Howell. *Phys. Rev. A* **87**, 062103 (2013).

"Violation of Continuous-Variable Einstein-Podolsky-Rosen Steering with Discrete Measurements". [J. Schneeloch](#), P. B. Dixon, G. A. Howland, C. J. Broadbent, and J. C. Howell. *Phys. Rev. Lett.* **110**, 130407 (2013).

"Quantum Mutual Information Capacity for High-Dimensional Entangled States". P. B. Dixon, G. A. Howland, [J. Schneeloch](#), and J. C. Howell. *Phys. Rev. Lett.* **108**, 143603 (2012).

"Radiative Lifetimes and Orbital Symmetry of Electronic Energy Levels of CdS Nanocrystals: Size Dependence". B. Yang, [J. Schneeloch](#), Z. Pan, M. Furis, and M. Achermann. *Phys. Rev. B* **81**, 073401 (2010).

Non-Refereed Publications

"On Position-Momentum Entanglement, Nonlocality, and Measurement". [J. Schneeloch](#), Ph.D. Thesis, University of Rochester (2015).

"The Relationship between Discrete and Continuous Entropy in EPR-steering Inequalities". [J. Schneeloch](#). *arXiv* 1312.2604 (2013).

Presentations

"Quantifying record entanglement in extremely large Hilbert spaces with adaptively sampled EPR correlations", [J. Schneeloch](#), and C. C. Tison, and M. L. Fanto, and P. M. Alsing, and G. A. Howland, PSPIE Security + Defense Symposium, Quantum Technologies and Quantum Information Science Conference, Estrel Congress Center, Berlin, Germany, (Sep. 2018).

(Invited) **"Quantitatively Witnessing Exceptionally Large High-Dimensional Entanglement in Photon Pairs"**, [J. Schneeloch](#), and G. A. Howland, IEEE Photonics Society Summer Topicals Meeting Series, Hilton Waikoloa Village, Waikoloa, HI, (Jul. 2018).

"The Biphoton Borth Zone in Spontaneous Parametric Down-Conversion: Foundations and applications", [J. Schneeloch](#), Air Force Research Laboratory, (Apr. 2016)

"Demonstrating continuous-variable Einstein-Podolsky-Rosen steering with a finite number of measurements", [J. Schneeloch](#), S. H. Knarr, G. A. Howland, and J. C. Howell, SPIE-DSS Conference 9500-28 (Apr. 2015).

"Position-Momentum EPR Steering: Making Continuous-Variable Quantum Entanglement Easier to See with Discrete Measurements", [J. Schneeloch](#), Joint Quantum Institute (Apr. 2015).

"EPR-steering Inequalities from Entropic Uncertainty Relations", [J. Schneeloch](#), C.J. Broadbent, S. P. Walborn, E. G. Cavalcanti, and J. C. Howell. Center for Coherence and Quantum Optics (Oct. 2013).

"Entropic EPR-steering Inequalities," [C.J. Broadbent](#), J. Schneeloch, S.P. Walborn, E.G. Cavalcanti, and J. C. Howell, *Frontiers in Optics/Laser Science 2013*, Orlando, FL (Oct. 2013).

"Witnessing Continuous Variable Einstein-Podolsky-Rosen Steering with Discrete Measurements," [J. Schneeloch](#), P. B. Dixon, C. J. Broadbent, G. A. Howland, and J. C. Howell, *Frontiers in Optics/Laser Science 2013*, Orlando, FL (Oct. 2013).

"Einstein-Podolsky-Rosen Steering Inequalities from Entropic Uncertainty Relations", [J. Schneeloch](#), C. J. Broadbent, S. P. Walborn, E. G. Cavalcanti, and J. C. Howell, *Conference on Quantum Information and Quantum Control*, Toronto, Ontario, Canada (August 2013).

"Laser Radar Point-Target Localization at High Photon Efficiency". [J.H. Shapiro](#), [J. Schneeloch](#), G.A. Howland, and J.C. Howell. *CLEO: Sci. and Innov.*, CTu1H.5, San Jose, CA (June 2013).

"Violation of Continuous Variable EPR Steering with Discrete Measurements," [J. Schneeloch](#), P. B. Dixon, G. A. Howland, C. J. Broadbent, and J. C. Howell, *CLEO: QELS Fundamental Science*, San Jose, CA (June 2013).

References

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