Seyed Mohammad Hashemi Rafsanjani

CONTACT INFORMATION

Department of Physics
University of Miami
Coral Gables, FL 33146

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APPOINTMENTS

Assistant Professor University of Miami Aug 2017-Present
Postdoctoral Associate, Institute of Optics, University of Rochester 2015-2017

EDUCATION

University of Rochester, Rochester, NY

Ph.D., Physics, 2015

University of Windsor, Windsor, ON

M. Sc., Physics, 2008

Sharif University of Technology, Iran

B.S., Physics, 2006

REFEREED JOURNAL PUBLICATIONS[1]

[1] Seyed Mohammad Hashemi Rafsanjani, Mohammad Mirhosseini, Omar S. Magaña-Loaiza, Bryan T. Gard, Richard Birrittella, B. E. Koltenbah, C. G. Parazzoli, Barbara A. Capron, Christopher C. Gerry, Jonathan P. Dowling, Robert W. Boyd, Quantum-enhanced interferometry with weak thermal light, *Optica* 4, 487-491 (2017). doi:10.1364/OPTICA.4.000487

[2] Lu Gao, Seyed Mohammad Hashemi Rafsanjani, Yiyu Zhou, Zhe Yang, Omar S. Magaña-Loaiza, Mohammad Mirhosseini, Jiapeng Zhao, Boshen Gao, and Robert W. Boyd, Distributed angular double-slit interference with pseudo-thermal light, *Applied Physics Letters* 110, 071107 (2017). doi:10.1063/1.4976575

[3] Omar S. Magaña-Loaiza, Mohammad Mirhosseini, Robert M. Cross, Seyed Mohammad Hashemi Rafsanjani, and Robert W. Boyd, Hanbury-Brown and Twiss Interferometry with Twisted Light, Science Advances 2, e1501143 (2016). doi:10.1126/sciadv.1501143

[4] M. Mirhosseini, Omar S. Magaña-Loaiza, Changchen Chen, Seyed Mohammad Hashemi Rafsanjani, and Robert W. Boyd, Wigner distribution of twisted photons, *Physical Review Letters* 116, 130402 (2016). doi:10.1103/PhysRevLett.116.130402

[5] P. W. Milonni, and S. M. Hashemi Rafsanjani, Distance dependence of the two-atom dipole interaction with one atom excited, *Physical Review A* 92, 062711 (2015). doi:10.1103/PhysRevA.92.062711

[6] S. M. Hashemi Rafsanjani, M. Mirhosseini, O. S. Magaña-Loaiza, R. W. Boyd, State transfer based on classical nonseparability, *Physical Review A* 92, 023827 (2015). doi:10.1103/PhysRevA.92.023827

[1] For a complete list of publications including conference contributions please refer to my google scholar profile at https://scholar.google.com/citations?user=EuQy760AAAAJ&hl=en

[7] P. E. M. F. Mendonca, S. M. Hashemi Rafsanjani, D. Galetti, M. A. Marchiolli, Maximally genuine multipartite entangled mixed X-states of N-qubits, *J. Phys. A: Math. Theor.* 48, 215304 (2015).
doi:10.1088/1751-8113/48/21/215304

[8] S. M. Hashemi Rafsanjani, J. H. Eberly, Coherent control of multipartite entanglement, *Physical Review A* 91, 012313 (2015).
doi:10.1103/PhysRevA.91.012313

[9] M. Mirhosseini, O. S. Magaña-Loaiza, S. M. Hashemi Rafsanjani, R. W. Boyd, Compressive direct measurement of the quantum wave function, *Physical Review letters* 113, 090402 (2014).
doi:10.1103/PhysRevLett.113.090402

[10] S. M. Hashemi Rafsanjani, C. J. Broadbent, and J. H. Eberly, Bounding the entanglement of N qubits with only four measurements *Physical Review A* 88, 062331 (2013).
doi:10.1103/PhysRevA.88.062331

[11] S. Agarwal, S. M. Hashemi Rafsanjani, and J. H. Eberly, Dissipation of the Rabi model beyond the rotating wave approximation *Journal of Physics B* 46, 224017 (2013).
doi:10.1088/0953-4075/46/22/224017

[12] S. Agarwal and S. M. Hashemi Rafsanjani, Maximizing genuine multipartite entanglement of N mixed qubits *International Journal of Quantum Information* 11, 1350043 (2013).
doi:10.1142/S0219749913500433

[13] S. M. Hashemi Rafsanjani, M. Huber, C. J. Broadbent, and J. H. Eberly, Genuinely multipartite entanglement of N-qubit X matrices *Physical Review A* 86, 062303 (2012).
doi:10.1103/PhysRevA.86.062303

[14] S. Agarwal, S. M. Hashemi Rafsanjani, and J. H. Eberly, Tavis-Cummings model beyond rotating wave approximation *Physical Review A* 85, 043815 (2012).
doi:10.1103/PhysRevA.85.043815

[15] S. M. Hashemi Rafsanjani, T. Cheng, S. Mittler, and C. Rangan, Theoretical proposal for a bio-sensing approach based on a linear array of immobilized gold nanoparticles *Journal of Applied Physics* 107, 094303 (2010).
doi:10.1063/1.3369440

IN PREPARATIONS
PUBLICATIONS

[16] Zhe Yang, Omar S. Magana-Loaiza, Mohammad Mirhosseini, Yiyu Zhou, Boshen Gao, Lu Gao, Seyed Mohammad Hashemi Rafsanjani, Guilu Long, Robert W. Boyd, Digital spiral object identification using random light *arXiv:1609.08741* (Accepted to appear in Light: Science and Applications)

OTHER
PUBLICATIONS

[17] S. M. Hashemi Rafsanjani, S. Agarwal, and J. H. Eberly, X matrices provide a lower bound of concurrence, *arXiv:1204.3912* (2012).

[18] S. M. Hashemi Rafsanjani, S. Agarwal, and J. H. Eberly, Exact entanglement dynamics beyond the rotating wave approximation, *arXiv:1105.2835* (2011).

[19] S. Agarwal, S. M. Hashemi Rafsanjani, J. H. Eberly, Two qubit Tavis-Cummings model beyond the rotating wave approximation, *arXiv:1106.0052* (2011).

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CONTRIBUTIONS

[20] S. M. Hashemi Rafsanjani, M. Mirhosseini, O. S. Magana-Loaiza, and R. W. Boyd, Transfer of the orbital angular momentum of light to its polarization via classical nonseparability, *Frontiers in Optics 2015*, FTu2F.1, San Jose, CA (2015).
doi:10.1364/FIO.2015.FTu2F.1

[21] S. M. Hashemi Rafsanjani, J. H. Eberly, Control of entanglement dynamics in open systems of more than two qubits, *4th International Workshop on Entanglement, Decoherence, and Quantum Control*, Buffalo, NY, Oct 22-24 (2014).
http://www.physics.buffalo.edu/QC_Workshop/index.html

[22] Mohammad Mirhosseini, Omar S. Magaña-Loaiza, Seyed Mohammad Hashemi Rafsanjani, and Robert W. Boyd, Compressive Direct Measurement of the Transverse Photonic Wavefunction, *Frontiers in Optics 2014*, FM4E.5, Tucson, AZ (2014).
http://www.opticsinfobase.org/abstract.cfm?URI=FiO-2014-FM4E.5

[23] S. Agarwal, S. M. Hashemi Rafsanjani, and J. H. Eberly, Dissipative Rabi model in the quasi-degenerate regime, *The Rochester Conferences on Coherence and Quantum Optics and the Quantum Information and Measurement meeting*, M6-18, Rochester, NY (2013).
doi:10.1364/CQO.2013.M6.18

[24] S. M. Hashemi Rafsanjani, S. Agarwal, C. J. Broadbent, and J. H. Eberly, X matrices provide a platform for studying multipartite entanglement, *The Rochester Conferences on Coherence and Quantum Optics and the Quantum Information and Measurement meeting*, W6.51,Rochester, NY (2013).
doi:10.1364/QIM.2013.W6.51

[25] S. Agarwal, S. M. Hashemi Rafsanjani, J. H. Eberly, Two qubit entanglement when RWA is violated, *Frontiers in Optics 2012/Laser Science XXVIII*, FTh3B.7, Rochester, NY (2012).
doi:10.1364/FIO.2012.FTh3B.7

[26] S. M. Hashemi Rafsanjani, S. Agarwal, and J. H. Eberly, Testing separability of mixed states by looking at them *Frontiers in Optics 2012/Laser Science XXVIII*, FW3A.48 Rochester, NY (2012).
doi:10.1364/FIO.2012.FW3A.48

[27] S. M. Hashemi Rafsanjani, S. Agarwal, and J. H. Eberly, Pairwise Concurrence Dynamics of a 4 Qubit Model Beyond Rotating Wave Approximation, *CLEO: Science and Innovations*, JThB, Baltimore, Maryland United States (2011).
doi:10.1364/CLEO_AT.2011.JThB1

[28] S. M. Hashemi Rafsanjani, What determines how bosonic a cooper pair is? entanglement, *Frontiers in Optics 2010/Laser Science XXVI*, FTuG, Rochester, NY (2010).
doi:10.1364/FIO.2010.FTuG1

Teaching Experience

University of Rochester,

Teaching Assistant **September 2008 to May 2009**

- General physics lab: Responsible for lecture and supervision of the laboratory.

University of Windsor,

Teaching Assistant **September 2006 to May 2008**

- General physics lab: Responsible for lecture and supervision of the laboratory.

Professional Service

Referee Service

- *Physical Review Letters*
- *Physical Review A*
- *Annals of Physics*
- *Quantum Information Processing*
- *Physica A*
- *Optics Express*

Research Experience

University of Rochester, Rochester, NY

Postdoctoral Associate **January 2015- August 2017**

- Supervisor: Prof. Robert W. Boyd
- proposed and demonstrated a classical analog to quantum teleportation.
- demonstrated the advantages of using photon subtraction to enhance thermal interferometry and imaging.
- proposing and implementing a new approach for a direct measurement the orbital angular momentum Wigner distribution of light.

University of Rochester, Rochester, NY

Graduate research assistant **June 2009 to December 2014**

- Supervisor: Prof. Joseph H. Eberly
- Researched topics in theoretical quantum optics including theory of entanglement and its quantification and studying Rabi model beyond the weakly-coupled optical regime.
- Solved the problem of determining the entanglement in an important class of multiqubit mixed states. This is one of the few instances were a simple algebraic formula for entanglement has been derived.
- Introduced a new measure of multiqubit entanglement and found its value for an important class of states, as well as both experimentally accessible upper and lower bounds for all states.

University of Windsor, Windsor, ON

Graduate research assistant **September 2006 to August 2008**

- Supervisor: Dr. Chitra Rangan
- Studied the effect of dielectric coating on the spectrum of different nano particles, using a FORTRAN implementation of discrete dipole approximation (DDSCAT).

Awards

Susumo Okubo Prize for "excellent performance in graduate course work and on the preliminary exam", University of Rochester (2009).

Programming Skills

- Fluent: Matlab, Python (Numpy, Pandas, Scikit-learn)
- Previously worked with: C, FORTRAN, Mathematica.
- Others: Microsoft office, LaTeX, UNIX.