Joseph M. Lukens — CV

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Education

Purdue University **West Lafayette, IN**
Doctor of Philosophy, GPA – 4.0/4.0 *Aug. 2015*
Electrical Engineering
Dissertation
Novel Applications of Photonic Signal Processing: Temporal Cloaking and Biphoton Pulse Shaping
Advisor: Andrew M. Weiner

The University of Alabama **Tuscaloosa, AL**
Bachelor of Science, GPA – 4.0/4.0 *May 2011*
Electrical Engineering & Physics

Work Experience

Arizona State University **Tempe, AZ**
Sr. Director of Quantum Networking & Research Professor *Oct. 2022–present*
Joint Faculty Appointment (Oak Ridge National Laboratory)
Lead research and development in quantum networks for distributed quantum information science.

Oak Ridge National Laboratory **Oak Ridge, TN**
Research Scientist & Wigner Fellow *Aug. 2015–Oct. 2022*
Conduct experimental photonics and theoretical research in quantum information science.

Purdue University **West Lafayette, IN**
Graduate Research Assistant *Aug. 2011–Aug. 2015*
Conducted research in pulse shaping of entangled photons, optical communications, and temporal cloaking.

The University of Alabama **Tuscaloosa, AL**
Undergraduate Research Assistant *May 2010–May 2011*
Simulated electromagnetic wave phenomena, designing structures with COMSOL Multiphysics.

M. C. Dean, Inc. **Dulles, VA**
Engineering Intern *June–Aug. 2009*
Analyzed telecommunication infrastructure plans for forthcoming private and military constructions.

Professional Societies

2020–present: IEEE Photonics Society
2013–present: Optica (formerly OSA)
2009–present: Tau Beta Pi Engineering Honor Society
2009–present: Eta Kappa Nu Electrical & Computer Engineering Honor Society

Awards & Honors

2022: Research Featured in *Optics & Photonics News*, "Year in Optics"
2020: Research Accomplishment Award, UT-Battelle Awards Night
2020: Outstanding Scholarly Output Award, UT-Battelle Awards Night
2020: Third Place, IEEE Photonics Conference Student Paper Competition (as coauthor)
2019: Technology Commercialization Award, UT-Battelle
2019: Research Featured in *Optics & Photonics News*, "Year in Optics"
2019: Early Career Award, U.S. Department of Energy
2017: Technology Commercialization Award, UT-Battelle
2017: Significant Event Award, UT-Battelle, for ORNL's first quantum technology license
2015: Paul Baran Young Scholar Award from the Marconi Society
2015: College of Engineering Outstanding Graduate Student Research Award
2014: Finalist, Frontiers in Optics Emil Wolf Student Paper Competition (as coauthor)
2014: First Place, Siegman International School on Lasers Poster Competition
2013: Temporal Cloaking Research Featured in CLEO Press Luncheon
2011: Outstanding Senior Physics Major
2011: Eta Kappa Nu Outstanding Senior Award
2011: First Place, IEEE Region 3 Southeastcon Student Paper Competition
2010: Fred R. Maxwell, Jr., Award for the Outstanding Junior Student in ECE
2007: National Merit Scholar

Fellowships & Scholarships

Wigner Fellowship — **Oak Ridge National Laboratory**, *Aug. 2015–Aug. 2018*

NDSEG Fellowship — **Department of Defense**, *Sept. 2012–Aug. 2015*

Meissner Fellowship — **Purdue University**, *Aug. 2011–Aug. 2012*

National Merit Presidential Scholarship — **University of Alabama**, *Aug. 2007–May 2011*

Articles

Google Scholar: `https://scholar.google.com/citations?user=jl6yjvQAAAAJ&hl`
total citations: 2224 — *h-index: 21* — *as of 2/20/2023*

55: H.-H. Lu, N. A. Peters, A. M. Weiner, & J. M. Lukens, "Characterization of quantum frequency processors," *arXiv:2302.01495* (2023).

54: S. Lohani, J. M. Lukens, A. A. Davis, A. Khannejad, S. Regmi, D. E. Jones, R. T. Glasser, T. A. Searles, & B. T. Kirby, "Demonstration of machine-learning-enhanced Bayesian quantum state estimation," *arXiv:2212.08032* (2022).

53: J. C. Chapman, J. M. Lukens, M. Alshowkan, N. Rao, B. T. Kirby, & N. A. Peters, "Coexistent quantum channel characterization using spectrally resolved Bayesian quantum process tomography," *Physical Review Applied* **19**, 044026 (2022).

52: K. V. Myilswamy, S. Seshadri, H.-H. Lu, M. S. Alshaykh, J. Liu, T. J. Kippenberg, A. M. Weiner, & J. M. Lukens, "Time-resolved Hanbury Brown–Twiss interferometry of on-chip biphoton frequency combs using Vernier phase modulation," *Physical Review Applied* **19**, 034019 (2023).

51: S. Lohani, S. Regmi, J. M. Lukens, R. T. Glasser, T. A. Searles, & B. T. Kirby, "Dimension-adaptive machine-learning-based quantum state reconstruction," *Quantum Machine Intelligence* **5**, 1 (2023).

50: B. E. Nussbaum, A. J. Pizzimenti, N. B. Lingaraju, H.-H. Lu, & J. M. Lukens, "Design methodologies for integrated quantum frequency processors," *Journal of Lightwave Technology* **40**, 7648–7657 (2022).

49: M. Alshowkan, J. M. Lukens, H.-H. Lu, B. T. Kirby, B. P. Williams, W. P. Grice, & N. A. Peters, "Broadband polarization-entangled source for C+L-band flex-grid quantum networks," *Optics Letters* **47**, 6480–6483 (2022).

48: S. Seshadri, H.-H. Lu, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Complete frequency-bin Bell basis synthesizer," *Physical Review Letters* **129**, 230505 (2022).

47: H.-H. Lu, M. Alshowkan, N. A. Peters, J. M. Lukens, K. V. Myilswamy, A. M. Weiner, & N. B. Lingaraju, "A wavelength-multiplexing toolkit for quantum networking," *Optics & Photonics News* **33(11)**, 47 (2022). **Optics in 2022 Feature**

46: S. Lohani, J. M. Lukens, R. T. Glasser, T. A. Searles, & B. T. Kirby, "Data-centric machine learning in quantum information science," *Machine Learning: Science and Technology* **3**, 04LT01 (2022).

45: J. M. Lukens, A. Passian, S. Yoginath, K. J. H. Law, & J. A. Dawson, "Bayesian estimation of oscillator parameters: toward anomaly detection and cyber-physical system security," *Sensors* **22**, 6112 (2022).

44: H.-H. Lu, K. V. Myilswamy, R. S. Bennink, S. Seshadri, M. S. Alshaykh, J. Liu, T. J. Kippenberg, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Bayesian tomography of high-dimensional on-chip biphoton frequency combs with randomized measurements," *Nature Communications* **13**, 4338 (2022). **Altmetric Score: 124**

43: J. Alnas, M. Alshowkan, N. S. V. Rao, N. A. Peters, & J. M. Lukens, "Optimal resource allocation for flexible-grid entanglement distribution networks," *Optics Express* **30**, 24375–24393 (2022).

42: M. Alshowkan, P. G. Evans, B. P. Williams, N. S. V. Rao, C. E. Marvinney, Y.-Y. Pai, B. J. Lawrie, N. A. Peters, & J. M. Lukens, "Advanced architectures for high-performance quantum networking," *Journal of Optical Communications and Networking* **14**, 493–499 (2022).

41: J. C. Chapman, J. M. Lukens, B. Qi, R. C. Pooser, & N. A. Peters, "Bayesian homodyne and heterodyne tomography," *Optics Express* **30**, 15184–15200 (2022).

40: H.-H. Lu, N. B. Lingaraju, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "High-dimensional discrete Fourier transform gates with the quantum frequency processor," *Optics Express* **30**, 10126–10134 (2022). **Editors' Pick**

39: N. B. Lingaraju, H.-H. Lu, D. E. Leaird, S. Estrella, J. M. Lukens, & A. M. Weiner, "Bell state analyzer for spectrally distinct photons," *Optica* **9**, 280–283 (2022).

38: A. J. Pizzimenti, J. M. Lukens, H.-H. Lu, N. A. Peters, S. Guha, & C. N. Gagatsos, "Non-Gaussian photonic state engineering with the quantum frequency processor," *Physical Review A* **104**, 062437 (2021).

37: S. Lohani, J. M. Lukens, D. E. Jones, T. A. Searles, R. T. Glasser, & B. T. Kirby, "Improving application performance with biased distributions of quantum states," *Physical Review Research* **3**, 043145 (2021).

36: J. M. Lukens & A. Passian, "Bayesian inference for plasmonic nanometrology," *Physical Review A* **104**, 053501 (2021).

35: M. Alshowkan, B. P. Williams, P. G. Evans, N. S. V. Rao, E. M. Simmerman, H.-H. Lu, N. B. Lingaraju, A. M. Weiner, C. E. Marvinney, Y.-Y. Pai, B. J. Lawrie, N. A. Peters, & J. M. Lukens, "Reconfigurable quantum local area network over deployed fiber," *PRX Quantum* **2**, 040304 (2021).

34: J. M. Lukens, N. Lagakos, V. Kaybulkin, C. J. Vizas, & D. J. King, "Intensity-modulated fiber-optic voltage sensors for power distribution systems," *IEEE Photonics Technology Letters* **33**, 880–883 (2021).

33: J. M. Lukens, K. J. H. Law, & R. S. Bennink, "A Bayesian analysis of classical shadows," *npj Quantum Information* **7**, 113 (2021).

32: N. B. Lingaraju, H.-H. Lu, S. Seshadri, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Adaptive bandwidth management for entanglement distribution in quantum networks," *Optica* **8**, 329–332 (2021).

31: H.-H. Lu, E. M. Simmerman, P. Lougovski, A. M. Weiner, & J. M. Lukens, "Fully arbitrary control of frequency-bin qubits," *Physical Review Letters* **125**, 120503 (2020).

30: H.-H. Lu, B. Qi, B. P. Williams, P. Lougovski, A. M. Weiner, & J. M. Lukens, "Agile frequency transformations for dense wavelength-multiplexed communications," *Optics Express* **28**, 20379–20390 (2020).

29: J. M. Lukens, K. J. H. Law, A. Jasra, & P. Lougovski, "A practical and efficient approach for Bayesian quantum state estimation," *New Journal of Physics* **22**, 063038 (2020).

28: E. M. Simmerman, H.-H. Lu, A. M. Weiner, & J. M. Lukens, "Efficient compressive and Bayesian characterization of biphoton frequency spectra," *Optics Letters* **45**, 2886–2889 (2020).

27: J. M. Lukens, H.-H. Lu, B. Qi, P. Lougovski, A. M. Weiner, & B. P. Williams, "All-optical frequency processor for networking applications," *Journal of Lightwave Technology* **38**, 1678–1687

(2020).

26: T. Gonzalez-Raya, J. M. Lukens, L. C. Céleri, & M. Sanz, "Quantum memristors in frequency-entangled optical fields," *Materials* **13**, 864 (2020).

25: N. B. Lingaraju, H.-H. Lu, S. Seshadri, P. Imany, D. E. Leaird, J. M. Lukens, & A. M. Weiner, "Quantum frequency combs and Hong–Ou–Mandel interferometry: the role of spectral phase coherence," *Optics Express* **27**, 38683–38697 (2019).

24: H.-H. Lu, A. M. Weiner, P. Lougovski, & J. M. Lukens, "Quantum information processing with frequency-comb qudits," *IEEE Photonics Technology Letters* **31**, 1858–1861 (2019). **Invited**

23: H.-H. Lu, P. Imany, N. B. Lingaraju, M. S. Alshaykh, O. D. Odele, A. J. Moore, D. E. Leaird, M. Qi, A. M. Weiner, J. M. Lukens, B. P. Williams, N. A. Peters, P. Lougovski, & J. A. Jaramillo-Villegas, "Quantum information processing in the frequency domain," *Optics & Photonics News* **30(11)**, 43 (2019). **Optics in 2019 Feature**

22: H.-H. Lu, N. Klco, J. M. Lukens, T. D. Morris, A. Bansal, A. Ekström, G. Hagen, T. Papenbrock, A. M. Weiner, M. J. Savage, & P. Lougovski, "Simulations of subatomic many-body physics on a quantum frequency processor," *Physical Review A* **100**, 012320 (2019).

21: P. Imany, J. A. Jaramillo-Villegas, M. S. Alshaykh, J. M. Lukens, O. D. Odele, A. J. Moore, D. E. Leaird, M. Qi, & A. M. Weiner, "High-dimensional optical quantum logic in large operational spaces," *npj Quantum Information* **5**, 59 (2019).

20: B. P. Williams, J. M. Lukens, N. A. Peters, B. Qi, & W. P. Grice, "Quantum secret sharing with polarization-entangled photon pairs," *Physical Review A* **99**, 062311 (2019).

19: H.-H. Lu, J. M. Lukens, B. P. Williams, P. Imany, N. A. Peters, A. M. Weiner, & P. Lougovski, "A controlled-NOT gate for frequency-bin qubits," *npj Quantum Information* **5**, 24 (2019).

18: M. Kues, C. Reimer, J. M. Lukens, W. J. Munro, A. M. Weiner, D. J. Moss, & R. Morandotti, "Quantum optical microcombs," *Nature Photonics* **13**, 170–179 (2019).

17: H.-H. Lu, J. M. Lukens, N. A. Peters, B. P. Williams, A. M. Weiner, & P. Lougovski, "Quantum interference and correlation control of frequency-bin qubits," *Optica* **5**, 1455–1460 (2018).

16: J. M. Lukens, R. C. Pooser, & N. A. Peters, "A broadband fiber-optic nonlinear interferometer," *Applied Physics Letters* **113**, 091103 (2018). **Editor's Pick**

15: M. McCall, J. B. Pendry, V. Galdi, Y. Lai, S. A. R. Horsley, J. Li, J. Zhu, R. C. Mitchell-Thomas, O. Quevedo-Teruel, P. Tassin, V. Ginis, E. Martini, G. Minatti, S. Maci, M. Ebrahimpouri, Y. Hao, P. Kinsler, J. Gratus, J. M. Lukens, A. M. Weiner, U. Leonhardt, I. I. Smolyaninov, V. N. Smolyaninova, R. T. Thompson, M. Wegener, M. Kadic, & S. A. Cummer, "Roadmap on transformation optics," *Journal of Optics* **20**, 063001 (2018).

14: J. M. Lukens, N. T. Islam, C. C. W. Lim, & D. J. Gauthier, "Reconfigurable generation and measurement of mutually unbiased bases for time-bin qudits," *Applied Physics Letters* **112**, 111102 (2018). **Editor's Pick**

13: P. Imany, J. A. Jaramillo-Villegas, O. D. Odele, K. Han, D. E. Leaird, J. M. Lukens, P. Lougovski, M. Qi, & A. M. Weiner, "50-GHz-spaced comb of high-dimensional frequency-bin entangled photons from an on-chip silicon nitride microresonator," *Optics Express* **26**, 1825–1840 (2018).

12: H.-H. Lu, J. M. Lukens, N. A. Peters, O. D. Odele, D. E. Leaird, A. M. Weiner, & P. Lougovski, "Electro-optic frequency beamsplitters and tritters for high-fidelity quantum information processing," *Physical Review Letters* **120**, 030502 (2018). **Altmetric Score: 91**

11: J. M. Lukens & P. Lougovski, "Frequency-encoded photonic qubits for scalable quantum information processing," *Optica* **4**, 8–16 (2017).

10: O. D. Odele, J. M. Lukens, J. A. Jaramillo-Villegas, P. Imany, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "High-speed switching of biphoton delays through electro-optic pump frequency modulation," *APL Photonics* **2**, 011301 (2017).

9: J. M. Lukens, N. A. Peters, & R. C. Pooser, "Naturally stable Sagnac–Michelson nonlinear interferometer," *Optics Letters* **41**, 5438–5441 (2016). **Editors' Pick**

8: J. M. Lukens, O. D. Odele, D. E. Leaird, & A. M. Weiner, "Electro-optic modulation for high-speed characterization of entangled photon pairs," *Optics Letters* **40**, 5331–5334 (2015). **Featured in Spotlight on Optics**

7: O. D. Odele, J. M. Lukens, J. A. Jaramillo-Villegas, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Tunable delay control of entangled photons based on dispersion cancellation," *Optics Express* **23**, 21857–21866 (2015).

6: J. M. Lukens, A. J. Metcalf, D. E. Leaird, & A. M. Weiner, "Temporal cloaking for data suppression and retrieval," *Optica* **1**, 372–375 (2014). **Scientific Press Coverage**

5: J. M. Lukens, O. Odele, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Generation of biphoton correlation trains through spectral filtering," *Optics Express* **22**, 9585–9596 (2014).

4: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Orthogonal spectral coding of entangled photons," *Physical Review Letters* **112**, 133602 (2014).

3: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Demonstration of high-order dispersion cancellation with an ultrahigh-efficiency sum-frequency correlator," *Physical Review Letters* **111**, 193603 (2013).

2: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Biphoton manipulation with a fiber-based pulse shaper," *Optics Letters* **38**, 4652–4655 (2013).

1: J. M. Lukens, D. E. Leaird, & A. M. Weiner, "A temporal cloak at telecommunication data rate," *Nature* **498**, 205–208 (2013). **General Press Coverage**

Conference Papers

(73) June 2023: S. Regmi, A. N. Blackwell, A. Khannejad, S. Lohani, J. M. Lukens, R. T. Glasser, B. T. Kirby, & T. A. Searles, "Bayesian quantum state reconstruction with a learning-based tuned prior," QM4B.3, Quantum 2.0, Denver, CO

(72) May 2023: N. S. V. Rao, M. Alshowkan, J. C. Chapman, N. A. Peters, & J. M. Lukens, "Throughput measurements and capacity estimations for quantum connections," XXXX, IEEE NetSciQCom, Hoboken, NJ.

(71) May 2023: M. Alshowkan, J. M. Lukens, H.-H. Lu, B. T. Kirby, B. P. Williams, W. P. Grice, & N. A. Peters, "Polarization-entangled source for flex-grid C+L-band quantum networks," XXXX, CLEO, San Jose, CA.

(70) Feb. 2023: B. E. Nussbaum, A. J. Pizzimenti, N. B. Lingaraju, H.-H. Lu, & J. M. Lukens,

"Modelling integrated quantum frequency processors towards robust quantum networks," 124460I, SPIE Photonics West, San Francisco, CA.

(69) Jan. 2023: J. C. Chapman, J. M. Lukens, M. Alshowkan, N. S. V. Rao, B. T. Kirby, & N. A. Peters, "Coexistent quantum channel characterization using quantum process tomography with spectrally resolved detection," 124460F, SPIE Photonics West, San Francisco, CA. **Invited**

(68) Jan. 2023: S. Seshadri, H.-H. Lu, J. M. Lukens, & A. M. Weiner, "Biphoton spectral quantum interference for information processing and delay metrology," 1244605, SPIE Photonics West, San Francisco, CA. **Invited**

(67) Nov. 2022: N. S. V. Rao, M. Alshowkan, A. Al-Najjar, S. E. Hicks, P. G. Evans, J. M. Lukens, & N. A. Peters, "Site-to-site tunnels authenticated by quantum keys," WF2.4, IEEE Photonics Conference, Vancouver, Canada.

(66) Nov. 2022: B. E. Nussbaum, A. J. Pizzimenti, N. B. Lingaraju, H.-H. Lu, & J. M. Lukens, "Modeling integrated quantum frequency processors," TuG2.3, IEEE Photonics Conference, Vancouver, Canada.

(65) Nov. 2022: M. Alshowkan, P. G. Evans, B. P. Williams, N. S. V. Rao, C. E. Marvinney, Y.-Y. Pai, B. J. Lawrie, N. A. Peters, & J. M. Lukens, "Scalable and secure architecture for quantum networks," MB1.4, IEEE Photonics Conference, Vancouver, Canada. **Upgraded to Invited**

(64) Nov. 2022: J. Alnas, M. Alshowkan, N. S. V. Rao, N. A. Peters, & J. M. Lukens, "Optimizing resource allocation in flex-grid entanglement distribution networks," MB1.3, IEEE Photonics Conference, Vancouver, Canada.

(63) Oct. 2022: S. Seshadri, K. V. Myilswamy, J. Liu, T. J. Kippenberg, A. M. Weiner, & J. M. Lukens, "Time-resolved HBT interferometry of an integrated pulsed biphoton frequency comb," LM3F.1, Frontiers in Optics, Rochester, NY.

(62) Oct. 2022: S. Seshadri, H.-H. Lu, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Quantum delay metrology with complete frequency-bin Bell basis synthesizer, JTu4A.30, Frontiers in Optics, Rochester, NY.

(61) Aug. 2022: S. Bolton, J. M. Lukens, C. Moseley, M. Woodson, S. Estrella, S. Sun, S. M. Kim, & P. Kung, "Investigation of microwave transducers for linearity dependence and applications in quantum networking," 122380C, SPIE Optical Engineering + Applications, San Diego, CA.

(60) May 2022: S. Seshadri, H.-H. Lu, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Frequency-bin Bell state generation via successive single and dual spectral-line pumping," FF4I.2, CLEO, San Jose, CA.

(59) May 2022: J. M. Lukens & A. Passian, "A Bayesian approach to nanoparticle characterization," FTh2B.6, CLEO, San Jose, CA.

(58) May 2022: S. Lohani, J. M. Lukens, D. E. Jones, R. T. Glasser, T. A. Searles, & B. T. Kirby, "Learning-based quantum state reconstruction using biased quantum state distributions," AW4P.2, CLEO, San Jose, CA.

(57) May 2022: J. C. Chapman, J. M. Lukens, B. Qi, R. C. Pooser, & N. A. Peters, "Bayesian optical heterodyne tomography," FTu5A.5, CLEO, San Jose, CA.

(56) May 2022: A. J. Pizzimenti, J. M. Lukens, H.-H. Lu, N. A. Peters, S. Guha, & C. Gagatsos, "Non-Gaussian state design with the quantum frequency processor," FTu5A.3, CLEO, San Jose, CA.

(55) May 2022: K. V. Myilswamy, S. Seshadri, J. Liu, T. J. Kippenberg, A. M. Weiner, & J. M. Lukens, "Time-resolved second-order coherence of an integrated biphoton frequency comb," FTu5A.2, CLEO, San Jose, CA.

(54) May 2022: M. Alshowkan, P. G. Evans, B. P. Williams, N. S. V. Rao, C. E. Marvinney, Y.-Y. Pai, B. J. Lawrie, N. A. Peters, & J. M. Lukens, "Synchronizing a quantum local area network with White Rabbit," FM1C.4, CLEO, San Jose, CA.

(53) May 2022: N. A. Peters, M. Alshowkan, J. C. Chapman, P. G. Evans, D. A. Hooper, W. P. Grice, H.-H. Lu, J. M. Lukens, R. C. Pooser, C. E. Marvinney, A. Miloshevsky, B. P. Williams, & B. A. Wilson, "Quantum networking and communications at Oak Ridge National Laboratory," 979780, IEEE INFOCOMM.

(52) Mar. 2022: S. Lohani, J. M. Lukens, D. E. Jones, T. A. Searles, R. T. Glasser, & B. T. Kirby, "Quantum state reconstruction with biased distributions of quantum states," N35.00003, APS March Meeting, Chicago, IL.

(51) Mar. 2022: M. Alshowkan, B. P. Williams, P. G. Evans, N. S. V. Rao, E. M. Simmerman, H.-H. Lu, N. B. Lingaraju, A. M. Weiner, C. E. Marvinney, Y.-Y. Pai, B. J. Lawrie, N. A. Peters, & J. M. Lukens, "A deployed quantum local area network with flex-grid technology," A35.00004, APS March Meeting, Chicago, IL.

(50) Mar. 2022: S. Lohani, J. M. Lukens, D. E. Jones, T. A. Searles, R. T. Glasser, & B. T. Kirby, "Learning from biased distributions of quantum states," Poster 372, 25th Annual Conference on Quantum Information Processing, Pasadena, CA.

(49) Nov. 2021: S. Lohani, J. M. Lukens, D. E. Jones, T. A. Searles, R. T. Glasser, & B. T. Kirby, "Biased distributions of random quantum states for high-performance quantum state reconstruction," Workshop on Innovative Nanoscale Devices and Systems (WINDS), Waikoloa, HI.

(48) Nov. 2021: K. V. Myilswamy, H.-H. Lu, S. Seshadri, M. S. Alshaykh, J. Liu, D. E. Leaird, T. J. Kippenberg, A. M. Weiner, & J. M. Lukens, "Randomized tomography of on-chip biphoton frequency combs," LM6E.3, Frontiers in Optics.

(47) Oct. 2021: M. Alshowkan, B. P. Williams, P. G. Evans, N. S. V. Rao, E. M. Simmerman, H.-H. Lu, N. B. Lingaraju, A. M. Weiner, N. A. Peters, & J. M. Lukens, "Remote state preparation in a reconfigurable quantum local area network," TuD3.3, IEEE Photonics Conference.

(46) May 2021: M. Alshowkan, B. P. Williams, P. G. Evans, N. S. V. Rao, E. M. Simmerman, H.-H. Lu, N. B. Lingaraju, A. M. Weiner, N. A. Peters, & J. M. Lukens, "A reconfigurable quantum local area network over deployed fiber," FF2J.4, CLEO.

(45) May 2021: J. M. Lukens, K. J. H. Law, & R. S. Bennink, "Classical shadows and Bayesian mean estimation: a comparison," FW3N.3, CLEO.

(44) May 2021: H.-H. Lu, N. B. Lingaraju, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Scaling the discrete Fourier transform gate in the quantum frequency processor," FTu1N.8, CLEO.

(43) May 2021: N. B. Lingaraju, H.-H. Lu, D. E. Leaird, S. Estrella, J. M. Lukens, & A. M. Weiner "A programmable electro-optic Bell-state analyzer for spectrally distinguishable photons," FTu1N.5, CLEO.

(42) May 2021: H.-H. Lu, A. M. Weiner, & J. M. Lukens, "High-dimensional frequency-bin tomography with random measurements," FM1N.2, CLEO.

(41) Oct. 2020: N. B. Lingaraju, H.-H. Lu, D. E. Leaird, S. Estrella, J. M. Lukens, & A. M. Weiner, "A Bell-state analyzer for photonic frequency," PD4, IEEE Photonics Conference. **Postdeadline Session**

(40) Oct. 2020: J. M. Lukens, K. J. H. Law, A. Jasra, & P. Lougovski, "Computationally efficient Bayesian quantum state tomography," ThA3.4, IEEE Photonics Conference. **Upgraded to Invited**

(39) Oct. 2020: J. M. Lukens, N. Lagakos, V. Kaybulkin, C. J. Vizas, & D. J. King, "Characterization and equalization of intensity-modulated voltage sensors," ThF2.5, IEEE Photonics Conference.

(38) Sep. 2020: E. M. Simmerman, H.-H. Lu, A. M. Weiner, & J. M. Lukens, "Bayesian reconstruction of biphoton frequency correlations," MI2.5, IEEE Photonics Conference.

(37) Sep. 2020: H.-H. Lu, E. M. Simmerman, P. Lougovski, A. M. Weiner, & J. M. Lukens, "Arbitrary single-qubit transformations on a quantum frequency processor," MI2.1, IEEE Photonics Conference. **Third Place, Student Paper Competition**

(36) Sep. 2020: N. B. Lingaraju, N. O'Malley, D. E. Jones, O. E. Sandoval, H. N. Azzouz, D. E. Leaird, J. M. Lukens, M. Brodsky, & A. M. Weiner, "Harnessing entanglement in polarization state and frequency-bin for quantum communication and networking," QW6A.15, OSA Quantum 2.0.

(35) Sep. 2020: N. B. Lingaraju, H.-H. Lu, S. Seshadri, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Flex-grid spectrum allocation for entanglement distribution in quantum networks," QW6A.9, OSA Quantum 2.0.

(34) May 2020: J. M. Lukens, H.-H. Lu, B. Qi, P. Lougovski, A. M. Weiner, & B. P. Williams, "All-optical frequency hopping and broadcasting in wavelength-multiplexed channels," SF2L.2, CLEO.

(33) May 2020: N. B. Lingaraju, N. O'Malley, D. E. Jones, O. E. Sandoval, H. N. Azzouz, D. E. Leaird, J. M. Lukens, M. Brodsky, & A. M. Weiner, "Polarization diversity phase modulator for frequency-bin operations with hyperentangled biphoton frequency combs," FF1D.5, CLEO.

(32) May 2020: N. B. Lingaraju, H.-H. Lu, S. Seshadri, D. E. Leaird, A. M. Weiner, & J. M. Lukens, "Adaptive bandwidth management for entanglement distribution in a fully-connected fiber-optic network," FTh1D.2, CLEO.

(31) May 2020: E. M. Simmerman, H.-H. Lu, A. M. Weiner, & J. M. Lukens, "Compressive characterization of biphoton frequency spectra," FM2C.6 CLEO.

(30) Oct. 2019: H.-H. Lu, J. M. Lukens, B. Qi, P. Lougovski, A. M. Weiner, & B. P. Williams, "All-optical processing with dynamic frequency transformations," 8908514, IEEE Photonics Conference, San Antonio, TX.

(29) Aug. 2019: P. Imany, M. S. Alshaykh, J. M. Lukens, J. A. Jaramillo-Villegas, A. J. Moore, D. E. Leaird, & A. M. Weiner, "Generation of a non-separable two-qudit state using a time-frequency SUM operation," Th1A.4, Coherence and Quantum Optics, Rochester, NY.

(28) May 2019: H.-H. Lu, J. M. Lukens, B. P. Williams, P. Imany, N. A. Peters, A. M. Weiner, & P. Lougovski, "Bayesian machine learning of frequency-bin CNOT," FF1F.3, CLEO, San Jose, CA. **Upgraded to Invited**

(27) May 2019: P. Imany, M. S. Alshaykh, J. M. Lukens, A. J. Moore, D. E. Leaird, & A. M.

Weiner, "Demonstration of four-party 32-dimensional Greenberger–Horne–Zeilinger entangled state," JTh5C.5, CLEO, San Jose, CA. **Postdeadline Session**

(26) May 2019: H.-H. Lu , N. Klco, J. M. Lukens, T. D. Morris, A. Bansal, A. Ekström, G. Hagen, T. Papenbrock, A. M. Weiner, M. J. Savage, & P. Lougovski, "Subatomic many-body physics simulations on a quantum frequency processor," FTh3A.6, CLEO, San Jose, CA.

(25) May 2019: J. M. Lukens, "Quantum information processing with frequency-bin qubits: progress, status, and challenges," JTu4A.3, CLEO, San Jose, CA. **Invited**

(24) May 2019: N. Lingaraju, H.-H. Lu, S. Seshadri, P. Imany, D. E. Leaird, J. M. Lukens, & A. M. Weiner, "Spectral phase coherence in HOM interferometry," JTu3A.5, CLEO, San Jose, CA.

(23) May 2019: P. Imany, M. S. Alshaykh, J. M. Lukens, J. A. Jaramillo-Villegas, D. E. Leaird, & A. M. Weiner, "A two-qudit operation on a 256-dimensional Hilbert space," JTu3A.3, CLEO, San Jose, CA.

(22) Sep. 2018: J. M. Lukens, N. T. Islam, C. C. W. Lim, and D. J. Gauthier, "Mutually unbiased bases for time-bin qudits," JW3A.66, Frontiers in Optics, Washington, DC.

(21) Sep. 2018: H.-H. Lu, J. M. Lukens, P. Imany, N. A. Peters, B. P. Williams, A. M. Weiner, & P. Lougovski, "Experimental demonstration of CNOT gate for frequency-encoded qubits," JTu3A.55, Frontiers in Optics, Washington, DC.

(20) Sep. 2018: P. Imany, J. A. Jaramillo-Villegas, J. M. Lukens, O. D. Odele, D. E. Leaird, M. Qi, & A. M. Weiner, "Two-qudit deterministic optical quantum logic in a single photon," JTu2A.53, Frontiers in Optics, Washington, DC.

(19) May 2018: H.-H. Lu, J. M. Lukens, N. A. Peters, B. P. Williams, A. M. Weiner, & P. Lougovski, "Two-photon interference and entanglement control via reconfigurable quantum frequency processor," JTh5B.3, CLEO, San Jose, CA. **Postdeadline Session**

(18) May 2018: J. M. Lukens, R. C. Pooser, & N. A. Peters, "A broadband all-fiber SU(1,1) interferometer," FTh4G.3, CLEO, San Jose, CA.

(17) May 2018: W. P. Grice, J. M. Lukens, N. A. Peters, & B. P. Williams, "Two-photon N-party quantum secret sharing," FTu4A.5, CLEO, San Jose, CA.

(16) Sep. 2017: H.-H. Lu, J. M. Lukens, N. A. Peters, O. D. Odele, A. M. Weiner, & P. Lougovski, "Linear-optical frequency beamsplitter for fiber-optic quantum networks," Th454, QCrypt, Cambridge, UK.

(15) Sep. 2017: H.-H. Lu, J. M. Lukens, N. A. Peters, O. D. Odele, A. M. Weiner, & P. Lougovski, "Electro-optic frequency beamsplitter for quantum networking applications," JW4A.23, Frontiers in Optics, Washington, DC.

(14) June 2017: J. M. Lukens, N. A. Peters, & R. C. Pooser, "A nonlinear interferometer with intrinsic stability," FTu3F.6, CLEO, San Jose, CA.

(13) Oct. 2016: J. M. Lukens & P. Lougovski, "Optical quantum computing with spectral qubits," FTh5F.5, Frontiers in Optics, Rochester, NY.

(12) Oct. 2016: O. D. Odele, J. M. Lukens, J. A. Jaramillo-Villegas, P. Imany, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Rapid delay modulation of biphotons," JW4A.174, Frontiers in Optics, Rochester, NY.

(11) Oct. 2016: E. Layden, T. Coulter, J. Lukens, N. A. Peters, B. Lawrie, & R. Pooser, "Nonlinear interferometric plasmonic sensing," LF2E.6, Laser Science, Rochester, NY.

(10) June 2016: O. D. Odele, J. M. Lukens, D. E. Leaird, & A. M. Weiner, "Modulation technique for improving temporal resolution in biphoton coincidence measurements," FTu4C.5, CLEO, San Jose, CA.

(9) May 2016: E. Layden, T. Coulter, J. Lukens, B. Lawrie, & R. Pooser, "Locked SU(1,1) Nonlinear Interferometer for Phase Shift Measurements in Triangular Nanohole Arrays," B7.00008, DAMOP: Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Providence, RI.

(8) May 2015: O. D. Odele, J. M. Lukens, J. A. Jaramillo-Villegas, C. Langrock. M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Temporal position modulation of biphoton correlations through pump frequency tuning," FTh1A.8, CLEO, San Jose, CA.

(7) May 2015: J. M. Lukens, A. J. Metcalf, D. E. Leaird, & A. M. Weiner, "Temporal cloaking enhancements for optical communication," FW4D.7, CLEO, San Jose, CA. **Upgraded to Invited**

(6) Oct. 2014: O. D. Odele, J. M. Lukens, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Observation of the temporal Talbot effect for entangled photons," FW2C.2, Frontiers in Optics, Tucson, AZ. **Finalist, Emil Wof Student Paper Competition**

(5) Aug. 2014: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Ultrafast biphoton spectral coding," Poster T23, Siegman International School on Lasers, Stanford, CA.

(4) June 2014: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Record-efficiency biphoton correlator and observation of high-order dispersion cancellation," FTh4A.3, CLEO, San Jose, CA.

(3) June 2014: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Encoding and decoding of biphoton wavepackets," FW3A.8, CLEO, San Jose, CA.

(2) Oct. 2013: J. M. Lukens, A. Dezfooliyan, C. Langrock, M. M. Fejer, D. E. Leaird, & A. M. Weiner, "Manipulation of entangled photons with a fiber-based pulse shaper," FW1C.3, Frontiers in Optics, Orlando, FL.

(1) June 2013: J. M. Lukens, D. E. Leaird, & A. M. Weiner, "A telecom-based temporal cloak," QM4E.4, CLEO, San Jose, CA. **Selected for Press Luncheon**

Invited Talks & Seminars

(21) Feb. 2023: *NIST*: "Flex-grid quantum networks: function at the junction" (QNGC Seminar Series).

(20) Feb. 2023: *SIPQNP*: "Programmable spectral mode sorting with the quantum frequency processor" (Scalable Information Processing with Quantum Nano-Photonics).

(19) Oct. 2022: *SQuInT*: "Elastic optical quantum networks: connecting two worlds" (Southwest Quantum Information and Technology Workshop).

(18) Aug. 2022: *NIST*: "Bayesian homodyne and heterodyne tomography" (Quantum Network Metrology Group Seminar).

(17) June 2022: *SPIE*: "Flex-grid quantum networking" (Photonics for Quantum).

(16) Oct. 2021: *Quantum Science Center*: "Adaptive bandwidth management for entanglement distribution in quantum networks" (QSC Postdoctoral and Graduate Student Association "Meet a QIST Expert" Seminar Series).

(15) Aug. 2021: *IEEE*: "Broadband quantum networking opportunities with the quantum frequency processor" (IEEE Research and Applications of Photonics in Defense Conference).

(14) June 2021: *Cornell University*: "The quantum frequency processor for quantum networking" (McMahon Lab Seminar).

(13) May 2021: *NIST*: "Adaptive bandwidth management for entanglement distribution in quantum networks" (Quantum Network Metrology Group Seminar).

(12) Apr. 2021: *Purdue University*: "The quantum frequency processor for quantum networking" (PQSEI Seminar Series).

(11) Jan. 2021: *Northwestern University*: "The quantum frequency processor for quantum networking" (ISQNet Seminar Series).

(10) Oct. 2020: *University of Tennessee*: "Computationally efficient Bayesian quantum state tomography" (Physics 599 Seminar Series).

(9) Feb. 2020: *ORNL*: "Scalable architectures for hybrid quantum/classical networking" (UT–Battelle Science and Technology Committee).

(8) Jan. 2019: *Rochester Institute of Technology*: "Frequency bins for quantum information processing" (Photonics for Quantum Workshop).

(7) Jan. 2019: *ORNL*: "Frequency bins for quantum information processing" (ORNL Quantum Networking Symposium).

(6) Nov. 2018: *Tennessee Technological University*: "Quantum optics: what is and what should be."

(5) Oct. 2018: *University of Bologna, Italy*: "Emerging technology: quantum information" (Marconi Society Young Scholars Symposium).

(4) Feb. 2018: *University of Bilbao, Spain*: "Photonic quantum information processing with spectral qubits" (Quantum Simulation and Computation).

(3) Oct. 2017: *University of Waterloo, Canada*: "Classical telecom meets spectral qubits: frequency-bin encoding for photonic quantum information" (Quantum Innovators in Science and Engineering).

(2) Mar. 2016: *University of Warsaw, Poland*: "Optical telecom technology for quantum signal processing" (Spectral and Spatial Engineering of Quantum Light).

(1) Oct. 2015: *University of Oxford, UK*: "Taking photonic signal processing to new heights: classical and quantum."

Book Chapters

2: M. Alshowkan, N. S. V. Rao, J. C. Chapman, B. P. Williams, P. G. Evans, R. C. Pooser, J. M. Lukens, & N. A. Peters, "Lessons learned on the interface between quantum and conventional networking," in *Driving Scientific and Engineering Discoveries Through the Integration of Experi-*

ment, Big Data, and Modeling and Simulation (J. Nichols, A. Maccabe, J. Nutaro, S. Pophale, P. Devineni, T. Ahearn, & B. Verastegui, eds.), *Communications in Computer and Information Science* **1512**, 262–279 (2022).

1: J. M. Lukens & A. M. Weiner, "Biphoton Pulse Shaping," in *All-Optical Signal Processing* (S. Wabnitz & B. J. Eggleton, eds.), *Springer Series in Optical Sciences* **194**, 423–448 (2015).

Intellectual Property

5: N. S. V. Rao, M. Alshowkan, A. Al-Najjar, S. E. Hick, P. G. Evans, J. M. Lukens, & N. A. Peters, "Site-to-site tunnels authenticated by quantum keys," *U. S. Patent Application* 63422756 (2022).

4: J. M. Lukens, N. A. Peters, & R. C. Pooser, "Gain balanced nonlinear optical interferometer [continuation]," *U. S. Patent* 11,402,723 (2022).

3: J. M. Lukens, N. A. Peters, & R. C. Pooser, "Gain balanced nonlinear optical interferometer," *U. S. Patent* 10,725,360 (2020). **Licensed by Memcus, Inc. (PLA-1950)**

2: J. M. Lukens, N. A. Peters, & R. C. Pooser, "Nonlinear interferometer systems and methods," *U. S. Patent* 10,605,727 (2020). **Licensed by Memcus, Inc. (PLA-1950)**

1: W. P. Grice, J. M. Lukens, & N. A. Peters, "Deterministic single-photon source based on spectral shift of a heralded photon," *U. S. Patent* 10,175,554 (2019).

Licensed by Qubitekk (PLA-1934)

Mentorship Experience

Student	Institution	Program	Years
Hsuan-Hao Lu	Purdue University	PhD	2016–2020
Emma M. Simmerman	University of Colorado	DOE SULI	2019–2020
Navin B. Lingaraju	Purdue University	PhD	2019–2021
Muneer Alshowkan	Oak Ridge National Laboratory	Postdoctoral Research	2020–2021
Benjamin E. Nussbaum	University of Rochester	DOE SULI	2020
Summer Bolton	University of Alabama	MS	2020–2022
Andrew J. Pizzimenti	University of Florida	DOE SULI	2020–2021
Jude Alnas	University of Alabama	DOE SULI	2021–2022
Suparna Seshadri	Purdue University	PhD	2021–
Karthik V. Myilswamy	Purdue University	PhD	2021–
Benjamin R. Clark	Mississippi State University	DOE SULI	2022
Carson Moseley	University of Alabama	PhD	2022–
Timothy Pentapaty	Arizona State University	Internship	2022–
Rhea Fernandes	Arizona State University	PhD	2023–

SULI: Science Undergraduate Laboratory Internships
PhD and MS are co-advised with their home institution's thesis advisor.

Selected Press Coverage

ABC News (6/7/2013): http://abcnews.go.com/blogs/technology/2013/06/researchers-invent-invisibility-cloak/

ARS Technica (2/8/2018): https://arstechnica.com/science/2018/02/careful-phasing-of-a-photonic-qubit-brings-light-under-control/

ASCR Discovery (6/18/2020): https://ascr-discovery.org/2020/06/quantum-backbone/

ASU (1/18/2023): https://news.asu.edu/20230118-university-news-future-internet

BBC (6/5/2013): http://www.bbc.co.uk/news/science-environment-22780651

Forbes (6/6/2013): http://www.forbes.com/sites/alexknapp/2013/06/06/take-that-nsa-scientists-hide-communications-using-a-hole-in-time/

New Scientist (11/28/2014) : http://www.newscientist.com/article/dn26627-time-cloak-used-to-hide-messages-in-laser-light.html#.VICbbTHF_j2

ORNL (3/4/2022): https://www.ornl.gov/news/giant-leap-toward-quantum-internet-realized-bell-state-analyzer

Wall Street Journal (6/14/2013): http://online.wsj.com/article/SB10001424127887323734304578543530511954180.html