

SUMMARY AND HIGHLIGHTS

CONTACT INFORMATION	E. L. Ginzton Laboratory Stanford University 348 Via Pueblo, Stanford, CA 94305, USA
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	26+ journal articles (24 peer-reviewed, 3 under review, 2 invited perspectives; in Science, Nature, and Nature journals (Physics, Communications), APS, IEEE, OSA, ACS, and APL journals), 29+ peer-reviewed conference talks and proceedings , 7+ patents (4 provisional)
SELECTED HONORS AND AWARDS	▷ 16+ plenary and invited talks ▷ Forbes 30 under 30 (Science, 2023) ▷ Stanford Science Fellow (2023) ▷ MathWorks Engineering Fellowship 2020-2021 ▷ Robert B. Guenassia Award 2019 ▷ Carnot Foundation Fellow 2016 ▷ X—ESPCI—Saint-Gobain Research Prize
SELECTED TEACHING ACTIVITIES	Mentored 23+ graduate and undergraduate students , Teaching Assistant for Nonlinear Optics graduate level course, Kaufman Teaching Certificate (Spring 2022)
SELECTED SERVICE AND OUTREACH ACTIVITIES	MIT GAAP Program Mentor (2020), Member of several professional associations (SPIE, OSA), Vice-President of Ecole polytechnique’s Startup Association (2014-2016), METANANO 2019-2021 session organizer, Frequent Journal reviewer, French military service
SELECTED ENTREPRENEURIAL ACTIVITIES	▷ MIT 100K Launch Finalist ▷ SPIE Startup Challenge (3 rd place) (\$2.5k, January 2022) ▷ MIT Sandbox Fund recipient (\$10k, Fall 2021) ▷ MIT I-Corps Spark program (September 2021)
SELECTED RESEARCH MILESTONES	Free-electron-light-matter interaction and scintillation: ▷ Built from scratch a \$300k+ experiment to study the interaction of free electrons with nanophotonic structures ▷ Developed a novel class of high-energy particle detectors based on nanophotonic structures ▷ Demonstrated the first electron-beam, wavelength-tunable light source in all-silicon structures Metasurfaces and nanophotonics computational imaging: ▷ Demonstrated the first 3d-printed multi-layer metastructure ▷ Contributed to the demonstration of metasurfaces with tailored chromatic and angular properties Photonic computing: ▷ Developed a class of algorithms to solve combinatorial optimization problems on photonic chips ▷ Demonstrated the first integrated photonic circuit solving optimization problems ▷ Demonstrated the first photonic probabilistic bit using quantum noise as a source of randomness

EDUCATION

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

Ph.D. Candidate, 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: 3.89/4.0

Lycée Louis-le-Grand, Paris, France

Preparatory courses for entry into the French Grandes Écoles (2011 - 2013). GPA: 4.0/4.0

EMPLOYMENT

Ginzton Laboratory, Stanford University, Stanford, CA, USA

Stanford Science Fellow, 2023 - today

- Faculty Host: Prof. Shanhui Fan
- Research topics:
 - ▷ X-ray imaging and detection with nanophotonic scintillators
 - ▷ Free-electron quantum optics

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

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

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, six 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 investment and leadership in Ecole polytechnique's entrepreneurship association.

PUBLICATIONS

For updated publication list, see my Google Scholar profile.

29. **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* 381, 6654 (2023)

28. 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*, arXiv preprint, *Optics Express*, 31 (15), 24260-24272 (2023)

27. **C. Roques-Carmes**, *Learning photons go backward*, *Science*, 380, 6643 (2023), **invited perspective. Covered in the press by IEEE spectrum.**

26. 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*, arXiv preprint, *arXiv:2302.01300*
25. A. Shultzman*, O. Segal*, Y. Kurman, **C. Roques-Carmes**, and I. Kaminer, *Enhanced Imaging Using Inverse-Design of Nanophotonic Scintillators*, *Advanced Optical Materials*, adom.202202318, **invited article**
24. **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* 10, 011303 (2023), **invited and featured review article**
23. 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.**
22. 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*, 30 (16), 28358-28370 (2022)
21. **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* 375 (6583). **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.
20. 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*, arXiv preprint, *arXiv:2201.12348*
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* 9 (1) 43-51 (2022)
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 (3), 034041 (2021)
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* 118 (4), 041104 (2021) - **invited paper**
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* (2020)
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* 28, 23 33854-33868 (2020)
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* (2020), **review 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* 7 (5), 551-558 (2020)

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, 7, 5, 1096 - 1103 (2020)
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, 11, 1 1-8 (2020)
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 10, 3176 (2019)
9. **C. Roques-Carmes**, and M. Soljačić, *Viewpoint: Photonic Ising Machines Go Big*, Physics 12, 61 (2019)
8. **C. Roques-Carmes**, N. Rivera, J. D. Joannopoulos, M. Soljačić, and I. Kaminer, *Non-perturbative Quantum Electrodynamics in the Cherenkov Effect*, Phys. Rev. X 8.4 (2018): 041013
7. 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 (2018)
6. 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, 894-899 (2018)
5. B. Groever, **C. Roques-Carmes**, S. Byrnes, and F. Capasso, *Substrate aberration and correction for metasurface imaging*, Applied optics 57.12 (2018):2973-2980.
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 18.4 (2018): 2420-2427.
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 96.6 (2017)
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, 23.3 (2017): 43-58 (invited paper)
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 16.11 (2016).

PATENTS AND
PATENT
APPLICATIONS

Photonic and Electronic Hamiltonian Machines, U.S. Provisional Application 63/291,754 (December 2021)

Nanophotonic Scintillators for High-Energy Particles Detection, Imaging, and Spectroscopy, U.S. Provisional Application 63/257,611 (October 2021)

Methods and Apparatus To Generate Terahertz Waves Through Cascaded Nonlinear Processes, U.S. Provisional Application 63/182,177 (May 2021)

Methods and Apparatuses for Enhancing Scintillation with Optical Nanostructures for Scintillators, LEDs, and Laser Sources, U.S. Provisional Application 63/178,176 (April 2021)

Optical Ising Machines and Optical Convolutional Neural Networks, US11017309B2 (July 2017), **licensed to Lightelligence**. See press release on Lightelligence's demonstration.

Apparatus and methods for generating and enhancing Smith-Purcell radiation *Methods*, US10505334B2 (April 2017).

Meta-lenses for sub-wavelength resolution imaging, US11092717B2 (April 2016), **licensed to Met-alenz**.

CONFERENCES - **C. Roques-Carmes**, *Free-electron-light interactions in nanophotonics*, 67th ICFA Advanced Beam
TALKS - SEMINARS Dynamics Workshop on Future Light Sources, Lucerne, Switzerland, August 2023, **plenary session speaker**

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

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 probability distributions from the quantum vacuum*, CLEO 2023

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**

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**

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**

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

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

C. Roques-Carmes, *X-ray imaging with nanophotonic scintillators*, SCINT2022, September 2022, Santa Fe, New Mexico

C. Roques-Carmes, *Enhancing and shaping radiation from high-energy particles with nanophotonics*, Lawrence Livermore National Laboratories NCI Seminar, May 2022, **invited**

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

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

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

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, March

2021, San Francisco, **invited**

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 2020, Tbilisi, Georgia, moved to online format because of COVID-19 pandemic

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 Dresden 2020, Special Symposium on : Advanced neuromorphic computing hardware: Towards efficient machine learning, **invited – cancelled because of COVID-19 pandemic**

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

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

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

C. Roques-Carmes, Special Seminar hosted by Dr. Peter McMahon (Stanford, Department of Applied Physics), *Photonic Recurrent Ising Sampler*, **invited**

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 (**upgraded to invited talk, CLEO's Chair Pick, Maiman Best Paper competition finalist**)

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

R. Remez, N. Shapira, **C. Roques-Carmes**, R. Tirole, Y. Yang, Y. Lereah, M. Soljačić, I. Kaminer, A. Arie, *Spectral and spatial shaping of Smith-Purcell radiation*, CLEO, 2018

C. Roques-Carmes, N. Rivera, John D. Joannopoulos, M. Soljačić, I. Kaminer, *Quantum Čerenkov radiation in weakly and strongly-coupled regimes*, CLEO, 2018

C. Roques-Carmes, S. E. Kooi, A. Massuda, A. Zaidi, Y. Yang, Y. Yang, K. K. Berggren, I. Kaminer, M. Soljačić, *Electron beam-induced tunable radiation from silicon-only structures in the near-infrared*, CLEO, 2018

A. Massuda, **C. Roques-Carmes**, A. Solanki, Y. Yang, S. E. Kooi, F. Habbal, I. Kaminer, M. Soljačić, *High-order Smith-Purcell radiation in Silicon Nanowires*, CLEO, 2017, **post-deadline abstract**

TEACHING 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 8 voting students 6.75/7.0.

Mentoring

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

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

21. Alex Gu (MIT Undergraduate Research Opportunities Program, Spring 2023 – today), Quantum sensing with weakly-biased optical parametric oscillators
20. Seou Choi (MIT EECS Graduate Student, Fall 2022 – today), 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 – today), Ultraviolet nanophotonic scintillators
14. Alice Le (MIT Undergraduate Research Opportunities Program, Fall 2021 – today), Multilayer metaoptics design, fabrication, and characterization
13. Yazan Almajnoui (MIT Undergraduate Research Opportunities Program, Summer 2021 – today), 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, Fall 2020 – today), 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 – today), Photonic probabilistic computing with optical parametric oscillators (Theory)
8. Gustavo Velez (MIT Research Assistant, Summer 2020 – today), 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 – today), 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

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

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

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)

OSA Member (2016-today)

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

Conferences Organization

METANANO 2021 (remote) – Special session organizer and chair (co-organized with Prof. Ido Kaminer). *Topic: Free-electron light-matter interaction.* Organization of round table on the quantum nature of free-electron radiation.

METANANO 2020 (remote) – Special session organizer and chair (co-organized with Prof. Ido Kaminer). *Topic: Free-electron light-matter interaction.*

METANANO 2019 (Saint-Petersburg, Russia) – Special session chair. *Topic: Bound States in the Continuum.*

Peer-Review Activities

AAAS Journals (Science, Science Advances); Nature Springer Journals (Nature Communications, Nature Communications Physics, Nature Biomedical Engineering); ACS Journals (ACS Photonics, Nanoletters); OSA 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.