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Summary and Highlights

Contact Information

Room I21.O2.223, Building Lab West
Am Campus 1
3400 Klosterneuburg, Austria

Education Summary

MIT Ph.D. (2022) and M.Sc. (2018),
Ecole Polytechnique M.Sc. (2016) and B.Sc. (2015)

Research Interests

Nanophotonics, Light-matter interactions, Electron microscopy,
Physics of x-ray imaging, Machine Learning, Optical computing

Publication Summary

63+ journal articles (51 peer-reviewed, 10 preprints, 2 invited perspectives; in Science, Nature, and Nature Springer journals (Physics, Communications), APS, IEEE, OPTICA, ACS, and APL journals),
73+ peer-reviewed conference talks and proceedings, **10+ patents** (7 provisional)

Selected Honors and Awards

- ▷ **40+ plenary, keynote, and invited talks**
- ▷ Federico Capasso innovation prize (inaugural) 2025
- ▷ Forbes 30 under 30 (Science category) 2023
- ▷ Stanford Science Fellow 2023
- ▷ MathWorks Engineering Fellowship 2020-2021
- ▷ Robert B. Guenassia Award 2019
- ▷ Carnot Foundation Fellow 2016

Selected Teaching Activities

Mentored 35+ graduate and undergraduate students, Teaching Assistant for Nonlinear Optics graduate level course, Kaufman Teaching Certificate (Spring 2022)

Selected Service and Outreach Activities

OPTICA technical group committee member (2023-), MIT GAAP Program Mentor (2020), CLEO special symposium organizer (2024), METANANO session organizer (2019-2021), Frequent journal reviewer, French military service

Summary and Selected Research Milestones

I lead a multidisciplinary research group working at the intersection of nanophotonics, quantum optics, and high-energy imaging, focused on engineering subwavelength light–matter interactions for detection, computation, and new radiation sources. My work integrates first-principles theory, computational design, and custom experimental platforms to open new regimes of optical and quantum functionality. Recent research highlights include:

- Introduced **nanophotonic scintillators** as a new X-ray detection modality, enabling control over directionality, emission spectrum, and timing in high-energy radiation detection.
- Demonstrated **free-electron–nanophotonic radiation mechanisms**, including tunable electron-beam light sources and new regimes of strong electron–photon coupling.
- Advanced **metasurface-based computational imaging**, with structures exhibiting tailored chromatic, angular, and coherence responses.
- Realized **integrated photonic optimization and probabilistic computing devices**, exploiting nonlinear dynamics and vacuum-level noise as computational resources.
- Built and operate **large-scale, multi-modal experimental platforms** spanning nanofabrication, electron microscopy, and X-ray imaging.

Education

MIT - Massachusetts Institute of Technology, Cambridge, MA, USA

Ph.D., Electrical Engineering and Computer Science, 2018-2022
M.Sc., Electrical Engineering and Computer Science, 2016-2018

- Advisor: Prof. Marin Soljačić
- GPA: 5.0/5.0

Ecole Polytechnique, Palaiseau, France

M.Sc., Physics, 2015-2016
B.Sc., Engineering, 2013-2015

- Outstanding investment and leadership award.
- GPA: 3.93/4.0

Lycée Louis-le-Grand, Paris, France

Preparatory courses for entry into the French Grandes Écoles 2011-2013

- GPA: 4.0/4.0

Employment

Institute of Science and Technology, Austria (ISTA), Klosterneuburg, Austria

Assistant Professor, starting 2026
Group leader (Principal investigator)

Ginzton Laboratory, Stanford University, Stanford, CA, USA

Stanford Science Fellow, 2023 - 2026

- Faculty Hosts and collaborators: Prof. Shanhui Fan, Prof. Jelena Vučković, Prof. David Miller
- Research topics:
  - ▷ X-ray imaging and detection with nanophotonic scintillators
  - ▷ Free-electron quantum optics
  - ▷ Partially coherent light processing

MIT Research Laboratory of Electronics, Cambridge, MA, USA

Visiting scientist, 2023-today
Postdoctoral associate, 2022-2023

- Research topics:
  - ▷ Macroscopic quantum optics for probabilistic computing
  - ▷ X-ray imaging and detection with nanophotonic scintillators
- Advisor: Prof. Marin Soljačić (Photonics and Modern Electro-magnetics Group)

MIT - Massachusetts Institute of Technology, Cambridge, MA, USA

Research Assistant, Department of Electrical Engineering
and Computer Science, 2016-2022

- Research topics:
  - ▷ Light—matter—free-electron interaction in nanophotonics systems
  - ▷ Optical systems for Machine Learning and NP-hard optimization
  - ▷ Inverse-design of 3D-Printed metaoptics
- Advisor: Prof. Marin Soljačić (Photonics and Modern Electro-magnetics Group)
- Thesis committee: Prof. Dirk Englund (MIT), Prof. Karl Berggren (MIT)
- Collaborators: Prof. John D. Joannopoulos (MIT-ISN), Prof. Dirk Englund (MIT), Prof. Ido Kaminer (Technion), Prof. Karl Berggren (MIT), Prof. Steven Johnson (MIT), Prof. Ady Arie (Tel-Aviv University)
- Environment, Health and Safety Representative Officer for 4 laboratories, covering microwave physics, optics, chemical and biological physics.

Harvard SEAS - School of Engineering and Applied Sciences, Cambridge, MA, USA

Research intern (2016 – 6 months)

- Research topics:
  - ▷ Modeling, design and experimental characterization of metasurfaces and their aberrations in the visible spectrum.
- Advisor: Prof. Federico Capasso

International training

Diamond Light Source (UK National Synchrotron), Didcot, United Kingdom

Beamline B16 user (2024)

- Beamtime recipient under proposal award No OM35423 "Quantifying Enhancements in Scintillator Performance due to Nanophotonic Patterning"

Technion - Israel Institute of Technology, Haifa, Israel

Ad Quanta Honorary Group Member (research group lead by Prof. Ido Kaminer)

- Active collaboration on following topics (2017-today):
  - ▷ Free-electron light-matter interactions in nanophotonics
  - ▷ Nanophotonic scintillators

ITMO University, Saint-Petersburg, Russia

Visiting researcher (2019 – 3 months)

- Research topics:
  - ▷ Merging topological charges to enhance robustness of bound states in the continuum; Bound states in the continuum in microwave experiments

attocube systems AG, Munich, Germany

Research intern (2015 – 3 months)

- Research topics:
  - ▷ Single photon counting measurements on Nitrogen-Vacancy (NV) fluorescent quantum emitters in diamond
- Advisor: Prof. Khaled Karrai

Honors and Awards

Newton Cell Press, Rising Stars Committee member (2026)

Photonics Innovation Award in honor of Federico Capasso (inaugural awardee), 2025 (press release)

Best Paper award, OPTO Symposium, SPIE Photonics West 2025

US NAS Young Researcher Nominee, 73rd Lindau Nobel Laureate Meeting 2024

Forbes 30 under 30, Science, North America 2023

Stanford Science Fellowship 2023

MIT German Excellence Award 2021 (2nd Prize)

MathWorks Engineering Fellowship 2020-2021

Robert B. Guenassia Award 2019

Maiman Best Paper Award Finalist (CLEO 2019, 6 abstracts selected over 500+)

MISTI Russia Fellowship 2019

Qualcomm Innovation Fellowship 2017 Finalist, for the project: *A tunable, nanoscale, free-electron light source for visible to EUV radiation*, 20 teams of two selected among 130+ applications from

top US universities.

Carnot Foundation Fellow 2016, 2-3 students selected each year out of 500+ from Ecole polytechnique

X—ESPCI—Saint-Gobain Research Prize, for my research in Federico Capasso's group.

X—ESPCI—Saint-Gobain Research Fellow. Grant awarded by Ecole polytechnique, ESPCI and Saint-Gobain for my research internship in Federico Capasso's group.

Outstanding Leadership and Investment, awarded for my role in Ecole polytechnique's entrepreneurship association.

Publications

For updated publication list, see my Google Scholar profile.
* denotes equally contributing authors
† denotes corresponding authors

2026

67. T. Bucher*, A. Gorlach*, A. Niedermayr, Q. Yan, H. Nahari, K. Wang, R. Ruimy, Y. Adiv, M. Yannai, T. L. Abudi, E. Janzen, C. Spaegele, **C. Roques-Carmes**, J. H. Edgar, F. H. L. Koppens, G. M. Vanacore, H. H. Sheinfux, S. Tsesses, and I. Kaminer†, *Superluminal correlations in ensembles of optical phase singularities*, *Nature*, 651, 920-926, (2026), — **Covered in the press including ScienceAlert, Phys.org, The Debrief, EurekAlert!, Haaretz (Weekend Mag), Hayadan, and the Technion Blog.** (Link to preprint) (Link to article)

66. D. Cheng*, H. Wang*, J. Zhong, E. Lustig, **C. Roques-Carmes**, S. Fan†, *Experimental observation of energy-band Riemann surface*, *Science Advances*, 12, 12, eaec8239, (2026) (Link to preprint) (Link to article)

65. P.-A. Mor, A. R. Kroo, C. G. Valdez, M. Šimić, A. Karnieli, G. Cavicchioli, Z. Sun, V. Grimaldi, S. Fan, O. Solgaard, D. A. B. Miller, **C. Roques-Carmes**†, *Separating partially coherent light*, *arXiv preprint*, arXiv:2603.15517, (2026) (Link to preprint)

64. J. Chen†, S. Vaidya, S. Pajovic, S. Choi, W. Michaels, L. Martin-Monier, J. Hu, C. Cogswell, **C. Roques-Carmes**, and M. Soljačić, *Wavefront Engineering for Scintillation-Based Imaging*, *ACS Photonics*, 7, 13, (2026) (Link to preprint) (Link to article)

63. Y. Salamin†, G. Yang, B. Mills, A. Grossi Fonseca, **C. Roques-Carmes**, Q. Yang, J. Beroz, S. Kooi, M. de Miguel Comella, K. Mak, S. Vaidya, D. Oran, C. Swain, Y. Sun, S. Maayani, J. Sloan, A. A. Elfadil Elawad, J. Lopez, E. Boyden, and M. Soljačić, *Three-Dimensional Nanophotonics with Spatially Modulated Optical Properties*, *Light: Science & Applications*, 1, 15, 145, (2026) (Link to article)

62. C. G. Valdez†, A. R. Kroo, A. J. Miller, **C. Roques-Carmes**, D. A. B. Miller, O. Solgaard, *Integrated Photonic Polarization Synthesizer and Analyzer*, *arXiv preprint*, arXiv:2602.17024, (2026) (Link to preprint)

61. C. Woodahl†, M. Murillo, **C. Roques-Carmes**, A. Karnieli, D. A. B. Miller, and O. Solgaard, *On-Chip Laser-Driven Free-Electron Spin Polarizer*, *Physical Review Letters*, 6, 136, 063802, (2026) (Link to preprint) (Link to article)

60. J. M. Grzesik†, A. Karnieli†, **C. Roques-Carmes**†, D. S. Black, T. K. Lê, O. Solgaard, S. Fan, and J. Vučković, *A general framework for interactions between electron beams and quantum optical systems*, *arXiv preprint*, arXiv:2601.21385, (2026) (Link to preprint)

2025

59. A. Karnieli*†, P. A. Mor*†, **C. Roques-Carmes***†, E. Lustig, J. Sloan, J. Vučković, D. A. B. Miller, and S. Fan, *Variational processing of multimode squeezed light*, *PRX Quantum*, in press, (2025) (Link

to preprint)

58. C. G Valdez[†], A. R. Kroo, M. Vlk, **C. Roques-Carmes**, S. Fan, D. A. B. Miller, and O. Solgaard, *Programmable Optical Filters Based on Feed-Forward Photonic Meshes*, *arXiv preprint*, arXiv:2509.12059, (2025) (Link to preprint)

57. T. K. Le, D. Lukin, **C. Roques-Carmes**, A. Karnieli, E. Lustig, M. Guidry, S. Fan, and J. Vučković, *Cavity Quantum Electrodynamics in Finite-Bandwidth Squeezed Reservoir*, *Physical Review Applied*, 24, 34053, (2025), — **Editor's suggestion** (Link to preprint) (Link to article)

56. D. Cheng, H. Wang, **C. Roques-Carmes**, J. Zhong, and S. Fan[†], *Creating high-dimensional topological physics using a single ring resonator*, *Newton*, 7, 1, 100163, (2025) (Link to preprint) (Link to article)

55. D. A. B. Miller[†], **C. Roques-Carmes**, Carson G. Valdez, Anne R. Kroo, Marek Vlk, Shanhui Fan, and Olav Solgaard, *Universal programmable self-configuring optical filter*, *Optica*, 9, 12, 1417-1426, (2025) (Link to preprint) (Link to article)

54. S. Pajovic[†], **C. Roques-Carmes**, S. Choi, S. E. Kooi, R. Gupta, M. E. Zalis, I. Celanović, and M. Soljačić, *Nanophotonic thermal management in X-ray tubes*, *ACS Nano*, 35, 19, (2025) (Link to preprint) (Link to article)

53. J. M. Grzesik*, D. Catanzaro*, **C. Roques-Carmes***[†], E. Rosenthal, G. L. van der Stolpe, A. Karnieli, G. Scuri, S. Biswas, K. J. Leedle, D. S. Black, R. L. Byer, I. Kaminer, R. J. England, S. Fan, O. Solgaard, and J. Vučković, *Quantum sensing of electron beams with solid-state spins*, *arXiv preprint*, arXiv:2508.13112, (2025) (Link to preprint)

52. S. Choi*[†], Y. Salamin*[†], **C. Roques-Carmes**, J. Sloan, M. Horodynski, and M. Soljačić, *Observing the dynamics of quantum states generated inside nonlinear optical cavities*, *Nature Communications*, 16, 7576, (2025) (Link to preprint) (Link to article)

51. S. Pontula[†], S. Vaidya, **C. Roques-Carmes**, S. Z. Uddin, M. Soljačić, and Y. Salamin[†], *Nonreciprocal frequency conversion in a multimode nonlinear system*, *Nature Communications*, 16, 7544, (2025) (Link to preprint) (Link to article)

50. L. Martin-Monier*[†], S. Pajovic*[†], M. G. Abebe*[†], J. Chen, S. Vaidya, S. Min, S. Choi, S. E. Kooi, B. Maes, J. Hu, M. Soljačić, and **C. Roques-Carmes**[†], *Large-scale self-assembled nanophotonic scintillators for X-ray imaging*, *Nature Communications*, 16, 5750, (2025) (Link to preprint) (Link to article)

49. A. Gu[†], J. Sloan, **C. Roques-Carmes**[†], S. Choi, E. Rosenthal, M. Horodynski, Y. Salamin, J. Vučković, M. Soljačić, *Quantum sensitivity of parametric oscillators*, *Physical Review Research*, 7, L022056, (2025) (Link to preprint) (Link to article)

48. **C. Roques-Carmes***[†], A. Karnieli*[†], D. A. B. Miller, and S. Fan[†], *Automated modal analysis of entanglement with bipartite self-configuring optics*, *ACS Photonics*, 6, 12, 3285-3294, (2025) (Link to preprint) (Link to article)

47. S. Z. Uddin*, N. Rivera*[†], D. Seyler, Y. Salamin, J. Sloan, **C. Roques-Carmes**, S. Xu, M. Y. Sander, I. Kaminer, M. Soljačić, *Noise-immune quantum correlations of intense light*, *Nature Photonics*, 19, 751-757, (2025) (Link to preprint) (Link to article)

46. S. Min, S. Choi, S. Pajovic, S. Vaidya, N. Rivera, S. Fan, M. Soljačić, and **C. Roques-Carmes**[†], *End-to-end design of multicolor scintillators for enhanced energy resolution in X-ray imaging*, *Light:Science & Applications*, 14, 158, (2025) (Link to preprint) (Link to article)

45. S. Hua*, E. Divita*, S. Yu, B. Peng[†], **C. Roques-Carmes**, Z. Su, Z. Chen, Y. Bai, J. Zou, Y. Zhu, Y. Xu, C.-K. Lu, Y. Di, H. Chen, L. Jiang, L. Wang, S. Zhang, L. Ou, C. Zhang, J. Chen,

Z. Xue, W. Zhang, H. Zhu, W. Kuang, H. Meng†, M. Steinman, Y. Shen†, *A highly-integrated large-scale photonic accelerator with an ultra-low latency*, *Nature*, 640, 361-367, (2025), — **Covered in the press including Nature News and Views article, ScienceNews, etc.** (Link to article)

44. O. Beer, A. Shultzman, R. Strassberg, G. Dosovitskiy, N. Veber, R. Schütz, **C. Roques-Carmes**, I. Kaminer and Y. Bekenstein†, *Heterostructure Nanoscintillator for Matching Radiation Absorbing Layers with Fast Light-Emitting Layers*, *Nano letters*, 25, 3422-3429, (2025) (Link to article)

43. **C. Roques-Carmes**†, K. Wang, Y. Yang, A. Majumdar, Z. Lin†, *Computational metaoptics for imaging*, *ACS Photonics*, 4, 12, 1722-1733, (2025), — **Invited perspective article** (Link to preprint) (Link to article)

42. A. Shultzman, R. Schutz, Y. Kurman, N. Lahav, G. Dosovitskiy, **C. Roques-Carmes**, Y. Bekenstein, G. Konstantinou, R. Latella, L. Zhang, F. Loignon-Houle, A. J. Gonzalez, J. M. Benlloch, I. Kaminer, P. Lecoq, *Towards a second generation of metascintillators using the Purcell effect*, *IEEE Transactions on Radiation and Plasma Medical Sciences*, 2, 9, 141-147, (2025) (Link to preprint) (Link to article)

41. A. Karnieli†, O. Tziperman, **C. Roques-Carmes**, and S. Fan, *Decoherence-free many-body Hamiltonians in nonlinear waveguide quantum electrodynamics*, *Physical Review Research*, 7, L012014, (2025) (Link to preprint) (Link to article)

40. M. Horodynski†, **C. Roques-Carmes**, Y. Salamin, S. Choi, J. Sloan, D. Luo, and M. Soljačić, *Stochastic logic in biased coupled photonic probabilistic bits*, *Communications Physics*, 31, 8, (2025) (Link to preprint) (Link to article)

39. **C. Roques-Carmes**†, and S. Fan†, *In situ training of on-chip neural networks*, *arXiv preprint*, arXiv:2501.07917, (2025) (Link to preprint)

38. D. Cheng, K. Wang, **C. Roques-Carmes**, E. Lustig, O. Y. Long, H. Wang, and S. Fan†, *Non-Abelian lattice gauge fields in the photonic synthetic frequency dimension*, *Nature*, 637, 52-56, (2025) (Link to preprint) (Link to article)

2024

37. S. Katznelson*, S. Levy*, A. Gorlach*, N. Regev*, M. Birk, C. Mechel, O. Tziperman, R. Schuetz, R. Strassberg, G. Dosovitsky, **C. Roques-Carmes**, Y. Bekenstein, and I. Kaminer†, *Superfluorescent scintillation from coupled perovskite quantum dots*, *arXiv preprint*, arXiv:2412.21101, (2024) (Link to preprint)

36. S. Katznelson*, Noam Kasten*, O. Tziperman, A. Shultzman, T. Bucher, T. Lenkiewicz Abudi, R. Schuetz, O. Be'er, S. Levy, R. Strassberg, G. Dosovitsky, S. Yanagimoto, F. Loignon-Houle, Y. Bekenstein, **C. Roques-Carmes**, and I. Kaminer†, *X-Ray-Driven Photon Bunching*, *arXiv preprint*, arXiv:2412.16975, (2024) (Link to preprint)

35. S. Pontula†, Y. Salamin, **C. Roques-Carmes**, and M. Soljačić, *Shaping Quantum Noise through Cascaded Nonlinear Processes in a Dissipation-Engineered Multimode Cavity*, *PRX Quantum*, 5, 43045, (2024) (Link to preprint) (Link to article)

34. O. Y. Long†, S. Pajovic, **C. Roques-Carmes**, Y. Tsurimaki, N. Rivera, M. Soljačić, S. V. Boriskina, and S. Fan†, *Nonreciprocal scintillation using one-dimensional magneto-optical photonic crystals*, *Physical Review Applied*, 22, 54062, (2024) (Link to article)

33. Y. Kurman*, N. Lahav*, R. Schuetz*, A. Shultzman*, **C. Roques-Carmes**†, A. Lifshits, S. Zaken, R. Strassberg, O. Be'er, Y. Bekenstein, and I. Kaminer†, *Purcell-enhanced X-ray imaging*, *Science Advances*, 44, 10, eadq6325, (2024) (Link to preprint) (Link to article)

32. **C. Roques-Carmes**†, S. Fan, and D. A. B. Miller, *Measuring, processing, and generating partially coherent light with self-configuring optics*, *Light: Science & Applications*, 260, 13, (2024) (Link to preprint) (Link to article)

31. S. Choi†, Y. Salamin, **C. Roques-Carmes**†, R. Dangovski, D. Luo, Z. Chen, M. Horodynski, J. Sloan, S. Z. Uddin, and M. Soljačić, *Photonic probabilistic machine learning using quantum vacuum noise*, *Nature Communications*, 7760, 15, (2024) (Link to preprint) (Link to article)

30. A. Karnieli*†, **C. Roques-Carmes***†, N. Rivera, and S. Fan, *Free-electron ponderomotive guiding for strong coupling and single-photon nonlinearity in free-electron quantum optics*, *ACS Photonics*, 8, 11, 3401-3411, (2024) (Link to preprint) (Link to article)

29. G. Arya†, W. Li, **C. Roques-Carmes**, M. Soljačić, S. G. Johnson, Z. Lin, *End-to-End Optimization of Metasurfaces for Imaging with Compressed Sensing*, *ACS Photonics*, 5, 11, 2077-2087, (2024) (Link to preprint) (Link to article)

2023

28. S. Z. Uddin*†, N. Rivera*†, D. Seyler, Y. Salamin, J. Sloan, **C. Roques-Carmes**, S. Xu, M. Y. Sander, and M. Soljačić, *An ab initio framework for understanding and controlling quantum fluctuations in highly multimoded light-matter systems*, *arXiv preprint*, arXiv:2311.05535, (2023) (Link to preprint)

27. **C. Roques-Carmes***†, Y. Salamin*†, J. Sloan, S. Choi, G. Velez, E. Koskas, N. Rivera, S. E. Kooi, J. D. Joannopoulos, and M. Soljačić, *Biasing the quantum vacuum to control macroscopic probability distributions*, *Science*, 6654, 381, 205-209, (2023), — **Covered in the press by New Scientist, IEEE Spectrum, MIT Physics, Le Monde, and Le Figaro. For full list, see this page** (Link to preprint) (Link to article)

26. W. Li†, G. Arya, **C. Roques-Carmes**, Z. Lin, S. G. Johnson, and M. Soljačić, *Transcending shift-invariance in the paraxial regime via end-to-end inverse design of freeform nanophotonics*, *Optics Express*, 15, 31, 24260-24272, (2023) (Link to preprint) (Link to article)

25. **C. Roques-Carmes**†, *Learning photons go backward*, *Science*, 643, 380, 341-342, (2023) (Link to article)

24. A. Shultzman*, O. Segal*, Y. Kurman, **C. Roques-Carmes**, and I. Kaminer†, *Enhanced Imaging Using Inverse-Design of Nanophotonic Scintillators*, *Advanced Optical Materials*, 8, 11, 2202318, (2023) (Link to article)

23. **C. Roques-Carmes**†, S. E. Kooi, Y. Yang, N. Rivera, P. D. Keathley, J. D. Joannopoulos, S. G. Johnson, I. Kaminer, K. K. Berggren, and M. Soljačić, *Free-electron-light interactions in nanophotonics*, *Applied Physics Reviews*, 1, 10, 11303, (2023) (Link to preprint) (Link to article)

22. Y. Yang*†, **C. Roques-Carmes***†, S. E. Kooi, H. Tang, J. Beroz, E. Mazur, I. Kaminer, J. D. Joannopoulos, and M. Soljačić, *Photonic flatband resonances for free-electron radiation*, *Nature*, 613, 42-47, (2023), — **Covered in the press by MIT.news, New Scientist, Optics and Photonics News, etc.** (Link to preprint) (Link to article)

2022

21. Z. Lin†, R. Pestourie, **C. Roques-Carmes**, Z. Li, F. Capasso, M. Soljačić, and S. G. Johnson, *End-to-end metasurface inverse design for single-shot multi-channel imaging*, *Optics Express*, 16, 30, 28358-28370, (2022) (Link to preprint) (Link to article)

20. **C. Roques-Carmes***†, N. Rivera*†, A. Ghorashi, S. E. Kooi, Y. Yang, Z. Lin, J. Beroz, Y. Yang, J. D. Joannopoulos, I. Kaminer, S. G. Johnson, and M. Soljačić, *A framework for scintillation in nanophotonics*, *Science*, 6583, 375, abm9293, (2022), — **Covered in the press by**

MIT.news and the Technion - Israel Institute of Technology. Also covered by Technology.org, Azooptics, Mirage News, Nanotechnology Now, Science Daily, Phys.org, Scitech Daily, etc. (Link to preprint) (Link to article)

19. **C. Roques-Carmes**†, Z. Lin, R. E. Christiansen, Y. Salamin, S. E. Kooi, J. D. Joannopoulos, S. G. Johnson, and M. Soljačić, *Toward 3D-Printed Inverse-Designed Metaoptics*, *ACS Photonics*, 1, 9, 43-51, (2022) (Link to preprint) (Link to article)

2021

18. M. S. Sidorenko†, O. N. Sergaeva, Z. F. Sadrieva, **C. Roques-Carmes**, P. S. Muraev, D. N. Maksimov, A. A. Bogdanov†, *Observation of an accidental bound state in the continuum in a chain of dielectric disks*, *Physical Review Applied*, 15, 34041, (2021) (Link to preprint) (Link to article)

17. Z. Lin†, **C. Roques-Carmes**, R. E. Christiansen, M. Soljačić, and S. G. Johnson, *Computational inverse design for ultra-compact single-piece metalenses free of chromatic and angular aberration*, *Applied Physics Letters*, 4, 118, 041104, (2021) (Link to preprint) (Link to article)

2020

16. Z. Lin†, **C. Roques-Carmes**, R. Pestourie, M. Soljačić, A. Majumdar, and S. G. Johnson, *End-to-end nanophotonic inverse design for imaging and polarimetry*, *Nanophotonics*, 3, 10, 1177-1187, (2020) (Link to preprint) (Link to article)

15. R. E. Christiansen*†, Z. Lin, **C. Roques-Carmes**, Y. Salamin, S. E. Kooi, J. D. Joannopoulos, M. Soljačić, and S. G. Johnson, *Full-Maxwell inverse design of axisymmetric, tunable, and multi-scale multi-wavelength metalenses*, *Optics Express*, 23, 28, 33854-33868, (2020) (Link to preprint) (Link to article)

14. B. J. Shastri, A. N. Tait, T. Ferreira de Lima, Y. Shen, H. Meng, **C. Roques-Carmes**, Z. Cheng, H. Bhaskaran, and P. R. Prucnal, *Section 10 – Light based neuromorphic computing in "Roadmap on emerging hardware and technology for machine learning"*, *Nanotechnology*, 1, 32, 012002, (2020), — **Invited viewpoint article** (Link to article)

13. M. Prabhu*†, **C. Roques-Carmes***†, Y. Shen*†, N. Harris, L. Jing, J. Carolan, R. Hamerly, T. Baehr-Jones, M. Hochberg, V. Čeperić, John D. Joannopoulos, D. Englund, and M. Soljačić, *Accelerating recurrent Ising machines in photonic integrated circuits*, *Optica*, 5, 7, 551-558, (2020) (Link to preprint) (Link to article)

12. S. Fisher†, **C. Roques-Carmes**, N. Rivera, L. J. Wong, I. Kaminer, and M. Soljačić, *Monochromatic X-ray source based on scattering from a magnetic nanoundulator*, *ACS Photonics*, 5, 7, 1096-1103, (2020) (Link to preprint) (Link to article)

11. **C. Roques-Carmes**†, Y. Shen†, C. Zanoci, M. Prabhu, F. Atieh, L. Jing, T. Dubček, C. Mao, M. Johnson, V. Čeperić, John D. Joannopoulos, D. Englund, and M. Soljačić, *Heuristic recurrent algorithms for photonic Ising machines*, *Nature Communications*, 249, 11, (2020) (Link to preprint) (Link to article)

2019

10. **C. Roques-Carmes***†, S. E. Kooi*, Y. Yang, A. Massuda, P. D. Keathley, A. Zaidi, Y. Yang, J. D. Joannopoulos, K. K. Berggren, I. Kaminer, and M. Soljačić, *Towards integrated tunable electron-beam all-silicon sources*, *Nature Communications*, 3176, 10, (2019) (Link to article)

9. **C. Roques-Carmes**†, and M. Soljačić†, *Viewpoint: Photonic Ising Machines Go Big*, *Physics*, 61, 12, (2019) (Link to article)

2018

8. **C. Roques-Carmes**†, N. Rivera, J. D. Joannopoulos, M. Soljačić, and I. Kaminer†, *Nonperturbative Quantum Electrodynamics in the Cherenkov Effect*, *Physical Review X*, 41013, 8, (2018) (Link to article)

7. Y. Yang†, A. Massuda, **C. Roques-Carmes**, S. E. Kooi, T. Christensen, S. G. Johnson, J. D. Joannopoulos, O. D. Miller†, Ido Kaminer†, and Marin Soljačić, *Maximal Photon Emission and Energy Loss from Free Electrons*, *Nature Physics*, 14, 894-898, (2018) (Link to preprint) (Link to article)

6. A. Massuda†, **C. Roques-Carmes**, Y. Yang, S. E. Kooi, Y. Yang, C. Murdia, K. K. Berggren, I. Kaminer, and M. Soljačić, *Smith-Purcell Radiation from Low-Energy Electrons*, *ACS Photonics*, 9, 5, 3513-3518, (2018) (Link to preprint) (Link to article)

5. B. Groever, **C. Roques-Carmes**, S. Byrnes, and F. Capasso†, *Substrate aberration and correction for metasurface imaging*, *Applied optics*, 12, 57, 2973-2980, (2018) (Link to article)

4. S. Zhujun, M. Khorasaninejad, Y.-W. Huang, **C. Roques-Carmes**, A. Y. Zhu, W.-T. Chen, V. Sanjeev, Z. Ding, M. Tamagnone, K. Chaudhary, R. C. Devlin, C. Qiu, and F. Capasso†, *Single-layer Metasurface with Controllable Multi-wavelength Functions*, *Nano letters*, 4, 18, 2420-2427, (2018) (Link to article)

2017

3. R. Remez†, N. Shapira, **C. Roques-Carmes**, R. Tirole, Y. Yang, Y. Lereah, M. Soljačić, I. Kaminer, and A. Arie, *Spectral and spatial shaping of Smith-Purcell radiation*, *Physical Review A*, 061801(R), 96, (2017) (Link to preprint) (Link to article)

2. M. Khorasaninejad, W.-T. Chen, A. Y. Zhu, J. Oh, **C. Roques-Carmes**, I. Mishra, R. C. Devlin, and F. Capasso†, *Visible wavelength planar metalenses based on titanium dioxide*, *IEEE journal of Selected Topics in Quantum Electronics*, 3, 23, (2017) (Link to article)

2016

1. M. Khorasaninejad†, A. Y. Zhu, **C. Roques-Carmes**, W.-T. Chen, J. Oh, I. Mishra, R. C. Devlin, and F. Capasso†, *Polarization-insensitive metalenses at visible wavelengths*, *Nano letters*, 11, 16, (2016) (Link to article)

Patents

13. J. Chen, S. Vaidya, S. Pajovic, **C. Roques-Carmes**, and M. Soljačić, *Scintillator Metalens for High-Resolution Scintillation-Based Imaging*, Massachusetts Institute of Technology, March 2026 — **U.S. Provisional Application 64/008,275**

12. M. Soljačić, **C. Roques-Carmes**, S. Vaidya, and S. Choi, *Supercollimating Photonic Crystal Scintillators*, Massachusetts Institute of Technology, January 2026 — **U.S. Provisional Application 63/960,449**

11. K. Van Gasse, P. Del'Haye, L. M. C. Pereira, S. Kraemer, T. Schumm, and **C. Roques-Carmes**, *Resonator-Based Nuclear Clock*, Universiteit Gent, December 2025 — **European patent application EP25227524.3**

10. A. Karnieli, **C. Roques-Carmes**, P.-A. Mor, E. Lustig, J. Sloan, J. Vučković, D. A. B. Miller, *Self-configuring optical networks for continuous-variable quantum information processing*, Stanford University, April 2025 — **U.S. Provisional Application 63/794,810**

9. M. Soljačić, J. Hu, **C. Roques-Carmes**, S. Pajovic, L. M. Martin, *Large-scale self-assembled nanophotonic scintillators for X-ray imaging*, Massachusetts Institute of Technology, April 2025 — **U.S. Provisional Application 63/778,698**

8. D. A. B. Miller, O. Solgaard, S. Fan, A. R. Kroo, C. G. Valdez, **C. Roques-Carmes**, M. Vlk, *Universal programmable and self-configuring optical spectral component*, Stanford University, June 2024 — **U.S. Provisional Application 63/655,451**

7. M. Soljačić, **C. Roques-Carmes**, N. Rivera, Z. Lin, W. Li, *Nanophotonic Scintillators for High-Energy Particles Detection, Imaging, and Spectroscopy*, Massachusetts Institute of Technology, August 2022 — **U.S. Patent Application US20250137942A1**

6. **C. Roques-Carmes**, M. Soljacic, *Photonic and Electronic Hamiltonian Machines*, Massachusetts Institute of Technology, December 2021 — **U.S. Patent US20250060774A1**

5. S. G. Johnson, M. Soljačić, **C. Roques-Carmes**, Y. Salamin, Z. Lin, *Methods and Apparatus To Generate Terahertz Waves Through Cascaded Nonlinear Processes*, Massachusetts Institute of Technology, May 2021 — **U.S. Patent Application 63/182,177**

4. J. D. Joannopoulos, S. G. Johnson, M. Soljačić, S. E. Kooi, J. Beroz, I. Kaminer, N. Rivera, Y. Yang, **C. Roques-Carmes**, A. Ghorashi, Z. Lin, N. Romeo, *Methods and Apparatuses for Enhancing Scintillation with Optical Nanostructures for Scintillators, LEDs, and Laser Sources*, Massachusetts Institute of Technology, April 2021 — **U.S. Patent Application 18/286,808**

3. **C. Roques-Carmes**, Y. Shen, L. Jing, T. Dubcek, S. A. Skirlo, H. Bagherianlemraski, M. Soljacic, *Optical Ising Machines and Optical Convolutional Neural Networks*, Massachusetts Institute of Technology, July 2017 — **U.S. Patent US11017309B2 licensed to Lightelligence. See press release on Lightelligence's PACE demonstration.**

2. Y. Yang, A. Massuda, **C. Roques-Carmes**, N. H. Rivera, T. Dubcek, J. D. Joannopoulos, K. K. Berggren, I. E. Kaminer, M. Soljacic, Y. Yang, S. E. Kooi, P. D. Keathley, *Apparatus and methods for generating and enhancing Smith-Purcell radiation*, Massachusetts Institute of Technology, April 2017 — **U.S. Patent US10505334B2**

1. F. Capasso, W. T. Chen, R. C. Devlin, M. Khorasaninejad, J. Oh, A. Zhu, **C. Roques-Carmes**, I. Mishra, *Meta-lenses for sub-wavelength resolution imaging*, Harvard University, April 2016 — **U.S. Patent US11092717B2 licensed to Metalenz.**

Invited, keynote, and plenary talks/seminars

2026

41. **C. Roques-Carmes**, *Separating partially coherent light*, Optica ImageSense Congress, Maastricht, Netherlands, July 2026 — **invited talk**

40. **C. Roques-Carmes**, *Separating partially coherent light*, 16th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2026), Dublin, Ireland, July 2026 — **invited talk**

39. K. Mamian, G. Kazakov, J. de Haan, K. van Gasse, T. Schumm, and **C. Roques-Carmes**, *A nuclear clock accelerated by collective coherence*, AES 2026, The 12th International Conference on Antennas and Electromagnetic Systems, Catania, Italy, June 2026 — **invited talk**

38. **C. Roques-Carmes**, *Separating partially coherent light*, International Conference on Optical Angular Momentum 2026 (ICOAM 2026), Graz, Austria, June 2026 — **invited talk**

37. **C. Roques-Carmes**, *Electron Microscopy as a Platform for Nanophotonics and Quantum Optics*, 16th ASEM Workshop on Advanced Electron Microscopy, Klosterneuburg, Austria, April 2026 — **invited talk**

36. **C. Roques-Carmes**, *Variational processing of partially coherent light in photonic integrated circuits*, CREOL, College of Optics and Photonics, Orlando, Florida, February 2026, — **invited seminar** (Link to slides)

35. **C. Roques-Carmes**, *Variational processing of partially coherent light in photonic integrated circuits*, Wetzstein group seminar, Stanford, USA, January 2026 — **invited seminar**

2025

34. **C. Roques-Carmes**, A. Karnieli, D. A. B. Miller, and S. Fan, *Variational Optical Processors*, PhotonIcs and Electromagnetics Research Symposium (PIERS 2025), Chiba, Japan, November 2025, — **invited talk** (Link to slides)

33. **C. Roques-Carmes**, A. Karnieli, D. A. B. Miller, and S. Fan, *Variational Optical Processors*, 15th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2025), Malaga, Spain, July 2025 — **invited talk**

32. **C. Roques-Carmes**, *Variational Optical Processors*, 25th International Conference on Transparent Optical Networks (ICTON 2025), Barcelona, Spain, July 2025 — **keynote talk**

31. **C. Roques-Carmes**, *Variational Optical Processors*, 33rd annual International Laser Physics Conference (LPHYS'25), Szeged, Hungary, July 2025 — **invited talk**

30. **C. Roques-Carmes**, *Metaoptic computational imaging*, Research seminar at XPANCEO, Dubai, UAE, April 2025 — **invited seminar**

29. **C. Roques-Carmes**, A. Karnieli, J. Grzesik, D. Catanzaro, O. Solgaard, J. Vučković, and S. Fan, *Enhancing interactions between free electrons and photons with nanophotonics*, APS March Meeting, Anaheim, CA, USA, March 2025 — **invited talk**

28. **C. Roques-Carmes**, *Enhancing and shaping interactions between energetic particles and nanophotonic quantum systems*, Panofsky SLAC Seminar, Menlo Park, CA, USA, March 2025 — **invited seminar**

27. **C. Roques-Carmes**, Y. Salamin, S. Choi, M. Horodynski, J. Sloan, D. Luo, and M. Soljačić, *Stochastic computing with biased optical parametric oscillators*, SPIE Photonics West, San Francisco, CA, USA, January 2025, — **invited talk and best paper award** (Link to slides)

2024

26. **C. Roques-Carmes**, *Light-matter interactions driven by high-energy particles*, TUM, Munich, Germany, December 2024 — **invited seminar**

25. **C. Roques-Carmes**, *Variational Optical Processors*, SPIE Photonex: Emerging Applications in Silicon Photonics, Manchester, United Kingdom, October 2024, — **invited talk** (Link to slides)

24. **C. Roques-Carmes**, *Light-matter interactions driven by high-energy particles*, Ghent University/imec seminar, Ghent, Belgium, August 2024 — **invited seminar**

23. **C. Roques-Carmes**, *A few recent developments in nanophotonic scintillators*, SCINT 2024, Milan, Italy, July 2024, — **keynote talk** (Link to slides)

22. **C. Roques-Carmes**, *A few recent developments in nanophotonic scintillators*, 10th International Conference on Antennas and Electromagnetic Systems, Rome, Italy, June 2024 — **invited talk**

21. **C. Roques-Carmes**, *Light-matter interactions with high-energy particles*, Physical Sciences seminar, ISTA, Klosterneuburg, Austria, February 2024 — **invited seminar**

20. **C. Roques-Carmes**, *Hybrid nanophotonic platforms for light-matter interactions with high-energy particles*, Department of Materials Science, ETH Zurich, ETH Zurich, Switzerland, February 2024 — **invited seminar**

19. **C. Roques-Carmes**, *Metasurfaces and inverse-design to shape photonic interactions with high-energy particles*, 3rd Colloquium on the Physics and Applications of Metasurfaces, ETH Zurich, Switzerland, January 2024 — **invited talk**

2023

18. **C. Roques-Carmes**, *Light-matter interactions driven by high-energy particles*, Industry Topics Seminar, Virginia Tech, Arlington, VA, USA, September 2023 — **invited seminar**

17. **C. Roques-Carmes**, *Light-matter interactions driven by high-energy particles*, Max-Planck Research Symposium: Chemistry, Physics, and Technology Section, Heidelberg, Germany, September 2023 — **invited seminar**

16. **C. Roques-Carmes**, *Free-electron-light interactions in nanophotonics*, 67th ICFA Advanced Beam Dynamics Workshop on Future Light Sources, Lucerne, Switzerland, August 2023 — **plenary talk**

15. **C. Roques-Carmes**, *Nanophotonic scintillators for enhanced x-ray detection and imaging*, Metamaterials, Photonic Crystals and Plasmonics Conference, META 2023, Paris, France, July 2023 — **invited talk**

14. **C. Roques-Carmes**, *Enhancing and shaping radiation from high-energy particles with nanophotonics*, Light-Matter Interaction Seminar, Tel-Aviv University, Tel-Aviv, Israel, March 2023 — **invited seminar**

13. **C. Roques-Carmes**, *Enhancing and shaping radiation from high-energy particles with nanophotonics*, Special Atomic Molecular and Optical Sciences Seminar, Weizmann Institute of Science, Rehovot, Israel, March 2023 — **invited seminar**

12. **C. Roques-Carmes**, *Enhancing and shaping radiation from high-energy particles with nanophotonics*, Special Solid State Institute Seminar, Technion, Israel Institute of Technology, Haifa, Israel, March 2023 — **invited seminar**

11. **C. Roques-Carmes**, *Enhancing and shaping radiation from high-energy particles with nanophotonics*, IEM Distinguished lecturers seminar series, EPFL, Lausanne, Switzerland, March 2023 — **invited seminar**

10. **C. Roques-Carmes**, *Enhancing and shaping radiation from high-energy particles with nanophotonics*, IEEE Photonics Boston monthly meeting, Arlington, MA, USA, February 2023 — **invited seminar**

2022

9. **C. Roques-Carmes**, *Enhancing and shaping radiation from high-energy particles with nanophotonic*, Lawrence Livermore National Laboratories NCI Seminar, Livermore, CA, USA, May 2022 — **invited seminar**

2021

8. **C. Roques-Carmes**, *X-ray imaging with nanophotonic scintillators*, Raith North America VELION Meeting at MIT.nano, Cambridge, MA, USA, December 2021 — **invited seminar**

7. **C. Roques-Carmes**, Y. Shen, M. Prabhu, J. D. Joannopoulos, D. Englund, and M. Soljačić, *Heuristic algorithms to solve combinatorial problems with photonics*, SPIE Photonics West, online, March 2021 — **invited talk**

2020

6. **C. Roques-Carmes**, Y. Shen, C. Zanoci, M. Prabhu, F. Atieh, L. Jing, T. Dubček, C. Mao, M. Johnson, V. Čeperić, John D. Joannopoulos, D. Englund, and M. Soljačić, *Photonic Recurrent Ising Sampler*, DPG Spring Meeting, Special Symposium on: Advanced neuromorphic computing hardware: Towards efficient machine learning, Dresden, Germany, March 2020 — **invited talk, cancelled because of COVID-19 pandemic**

2019

5. **C. Roques-Carmes**, and M. Soljačić, *Enhancing free-electron light-matter interaction with bound states in the continuum*, METANANO 2019, Saint-Petersburg, Russia, July 2019 — **invited talk**

4. **C. Roques-Carmes**, *Towards integrated tunable all-silicon free-electron light sources*, Theoretical seminar, ITMO, Saint-Petersburg, Russia, June 2019 — **invited talk**

3. **C. Roques-Carmes**, *Towards integrated tunable all-silicon free-electron light sources*, Low-dimensional seminar, Ioffe Institute, Saint-Petersburg, Russia, June 2019 — **invited seminar**

2. **C. Roques-Carmes**, *Photonic Recurrent Ising Sampler*, Special Seminar hosted by Dr. Peter McMahon, Stanford University, CA, USA, May 2019 — **invited seminar**

1. **C. Roques-Carmes**, Y. Shen, C. Zanoci, M. Prabhu, F. Atieh, L. Jing, T. Dubček, V. Čeperić, J. D. Joannopoulos, D. Englund, and M. Soljačić, *Photonic Recurrent Ising Sampler*, CLEO 2019, San Jose, CA, USA, May 2019 — **upgraded to invited status; CLEO's Chair Pick; Maiman Best Paper competition finalist**

Conference proceedings and contributed talks

2026

89. K. Mamian, J. de Haan, T. Bi, S. Dubey, G. Kazakov, K. Beeks, C. Marquard, S. Kraemer, L. Pereira, P. Del'Haye, K. van Gasse, T. Schumm, and **C. Roques-Carmes**, *Collective Optonuclear Cavity Quantum Electrodynamics in 229Th Nanophotonic Resonators*, CLEO 2026, Charlotte, NC, USA May 2026

88. S. Pontula, Y. Salamin, S. Uddin, **C. Roques-Carmes**, and M. Soljačić, *Doubly resonant nanosecond pumped cavity for narrowband THz generation*, CLEO 2026, Charlotte, NC, USA May 2026

87. **C. Roques-Carmes**, J. Grzesik, D. Catanzaro, E. Rosenthal, G. van de Stolpe, A. Karnieli, G. Scuri, S. Biswas, K. Leedle, D. Black, R. Byer, I. Kaminer, J. England, S. Fan, O. Solgaard, and J. Vučković, *Quantum sensing of electron beams using solid-state spins*, CLEO 2026, Charlotte, NC, USA, May 2026 — **upgraded to highlighted talk**

86. D. Baruch, C. Mechel, S. Katznelson, N. Regev, **C. Roques-Carmes**, R. Tenne, and I. Kaminer, *Hanbury-Brown Twiss microscopy of X-ray scintillation events*, CLEO 2026, Charlotte, NC, USA May 2026

85. A. Kam, **C. Roques-Carmes**, S. Tsesses, and A. Karnieli, *Encoding skyrmions in the partial coherence of light*, CLEO 2026, Charlotte, NC, USA May 2026

84. C. Woodahl, M. Murillo, **C. Roques-Carmes**, A. Karnieli, D. A. B. Miller, and O. Solgaard, *Spin Polarization of Free Electrons on-chip*, CLEO 2026, Charlotte, NC, USA May 2026

83. W. Michaels, S. Pajovic, J. Chen, **C. Roques-Carmes**, and M. Soljacic, *Optimized Diffractive Cascades for Polychromatic Hard X-ray Focusing*, CLEO 2026, Charlotte, NC, USA May 2026

82. J. Chen, S. Pajovic, S. Vaidya, W. Michaels, S. Choi, L. Martin-Monier, C. Spagele, C. Cogswell, **C. Roques-Carmes**, J. Hu, and M. Soljacic, *Micron-Scale X-Ray Resolution in Metalens-Integrated Thick Scintillators*, CLEO 2026, Charlotte, NC, USA May 2026

81. S. Choi, S. Vaidya, **C. Roques-Carmes**, and M. Soljacic, *Supercollimating Photonic Crystal Scintillators*, CLEO 2026, Charlotte, NC, USA May 2026

80. P.-A. Mor, A. R. Kroo, C. G. Valdez, M. Simic, A. Karnieli, G. Cavicchioli, Z. Sun, V. Grimaldi, S. Fan, O. Solgaard, D. A. B. Miller, and **C. Roques-Carmes**, *Variational processing of partially coherent light in a photonic integrated circuit*, CLEO 2026, Charlotte, NC, USA May 2026

79. S. Choi, S. Vaidya, J. Chen, S. Pajovic, **C. Roques-Carmes**, and M. Soljacic, *Simultaneous Enhancement of X-ray Absorption and Light Emission in Nanophotonic Scintillators*, CLEO 2026, Charlotte, NC, USA May 2026

78. W. Michaels, A. Chan, S. Pajovic, S. Vaidya, J. Chen, **C. Roques-Carmes**, S. E. Kooi, and M. Soljacic, *Enhancing Light Yield in Plastic Scintillators at Scale Using Surface Roughness*, CLEO 2026, Charlotte, NC, USA May 2026

77. D. Cheng, H. Wang, **C. Roques-Carmes**, J. Zhong, and S. Fan, *High-dimensional topological physics synthesized in a photonic ring resonator*, APS March Meeting 2026, Denver, CO, USA March 2026

76. M. Vlk, C. G. Valdez, A. R. Kroo, **C. Roques-Carmes**, S. Fan, D. A. B. Miller, and O. Solgaard, *Erbium fiber laser wavelength tuning by a forward-only optical mesh*, PHOTOPTICS 2026 - 14th International Conference on Photonics, Optics, and Laser Technology, Marbella, Spain March 2026

75. I. Braddock, C. Armstrong, J. Hu, S. Kooi, E. Liotti, S. Pajovic, J. Pratt, **C. Roques-Carmes**, M. Soljačić, A. Watt, and S. Richards, *Clear and Bright X-Ray Imaging with Nanophotonic Scintillators*, NuSec Detection Science Workshop 2026, National Physical Laboratory, Teddington, UK February 2026

74. S. Vaidya, S. Choi, **C. Roques-Carmes**, and M. Soljačić, *Supercollimating photonic crystal scintillators*, San Francisco, CA, USA, January 2026, — **invited talk** (Link to abstract)

73. D. A. B. Miller, **C. Roques-Carmes**, C. G. Valdez, A. R. Kroo, M. Vlk, S. Fan, and O. Solgaard, *Self-configuring spectral filters by mapping time to space*, 56th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, USA, January 2026, — **invited talk**, (Link to abstract) (Link to slides)

2025

72. **C. Roques-Carmes**, *A few recent developments in nanophotonic scintillators*, IEEE NSS MIC 2025, Yokohama, Japan, November 2025 (Link to abstract)

71. L. Martin-Monier, S. Pajovic, M. G. Abebe, J. Chen, S. Vaidya, S. Min, S. Choi, S. E. Kooi, B. Maes, J. Hu, M. Soljačić, and **C. Roques-Carmes**, *Large-area nanophotonic scintillators for X-ray imaging*, 2025 Nineteenth International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials), Amsterdam, Netherlands, September 2025 (Link to abstract)

70. N. Regev, A. Shultzman, F. Loignon-Houle, **C. Roques-Carmes**, and I. Kaminer, *Neural network inverse design of nanophotonic scintillators*, CLEO/Europe 2025, Munich, Germany, June 2025 (Link to abstract)

69. **C. Roques-Carmes**, A. Karnieli, D. A. B. Miller, and S. Fan, *Variational Optical Processors*, CLEO/Europe 2025, Munich, Germany, June 2025 (Link to abstract)

68. **C. Roques-Carmes**, A. Karnieli, D. A. B. Miller, and S. Fan, *Variational Optical Processors*, CLEO 2025, Long Beach, USA, May 2025, (Link to abstract) (Link to slides)

67. M. Jürgensen, S. Vaidya, S. Pajovic, J. P. Gales, J. Chen, S. Katznelson, S. E. Kooi, S. Richards, I. Braddock, C. D. Armstrong, I. Kaminer, M. Soljačić, M. C. Rechtsman, and **C. Roques-Carmes**, *Volumetrically-Patterned Nanophotonic Scintillators*, CLEO 2025, Long Beach, USA May 2025

66. S. Pontula, **C. Roques-Carmes**, J. Sloan, M. Soljačić, and Y. Salamin, *Modeling arbitrary continuous probability distributions in lasers through probabilistic biasing*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

65. Y. Huang, S. Choi, Y. Salamin, J. Sloan, **C. Roques-Carmes**, M. Horodynski, and M. Soljačić, *Vacuum-induced switching between macroscopic states*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

64. S. Pajovic, **C. Roques-Carmes**, S. Choi, S. E. Kooi, R. Gupta, M. E. Zalis, I. Celanovic, and M. Soljačić, *Nanophotonic Thermal Management for High-Brightness X-Ray Sources*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

63. J. Grzesik, **C. Roques-Carmes**, A. Karnieli, D. Black, D. Catanzaro, O. Solgaard, S. Fan, and J. Vučković, *A General Framework for Interactions between Electron Beams and Quantum Optical Systems*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

62. S. Pontula, S. Vaidya, **C. Roques-Carmes**, S. Z. Uddin, M. Soljačić, and Y. Salamin, *Non-reciprocal frequency conversion in a multimode nonlinear system*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

61. J. Chen, S. Pajovic, S. Vaidya, W. Michaels, S. Pontula, S. Choi, L. Martin-Monier, J. Hu, C. Cogswell, **C. Roques-Carmes**, and M. Soljačić, *Phase mask metasurfaces for high-resolution X-ray imaging*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

60. A. Karnieli, **C. Roques-Carmes**, P.-A. Mor, E. Lustig, J. Sloan, J. Vučković, D. A. B. Miller, and S. Fan, *Continuous-variable quantum information processing in real and synthetic dimensions with self-configuring optics*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

59. S. Choi, Y. Salamin, **C. Roques-Carmes**, J. Sloan, M. Horodynski, and M. Soljačić, *Measuring the dynamics of quantum states generated inside optical nonlinear cavities*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

58. O. Y. Long, S. Pajovic, **C. Roques-Carmes**, Y. Tsurimaki, N. Rivera, M. Soljačić, S. V. Boriskina, and S. Fan, *Nonreciprocal scintillation using magnetophotonic crystals*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

57. D. Cheng, K. Wang, **C. Roques-Carmes**, E. Lustig, O. Y. Long, H. Wang, and S. Fan, *Experimental observation of non-Abelian lattice gauge fields for photons in synthetic frequency dimensions*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

56. T. K. Le, D. Lukin, **C. Roques-Carmes**, A. Karnieli, E. Lustig, M. Guidry, S. Fan, and J. Vučković, *Cavity Quantum Electrodynamics in Finite-Bandwidth Squeezed Reservoir*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

55. A. Karnieli, O. Tziperman, **C. Roques-Carmes**, A. Poddubny, and S. Fan, *Engineerable many-body Hamiltonians in nonlinear waveguide quantum electrodynamics*, CLEO 2025, Long Beach, USA, May 2025 (Link to abstract)

54. Y. Salamin, **C. Roques-Carmes**, S. Choi, J. Sloan, M. Horodynski, D. Luo, and M. Soljačić, *Quantum tomography and intracavity dynamics with a biased optical parametric oscillator*, SPIE Photonics West, San Francisco, USA, January 2025, — **invited talk** (Link to abstract)

53. S. Pontula, S. Vaidya, **C. Roques-Carmes**, S. Z. Uddin, M. Soljačić, and Y. Salamin, *Nonreciprocal frequency conversion in a multimode nonlinear cavity*, SPIE Photonics West, San Francisco, USA, January 2025 (Link to abstract)

52. A. Karnieli, **C. Roques-Carmes**, R. Yu, and S. Fan, *Quantum optics with free electrons: from quantum sensing to strong coupling and single-photon nonlinearity*, SPIE Photonics West, San Francisco, USA, January 2025, — **invited talk** (Link to abstract)

51. O. Y. Long, S. Pajovic, **C. Roques-Carmes**, Y. Tsurimaki, N. Rivera, M. Soljačić, S. Boriskina, and S. Fan, *Nonreciprocal scintillation using magneto-optical photonic crystals*, SPIE Photonics West, San Francisco, USA, January 2025 (Link to abstract)

50. **C. Roques-Carmes**, Y. Salamin, S. Choi, M. Horodynski, J. Sloan, D. Luo, and M. Soljačić, *Stochastic computing with biased optical parametric oscillators*, SPIE Photonics West, San Francisco, USA, January 2025, — **invited talk and best paper award (OPTO)** (Link to abstract)

2024

49. S. Vaidya, M. Jürgensen, **C. Roques-Carmes**, S. Pajovic, S. Katznelson, J. Gales, J. Chen, S. Kooi, I. Kaminer, M. Rechtsman, M. Soljačić, *Volumetric Photonic Crystal Scintillators*, MRS Fall Meeting, Boston, MA, USA, December 2024 (Link to abstract)

48. J. Chen, S. Pajovic, S. Vaidya, W. Michaels, S. Pontula, S. Choi, L. Martin-Monier, J. Hu, **C. Roques-Carmes**, and M. Soljačić, *Phase Mask Metasurfaces for High-Resolution Scintillation-Based Imaging*, MRS Fall Meeting, Boston, MA, USA, December 2024 (Link to abstract)

47. S. Pajovic, **C. Roques-Carmes**, S. Choi, S. E. Kooi, R. Gupta, M. E. Zalis, I. Celanovic, and M. Soljačić, *Enabling High-Dose X-Ray Imaging Modalities via Nanophotonic Thermal Management in X-Ray Tubes*, MRS Fall Meeting, Boston, MA, USA, December 2024 (Link to abstract)

46. A. Karnieli, O. Tziperman, **C. Roques-Carmes**, and S. Fan, *Coherent generation of decoherence-free states in nonlinear waveguide quantum electrodynamics*, Frontier in Optics 2024, Denver, CO, USA, October 2024 (Link to abstract)

45. **C. Roques-Carmes**, S. Fan, and D. A. B. Miller, *Measuring and processing partially coherent light with self-configuring optics*, CLEO 2024, Charlotte, NC, USA, May 2024, (Link to abstract) (Link to slides)

44. S. Choi, Y. Salamin, **C. Roques-Carmes**, R. Dangovski, D. Luo, Z. Chen, M. Horodynski, J. Sloan, and M. Soljačić, *Photonic probabilistic computing leveraging quantum vacuum noise*, CLEO 2024, Charlotte, NC, USA, May 2024, — **upgraded to highlighted talk** (Link to abstract)

43. M. Horodynski, **C. Roques-Carmes**, Y. Salamin, S. Choi, J. Sloan, D. Luo, and M. Soljačić, *Stochastic logic in biased coupled photonic probabilistic bits*, CLEO 2024, Charlotte, NC, USA, May 2024, — **upgraded to highlighted talk** (Link to abstract)

42. N. Kasten, S. Katznelson, O. Tziperman, A. Shultzman, R. Strassberg, G. Dosovitskiy, Y. Bekenstein, **C. Roques-Carmes**, and I. Kaminer, *Photon Correlations of Scintillation Light and its Application to Scintillator Characterization*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

41. S. Katznelson, S. Levy, A. Gorlach, O. Tziperman, R. Schuetz, R. Strassberg, G. Dosovitsky, Y. Bekenstein, **C. Roques-Carmes**, and I. Kaminer, *Spectral splitting and enhanced emission rate in X-ray-driven scintillation from perovskite quantum dots*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

40. A. Shultzman, O. Beer, R. Strassberg, G. Dosovitskiy, R. Schuetz, N. Veber, **C. Roques-Carmes**, Y. Bekenstein, and I. Kaminer, *Theory and Experiment of Nano-Scale Heterostructure*

Scintillators, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

39. L. Martin-Monier, **C. Roques-Carmes**, S. Pajovic, J. Hu, and M. Soljačić, *Large-scale self-assembled nanophotonic scintillators for X-ray imaging*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

38. A. Gu, J. Sloan, **C. Roques-Carmes**, S. Choi, M. Horodynski, Y. Salamin, and M. Soljačić, *Controlling steady-state statistics of a bistable driven-dissipative system with quantum bias*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

37. A. Karnieli, N. Rivera, **C. Roques-Carmes**, and S. Fan, *Free-electron ponderomotive guiding for strong coupling and single-photon nonlinearity*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

36. S. Min, **C. Roques-Carmes**, S. Choi, S. Pajovic, S. Vaidya, and M. Soljačić, *Multilayer Scintillators for Enhanced Energy Resolution in X-Ray Imaging*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

35. N. Rivera, S. Z. Uddin, D. Seyler, Y. Salamin, J. Sloan, **C. Roques-Carmes**, S. Xu, M. Sander, and M. Soljačić, *An ab initio framework for understanding and controlling quantum fluctuations in complex light-matter systems*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

34. D. Catanzaro, J. Grzesik, **C. Roques-Carmes**, K. J. Leedle, D. S. Black, O. Solgaard, and J. Vučković, *An Experimental Platform to Control Solid-State Spin Systems with Engineered Electron Beams*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

33. Y. Salamin, S. Choi, **C. Roques-Carmes**, J. Sloan, M. Horodynski, and M. Soljačić, *Intracavity quantum dynamics and tomography in a biased optical parametric oscillator*, CLEO 2024, Charlotte, NC, USA, May 2024 (Link to abstract)

2023

32. **C. Roques-Carmes**, Y. Salamin, J. Sloan, S. Choi, G. Velez, E. Koskas, N. Rivera, S. E. Kooi, J. D. Joannopoulos, and M. Soljačić, *Tunable probabilities from the quantum vacuum*, CLEO 2023, San Jose, CA, USA, May 2023 (Link to abstract)

31. A. Shultzman, O. Segal, Y. Kurman, **C. Roques-Carmes**, and I. Kaminer, *Overcoming the Imaging Limits of High-Energy Particle Detection via Nanophotonic Inverse-Design*, CLEO 2023, San Jose, CA, USA, May 2023 (Link to abstract)

30. S. Katznelson, O. Tziperman, T. Bucher, T. L. Abudi, R. Schuetz, O. Be'er, S. Levy, Y. Bekenstein, **C. Roques-Carmes**, and I. Kaminer, *X-Ray-Driven Photon Bunching*, CLEO 2023, San Jose, CA, USA, May 2023 (Link to abstract)

29. R. Schuetz, Y. Kurman, N. Lahav, A. Shultzman, **C. Roques-Carmes**, A. Lifshits, S. Zaken, R. Strassberg, O. Be'er, Y. Bekenstein, and I. Kaminer, *Purcell-enhanced X-ray Imaging in Ultrathin Scintillators*, CLEO 2023, San Jose, CA, USA, May 2023 (Link to abstract)

28. W. F. Li, **C. Roques-Carmes**, Z. Lin, S. G. Johnson, and M. Soljačić, *X-Ray Spectroscopy With End-to-End Optimized Nanophotonic Scintillators*, CLEO 2023, San Jose, CA, USA, May 2023 (Link to abstract)

27. **C. Roques-Carmes**, Y. Salamin, J. Sloan, G. Velez, E. Koskas, S. Choi, N. Rivera, S. Kooi, J. Joannopoulos, and M. Soljacic, *Tuning the Probability Distribution of a Quantum Bistable Optical System*, APS March Meeting, Las Vegas, NV, USA, March 2023 (Link to abstract)

2022

26. S. Pajovic, **C. Roques-Carmes**, S. Kooi, N. Rivera, A. Ghorashi, Y. Yu, I. Kaminer, and M. Soljačić, *A System for Measuring Deep Ultraviolet Cathodoluminescence*, MRS Fall Meeting, Boston, MA, USA, November 2022 (Link to abstract)

25. **C. Roques-Carmes**, *X-ray imaging with nanophotonic scintillators*, SCINT2022, Santa Fe, NM, USA September 2022

24. **C. Roques-Carmes**, N. Rivera, S. E. Kooi, Y. Yu, J. D. Joannopoulos, I. Kaminer, and M. Soljačić, *X-ray imaging with nanophotonic scintillators*, CLEO 2022, San Jose, CA, USA, May 2022 (Link to abstract)

23. Z. Lin, G. Arya, W. F. Li, **C. Roques-Carmes**, R. Pestourie, Z. Li, F. Capasso, M. Soljačić, and S. G. Johnson, *End-to-end Nanophotonics Inverse Design for Computational Imaging*, CLEO 2022, San Jose, CA, USA, May 2022 (Link to abstract)

22. Y. Yang, **C. Roques-Carmes**, S. E. Kooi, H. Tang, J. Beroz, E. Mazur, I. Kaminer, J. D. Joannopoulos, and M. Soljačić, *Enhanced Smith-Purcell Radiation from Photonic Flatband Resonances*, CLEO 2022, San Jose, CA, USA, May 2022 (Link to abstract)

21. Y. Salamin, B. Mills, G. Yang, Q. Yang, C. Swain, D. Oran, J. Sloan, **C. Roques-Carmes**, J. Beroz, S. E. Kooi, E. S. Boyden, and M. Soljačić, *Three-Dimensional Optical Crystals Nanoprinted in a Hydrogel*, CLEO 2022, San Jose, CA, USA, May 2022 (Link to abstract)

20. W. F. Li, G. Arya, **C. Roques-Carmes**, Z. Lin, S. G. Johnson, M. Soljačić, *Angular and Spectral Sparse Sensing With End-to-End Optimized Nanophotonics*, CLEO 2022, San Jose, CA, USA, May 2022 (Link to abstract)

2021

19. M. Benzaouia, W. Yao, A. Cerjan, Z. Lin, **C. Roques-Carmes**, F. Verdugo, R. E. Christiansen, and S. G. Johnson, *Foundations of lasing and emission from surface-patterned structures*, SPIE Nanoscience + Engineering, Active Photonic Platforms XIII, Online, August 2021 (Link to abstract)

18. **C. Roques-Carmes**, N. Rivera, A. Ghorashi, S. E. Kooi, Y. Yang, Z. Lin, J. Beroz, J. D. Joannopoulos, I. Kaminer, S. G. Johnson, and M. Soljačić, *A general framework for shaping luminescence in materials*, CLEO 2021, San Jose, CA, USA, May 2021 (Link to abstract)

17. Y. Salamin, **C. Roques-Carmes**, Z. Lin, S. G. Johnson, and M. Soljačić, *Overcoming the Manley-Rowe Limit for CW Terahertz Generation in Q-Engineered Multimodal Cavity*, CLEO 2021, San Jose, CA, USA, May 2021 (Link to abstract)

16. **C. Roques-Carmes**, Y. Shen, M. Prabhu, J. D. Joannopoulos, D. Englund, and M. Soljačić, *Heuristic algorithms to solve combinatorial problems with photonics*, SPIE Photonics West, online, March 2021 (Link to abstract)

2020

15. **C. Roques-Carmes**, Z. Lin, R. E. Christiansen, Y. Salamin, S. E. Kooi, J. D. Joannopoulos, S. G. Johnson, and M. Soljačić, *3D-Printed Topology-Optimized Metaoptics*, METANANO, Online September 2020

14. N. Rivera, **C. Roques-Carmes**, I. Kaminer, and M. Soljačić, *Toward Nanophotonic Free-Electron Lasers*, CLEO 2020, Online, May 2020, — **upgraded to highlighted talk** (Link to abstract)

2019

13. R. Hamerly, A. Sludds, L. Bernstein, M. Prabhu, **C. Roques-Carmes**, J. Carolan, Y. Yamamoto, M. Soljačić, and D. Englund, *Towards Large-Scale Photonic Neural-Network Accelerators*, IEEE International Electron Devices Meeting, San Francisco, CA, USA, December 2019 (Link to abstract)

12. **C. Roques-Carmes**, Y. Shen, C. Zanoci, M. Prabhu, F. Atieh, L. Jing, T. Dubček, V. Čeperić, J. D. Joannopoulos, D. Englund, and M. Soljačić, *Photonic Recurrent Ising Sampler*, CLEO 2019, San Jose, CA, USA, May 2019, — **upgraded to invited status; CLEO's Chair Pick; Maiman Best Paper competition finalist** (Link to abstract)

2018

11. **C. Roques-Carmes**, M. Prabhu, Y. Shen, L. Jing, J. D. Joannopoulos, V. Čeperić, D. Englund, and M. Soljačić, *Photonic Recurrent Ising Sampler*, TECHCON, Austin, TX, USA September 2018

10. R. Remez, N. Shapira, **C. Roques-Carmes**, R. Tirole, Y. Yang, Y. Lereah, M. Soljačić, I. Kaminer, and A. Arie, *Spectral and spatial shaping of Smith-Purcell radiation*, CLEO 2018, San Jose, CA, USA, May 2018 (Link to abstract)

9. Y. Yang, **C. Roques-Carmes**, I. Kaminer, A. Zaidi, A. Massuda, Y. Yang, S. E. Kooi, K. K. Berggren, and M. Soljačić, *Manipulating Smith-Purcell Radiation Polarization with Metasurfaces*, CLEO 2018, San Jose, CA, USA, May 2018 (Link to abstract)

8. **C. Roques-Carmes**, N. Rivera, John D. Joannopoulos, M. Soljačić, and I. Kaminer, *Quantum Cerenkov radiation in weakly and strongly-coupled regimes*, CLEO 2018, San Jose, CA, USA, May 2018 (Link to abstract)

7. **C. Roques-Carmes**, S. E. Kooi, A. Massuda, A. Zaidi, Y. Yang, Y. Yang, K. K. Berggren, I. Kaminer, and M. Soljačić, *Electron beam-induced tunable radiation from silicon-only structures in the near-infrared*, CLEO 2018, San Jose, CA, USA, May 2018 (Link to abstract)

6. Y. Yang, A. Massuda, **C. Roques-Carmes**, S. E. Kooi, T. Christensen, S. G. Johnson, J. D. Joannopoulos, O. D. Miller, I. Kaminer, and M. Soljačić, *Fundamental limits on spontaneous emission and energy loss of free electrons*, CLEO 2018, San Jose, CA, USA, May 2018 (Link to abstract)

5. Z. Shi, M. Khorasaninejad, Y.-W. Huang, **C. Roques-Carmes**, A. Y. Zhu, W. T. Chen, V. Sanjeev, Z. W. Ding, M. Tamagnone, K. Chaudhary, R. C. Devlin, C. W. Qiu, and F. Capasso, *Metasurfaces with Wavelength-Controlled Functions*, CLEO 2018, San Jose, CA, USA, May 2018 (Link to abstract)

4. S. Kooi, **C. Roques-Carmes**, Y. Yang, I. Kaminer, M. Soljacic, A. Massuda, A. Solanki, F. Habbal, Y. Yang, T. Christensen, A. Zaidi, P. Krogen, C. Murdia, K. K. Berggren, and O. Miller, *Smith Purcell Radiation Generation from the VUV to the Near IR: Tunable Emission from Nanophotonic Structures in a Modified SEM*, APS March Meeting, Los Angeles, CA, USA, March 2018 (Link to abstract)

2017

3. A. Massuda, **C. Roques-Carmes**, A. Solanki, Y. Yang, S. E. Kooi, F. Habbal, I. Kaminer, and M. Soljačić, *High-order Smith-Purcell radiation in Silicon Nanowires*, CLEO 2017, San Jose, CA, USA, May 2017 (Link to abstract)

2. M. Khorasaninejad, W. T. Chen, A. Y. Zhu, J. Oh, R. C. Devlin, **C. Roques-Carmes**, I. Mishra, and F. Capasso, *Planar optics at visible wavelengths based on titanium dioxide*, SPIE OPTO, High Contrast Metastructures VI, San Francisco, CA, USA, April 2017 (Link to abstract)

2016

1. M. Khorasaninejad, W. T. Chen, A. Zhu, J. Oh, **C. Roques-Carmes**, I. Mishra, R. C. Devlin, and F. Capasso, *High Numerical Aperture Meta-lenses at Visible Wavelengths*, Frontier in Optics 2016, Rochester, NY, USA, October 2016 (Link to abstract)

Teaching and Mentoring Experience

Teaching

Kaufman Teaching Certificate (Spring 2022). Course preparation: Nanophotonics, from fundamental principles to modern applications and devices
Teaching Assistant for Graduate level class 6.634 Nonlinear Optics
Advisor: Prof. Jim Fujimoto. Mean TA feedback grade from voting students 6.75/7.0.

Mentoring of postdocs, graduate, and undergraduate students

At ISTA

8. Samuel Rind (Research intern, 2026 - now)

7. Dr. Georgy Dosovitskiy (Lab manager, 2026 - now)

6. Nikolaus Dräger (Rotation student, 2026 - now)

5. Pierre Mazzucotelli (Research intern, 2026 - now)

4. František Jeřábek (Rotation student, 2026 - now)

3. Paul-Alexis Mor (Research intern, 2026 - now)

2. Dr. Shaul Katznelson (Postdoctoral researcher, 2026 - now)

1. Karen Mamian (Research intern, 2025 - now)

At MIT + Stanford + Technion

28. Paul-Alexis Mor (Ecole polytechnique visiting student, 2024 – 2025), Self-configuring optical networks for quantum optics

27. Olivia Y. Long (Stanford Graduate Student, 2023 – 2025), Non-reciprocal scintillation

26. Trung Kien Le (Stanford Graduate Student, 2023 – 2025), Quantum optics

25. Joshua Chen (MIT Graduate Student, 2024 – 2026), Metaoptic scintillators

24. Seokhwan Min (KAIST, MIT Visiting Student, 2023 – 2024), Energy-resolved imaging with nanophotonic scintillators

23. Avner Shultzman (Technion Graduate Student, 2023 – 2025), Modeling and optimization of nanophotonic scintillators

22. Alex Gu (MIT Undergraduate Research Opportunities Program, Spring 2023 – Fall 2024), Quantum sensing with weakly-biased optical parametric oscillators

21. Jessica He (MIT Undergraduate Research Opportunities Program, Spring 2023 – Summer 2023), Quantum-enhanced computing with networks of weakly-biased optical parametric oscillators

20. Seou Choi (MIT EECS Graduate Student, Fall 2022 – 2026), Photonic probabilistic computing and ultrafast nonlinear optics

19. Nicolas Tanaka (MIT Undergraduate Research Opportunities Program, Summer 2022 – January 2023), End-to-end inverse-design in nanophotonics for depth-sensitive X-ray imaging

18. Ethan Koskas (Research assistant from Ecole polytechnique (France) – Spring – Summer 2022), Controllable probabilistic bits in optical parametric oscillators (experimental)

17. Yuxuan Zheng (MIT Undergraduate Research Opportunities Program, January 2022), Probabilistic computing with coupled arrays of stochastic resonators

16. Gaurav Arya (MIT Undergraduate Research Opportunities Program, Fall 2021 – Summer 2022), End-to-end inverse-design in nanophotonics for depth-sensitive X-ray imaging

15. Simo Pajovic (MIT MechE Graduate Student, Fall 2021 – 2025), Ultraviolet nanophotonic scintillators

14. Alice Le (MIT Undergraduate Research Opportunities Program, Fall 2021 – Spring 2024), Multilayer metaoptics design, fabrication, and characterization

13. Yazan Almajnouni (MIT Undergraduate Research Opportunities Program, Summer 2021 – Fall 2021), Modeling and design of optimized nanophotonic scintillators

12. Moaaz Fayumy (MIT Undergraduate Research Opportunities Program, Summer 2021), Modeling and design of optimized nanophotonic scintillators

11. William Li (MIT Undergraduate Research Opportunities Program, 2020 – 2025), End-to-end inverse-design in nanophotonics for hyperspectral X-ray imaging

10. David Fang (MIT Undergraduate Research Opportunities Program, Fall 2020 – Fall 2021), End-to-end inverse-design in nanophotonics for hyperspectral and depth imaging

9. Tiankuang Zhou (PhD student, Tsinghua University, Visting Researcher at MIT, Spring 2020 – 2021), Photonic probabilistic computing with optical parametric oscillators (Theory)

8. Gustavo Velez (MIT Research Assistant, Summer 2020 – Summer 2021), Photonic probabilistic computing with optical parametric oscillators (Experiment)

7. Sabina Toncini (MIT Undergraduate Research Opportunities Program – Summer 2020), Photonic Probabilistic Computing (Theory)

6. Miles Ross Johnson (MIT Undergraduate Research Opportunities Program – Summer 2018 – December 2019), Implementing the Recurrent Ising Sampler on FPGAs

5. Chenkai Mao (MIT Undergraduate Research Opportunities Program – Summer 2018 – December 2019), Implementing the Recurrent Ising Sampler on FPGAs

4. Nicolas Romeo (Research assistant from Ecole polytechnique (France) – Spring - Summer 2018), Spatial and spectral shaping of cathodoluminescence in nanophotonic systems

3. Sophie Fisher (MIT Undergraduate Research Opportunities Program – Summer 2018 – 2020), Free-electron-light-matter in ferromagnetic materials for compact X-ray sources

2. Fadi Atieh (MIT Undergraduate Research Opportunities Program – 2018), Statistical Mechanics of the Optical Ising Machine

1. Romain Tirole (Visiting research intern from Imperial College (UK) – Summer 2017), Spatial shaping of Smith-Purcell radiation with chirped gratings

Service, Outreach, and Others

Service and Professional Society Affiliations

QuantA (Quantum Science Austria), Principal Investigator (2025-today)

ACS Photonics, Early-career advisory board (2024-today)

OPTICA Nanophotonics Technical Group, Executive Committee Member (2023-2025)

Ecole Polytechnique Scientific Group Project in Physics, External jury member (2023-today)

Geneva Science and Diplomacy Anticipator, Science Breakthrough Radar, Contributor (2023-2025)

MIT Physics Freshman Pre-Orientation Program, panelist (2022)

SPIE Member (2021-today)

MIT GAAP (Graduate Application Assistance Program) Program Mentor (2020-2021)

Ecole polytechnique Alumni Ambassador in the Boston area (2019-2023)

MIT Applied Physics Club, Member (2016-2018)

OPTICA Member (2016-today)

Vice-President of Ecole polytechnique's Startup Association (2014-2016)

Conference Organization

4. CLEO, 2026, Technical Program committee member, S&I10: Photonic Computing subcommittee, Charlotte, NC, USA (Link)

3. CLEO, 2024, Special session organizer and chair, Topic: photonics meets free-electron science (co-organized with Dr. Aviv Karnieli and Ido Kaminer), Charlotte, NC, USA (Link)

2. METANANO, 2021, Special session organizer and chair, Topic: Free-electron light-matter interaction + round-table on the quantum nature of free-electron radiation. Co-organized with Dr. Ido Kaminer online

1. METANANO, 2020, Special session organizer and chair, Topic: Free-electron light-matter interaction. Co-organized with Dr. Ido Kaminer online

Peer-Review Activities

AAAS Journals (Science, Science Advances); Nature Springer Journals (Nature Photonics, Nature Materials, Nature Communications, Communications Physics, Nature Biomedical Engineering); ACS Journals (ACS Photonics, Nanoletters); OPTICA Journals (Optica, Optics Letters, Optics Express, Applied Optics); IEEE Access; EPL; Applied Physics Letters.

Military Service

Military service in the French military police force (2013-2014)
Second-in-command of the Compagnie of Gendarmerie in Meaux (France)
Officer, Team Leader.