

Jamison Sloan

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Education

- Doctor of Philosophy in Electrical Engineering and Computer Science, Massachusetts Institute of Technology (2018 – present, anticipated graduation May 2024)
- Bachelor of Science in Physics, Massachusetts Institute of Technology (2014 – 2017)

Positions

- Research Assistant, Massachusetts Institute of Technology and MIT Lincoln Laboratory (2017 – 2018)
- Summer internship, Lawrence Livermore National Laboratory (2015)

Research Interests

Quantum optics, nonlinear optics, time-varying photonic media, nanophotonics, plasmonics and polaritonics, strong-field physics, high harmonic generation, attosecond science.

Awards and Honors

- Emerson Harris Fellow in Jazz (2022 – 2023)
- Mathworks Graduate Fellowship (2022 – 2023)
- Early career best poster award from Optica (formerly OSA). Waves in Time-Varying Media conference (2021)
- National Defense Science and Engineering (NDSEG) Fellowship (2019 – 2022, accepted)
- National Science Foundation (NSF) Graduate Research Fellowship (2019, declined)

Published Papers (* denotes equal contribution)

1. Charles Roques-Carmes*, Yannick Salamin*, **Jamison Sloan**, Seou Choi, Gustavo Velez, Ethan Koskas, Nicholas Rivera, Steven E. Kooi, John D. Joannopoulos, Marin Soljačić. Biasing the quantum vacuum to control macroscopic probability distributions. *Science*. (2023).
2. Nicholas Rivera*, **Jamison Sloan***, Yannick Salamin, John D. Joannopoulos, Marin Soljačić. Creating large fock states and massively squeezed states in optics using systems with nonlinear bound states in the continuum. *Proceedings of the National Academy of Sciences*. 2023.
3. Charles Roques-Carmes, Nicholas Rivera, Ali Ghorashi, Steven E. Kooi, Yi Yang, Zin Lin, Justin Beroz, Aviram Massuda, **Jamison Sloan**, Nicolas Romer, Yang Yu, John D. Joannopoulos, Ido Kaminer, Steven G. Johnson, Marin Soljačić. A framework for scintillation in nanophotonics. *Science*. (2022).
4. **Jamison Sloan**, Nicholas Rivera, John D. Joannopoulos, Marin Soljačić. Controlling two-photon emission from superluminal and accelerating index perturbations. *Nature Physics*. (2022). **Featured on the cover of Nature Physics, and selected for a popular summary in the issue.**

5. **Jamison Sloan**, Nicholas Rivera, John D. Joannopoulos, Marin Soljačić. Casimir light in dispersive nanophotonics. *Physical Review Letters*. (2022).
6. **Jamison Sloan**, Nicholas Rivera, John D. Joannopoulos, Ido Kaminer, Marin Soljačić. Controlling spins with surface magnon polaritons. *Physical Review B*. (2019).
7. **Jamison Sloan**, Nicholas Rivera, Marin Soljačić, Ido Kaminer. Tunable UV-emitters through graphene plasmonics. *Nano Letters*. (2018).
8. **Jamison Sloan**, Yunwei Sun, Charles Carrigan. Uncertainty quantification for the discrimination of nuclear events as violations of the comprehensive nuclear-test-ban treaty. *Journal of Environmental Radioactivity*. (2016).

Submitted Papers (* denotes equal contribution)

9. Linh Nguyen, **Jamison Sloan**, Nicholas Rivera, Marin Soljačić. Intense squeezed light from lasers with sharply nonlinear gain. *Arxiv:2306.01908*. (2023).
10. **Jamison Sloan**, Nicholas Rivera, John D. Joannopoulos, Marin Soljačić. Optical properties of dispersive time-dependent materials. *Arxiv:2211.16166*. (2022).
11. Sahil Pontula*, **Jamison Sloan***, Strong intensity noise condensation using nonlinear dispersive loss in semiconductor lasers. *Arxiv:2212.07300*. (2022).
12. Josephine Yu*, **Jamison Sloan***, Nicholas Rivera, Marin Soljačić. Quantum electro-dynamical meta-materials. *Arxiv:2209.02656*. (2022).
13. Nicholas Rivera, **Jamison Sloan**, Ido Kaminer, Marin Soljačić. Fock lasers based on deep-strong coupling of light and matter. *Arxiv:2111.07010*. (2021).

Papers in preparation (* denotes equal contribution)

14. **Jamison Sloan***, Nicholas Rivera*, Marin Soljačić. Nonlinear dynamics of dispersive Kerr nonlinear systems.
15. **Jamison Sloan**, Alexey Gorlach, Matan Even Tzur, Nicholas Rivera, Oren Cohen, Ido Kaminer, Marin Soljačić. Entangling soft X-rays through strong field pair generation.
16. Elina Sendonaris*, **Jamison Sloan***, Nicholas Rivera, Marin Soljačić. Controlling X-ray emission with optical nanostructures.

Talks and Seminars

- Author on 18 conference talks, with 8 as lead presenter
- Institute for Theoretical Atomic and Molecular Physics (ITAMP) seminar. Cambridge, MA. May 2023.
- Waves in Time-Varying Media (WiTVM) conference. Invited speaker. NYC. May 2023.
- Conference on Lasers and Electro-Optics (CLEO), San Jose, CA. May 2023. (**Upgraded from contributed talk to “highlighted talk” [top 1-2% of abstracts]**)

- Solid State Institute Seminar, Technion. Haifa, Israel. Jan 2023.

Patents

1. Jamison Sloan, Nicholas Rivera, John D. Joannopoulos, Marin Soljačić. Methods and Apparatus for Generating Coherent Light at New Frequencies via Floquet Lasing. Provisional patent application.
2. Nicholas Rivera, Jamison Sloan, Ido Kaminer, and Marin Soljačić. Methods and Apparatus to Generate Macroscopic Fock and other Sub-Poissonian States of Radiation. Provisional patent application.
3. Nicholas Rivera, Jamison Sloan, Yannick Salamin, and Marin Soljačić. Complete condensation of photon noise in nonlinear dissipative systems. Provisional patent application.
4. Josue Lopez, Samuel Kim, Jamison Sloan, et al. Planar luneburg lens system for two-dimensional optical beam steering, November 2 2021. US Patent 11,163,116.

Referee Activity

Nature Physics, Physical Review Letters, Physical Review X, Physical Review A, Optics Express, Nano Letters.

Mentorship and Teaching

Supervised research projects of >13 students, including 8 MIT undergraduates (with many now PhD students at top universities in USA), as well as Masters and visiting students from abroad (China, France, Israel).

Served as a TA for two writing-focused courses in the physics department: 8.08 (Quantum Mechanics III), and 8.S227 (Special Subject in Physics, focused on written and spoken technical communication).