

EDUCATION

Ph.D. Paris, France
PARIS SACLAY UNIVERSITY 2012 - 2016

M.S. Grenoble, France
GRENOBLE INP - PHELMA 2009 - 2012

RESEARCH
EXPERIENCES

University of Maryland - National Institute of Standards and Technology Maryland, USA
ASSISTANT RESEARCH SCIENTIST Jul. 2021 - present

- Study of chip-scale integrated micro-resonators made $\chi^{(3)}$ susceptible material for non-linear optics applications.
- Study of novel dispersion designs for broader, shorter wavelength, and new state of frequency combs in pulse regime
- Mentoring of students

University of Maryland - National Institute of Standards and Technology Maryland, USA
POSTDOCTORAL ASSOCIATE Feb. 2017 - Jun. 2021

- Study of chip-scale integrated micro-resonators made of Silicon Nitride for $\chi^{(3)}$ frequency comb applications.
- Development of in-house modelling tools, clean-room fabrication, development of new experimental setups

Thales Research and Technology Palaiseau, France
PHD CANDIDATE Dec. 2012 - Dec. 2016

- Study of carrier dynamics generated through $\chi^{(3)}$ non-linearity in III-V photonic crystals cavities
- Development of in-house computational solvers (FDTD, FEM, CMT), fabrication and measurement with custom developed setups

ACADEMIC
EXPERIENCE

Teaching

- Teaching assistant – 1st and 2nd year undergraduate student – UNIVERSITY PARIS SACLAY – 2014

Mentoring

- Highschool. Students: Christy Li – MONTGOMMERY BLAIR HS (NOW AT MIT) – Jul. 2021 → Aug. 2022
- Undergrad. Students: Dillion Cottrill – UNIVERSITY OF WEST VIRGINIA – 2020
Kristiana Ramos – U.M.D – 2021 → 2022
- Graduate Students: Edgar Perez – U.M.D – 2018 → 2024
Tahmid Raman – U.M.D – 2019 → 2024
Pradyoth Shandilya – U.M.B.C. – 2021 → present
Michal Chojnacky – U.M.D – 2022 → present
Shoa-Chein Ou – U.M.D – 2022 → present

Contribution to Funded Projects

Support staff:

- Agence National de la Recherche (France): AUCTOPUSS (2013-2015) – ETHAN (2015-2016)
- DARPA (USA): DODOS (2017-2020) – ACES (2017-2021) – APhi (2019-present) – LUMOS (2021-present) – SAVANT (2021-present)
- Space Force & Air Force Research Laboratory (USA): PICs for SCPNT (2022-present)

Co-Principal Investigator:

- Marsden Fund: “The light between: parametrically driven cavity solitons in pure-Kerr resonators” (2023-present)

Awards

- 2015: CLEO Incubic Milton Chang Travel Grant
- 2022: Postdoctoral and Early-career Association of Researcher (PEAR) award For significant advances in the science and technology of microresonator frequency combs.

SERVICE TO
COMMUNITY

Outreach

- Maintaining and updating an active github profile to share scripts for experiment control and in-house developed simulations tools. Combined, they account for **45 forks, 72 stars and an average of 35 unique views per week.**

Peer Reviewing

- Referee for *Optica*, *JOSA B*, *Optics Letters*, *Optics Express*, *OSA Continuum*, *Nature Communications*, *Physical Review Letters*, *Physical Review Applied*, *Physical Review A*, *Physical Review Research*, *Laser and Photonics Reviews*, *ACS Photonics*, *Applied Physics Letters Photonics*, *Micromachine*, *SPIE Advanced Photonics*

Committee Member

- 2019-2020 — Siegman international school: Review applications for the OSA Siegman international school on laser for the 2019 and 2020 editions
- 2023 - present — SPIE Photonics West: program committee member for Laser Resonators, Microresonators, and Beam Control XXVI conference
- Associate editor for 2024 special issue on nonlinear photonics in Optics Material Express

SKILLS SUMMARY

Relevant Work

Electromagnetism ● ● ● ● ●
Non-Linear Optics ● ● ● ● ●
Optoelectronics ● ● ● ● ●
Quantum Physics ● ● ● ● ●

E.M. Modeling

Comsol ● ● ● ● ●
Lumerical ● ● ● ● ●
Mathematica ● ● ● ● ●
HFSS ● ● ● ● ●

Experimental Skills

Photonics Charac. ● ● ● ● ●
Non-Linear Optics ● ● ● ● ●
Radio Freq. ● ● ● ● ●
Metrology ● ● ● ● ●

Coding

Python ● ● ● ● ●
Julia ● ● ● ● ●
Matlab ● ● ● ● ●
Fortran ● ● ● ● ●

NanoFab

Design Layout ● ● ● ● ●
EBL ● ● ● ● ●
Dy Etching ● ● ● ● ●
Wet Etching ● ● ● ● ●

Languages

French ● ● ● ● ●
English ● ● ● ● ●
Russian ● ● ● ● ●
Italian ● ● ● ● ●

SELECTED PUBLICATIONS

- >40 peer-reviewed journal articles
- Published in Nature, Science, Nature Photonics, Nature Physics, Optica, etc
- >50 conference proceedings
- 2 book chapters
- >2200 citations as of 09/2024
- h-index of 25 as of 09/2024

Articles 2024

- U. A. Javid, M. Chojnacky, K. Srinivasan, and G. Moille. **Terahertz Voltage-controlled Oscillator from a Kerr-Induced Synchronized Soliton Microcomb**. ARXIV:2404.16597 (2024)
- G. Moille, U. A. Javid, M. Chojnacky, P. Shandilya, C. Menyuk, and K. Srinivasan. **AC-Josephson Effect and Sub-Comb Mode-Locking in a Kerr-Induced Synchronized Cavity Soliton**. ARXIV:2402.08154 (2024)
- G. Moille, P. Shandilya, A. Niang, C. Menyuk, G. Carter, and K. Srinivasan. **Versatile Optical Frequency Division with Kerr-induced Synchronization at Tunable Microcomb Synthetic Dispersive Waves**. ARXIV:2403.00109 (2024)
- G. Moille, P. Shandilya, J. Stone, C. Menyuk, and K. Srinivasan. **All-Optical Noise Quenching of An Integrated Frequency Comb**. ARXIV:2405.01238 (2024)
- G. Moille, M. Leonhardt, D. Paligora, N. Englebert, F. Leo, J. Fatome, K. Srinivasan, and M. Erkintalo. **Parametrically Driven Pure-Kerr Temporal Solitons in a Chip-Integrated Microcavity**. NATURE PHOTONICS (2024).
- P. Shandilya, S.-C. Ou, J. Stone, C. Menyuk, M. Erkintalo, K. Srinivasan, and G. Moille. **All-Optical Azimuthal Trapping of Dissipative Kerr Multi-Solitons for Relative Noise Suppression**. ARXIV:2408.08253 (2024)
- J. R. Stone, X. Lu, G. Moille, D. Westly, T. Rahman, and K. Srinivasan. **Wavelength-Accurate Nonlinear Conversion through Wavenumber Selectivity in Photonic Crystal Resonators**. NATURE PHOTONICS 18.2 (2024).
- C. J. Flower, M. Jalali Mehrabad, L. Xu, G. Moille, D. G. Suarez-Forero, O. Örsel, G. Bahl, Y. Chembo, K. Srinivasan, S. Mittal, and M. Hafezi. **Observation of Topological Frequency Combs**. SCIENCE 384.6702 (2024).

2023

- G. Moille, X. Lu, J. Stone, D. Westly, and K. Srinivasan. **Fourier Synthesis Dispersion Engineering of Photonic Crystal Microrings for Broadband Frequency Combs**. COMMUNICATIONS PHYSICS 6.1 (2023).
- E. F. Perez, G. Moille, X. Lu, J. Stone, F. Zhou, and K. Srinivasan. **High-Performance Kerr Microresonator Optical Parametric Oscillator on a Silicon Chip**. NATURE COMMUNICATIONS 14.1 (2023).
- G. Moille, J. Stone, M. Chojnacky, R. Shrestha, U. A. Javid, C. Menyuk, and K. Srinivasan. **Kerr-Induced Synchronization of a Cavity Soliton to an Optical Reference**. NATURE 624.7991 (2023).

2022

- G. Moille, D. Westly, E. F. Perez, M. Metzler, G. Simelgor, and K. Srinivasan. **Integrated Buried Heaters for Efficient Spectral Control of Air-Clad Microresonator Frequency Combs**. APL PHOTONICS 7.12 (2022).
- J. R. Stone, G. Moille, X. Lu, and K. Srinivasan. **Conversion Efficiency in Kerr-microresonator Optical Parametric Oscillators: From Three Modes to Many Modes**. PHYSICAL REVIEW APPLIED 17.2 (2022).

2021

- G. Moille, E. F. Perez, J. R. Stone, A. Rao, X. Lu, T. S. Rahman, Y. K. Chembo, and K. Srinivasan. **Ultra-Broadband Kerr Microcomb through Soliton Spectral Translation**. NATURE COMMUNICATIONS 12.1 (2021).
- S. Mittal, G. Moille, K. Srinivasan, Y. K. Chembo, and M. Hafezi. **Topological Frequency Combs and Nested Temporal Solitons**. NATURE PHYSICS 17.10 (2021).

2020

- L. Chang, W. Xie, H. Shu, Q.-F. Yang, B. Shen, A. Boes, J. D. Peters, W. Jin, C. Xiang, S. Liu, et al. **Ultra-Efficient Frequency Comb Generation in AlGaAs-on-insulator Microresonators**. NATURE COMMUNICATIONS 11.1 (2020).
- G. Moille, L. Chang, W. Xie, A. Rao, X. Lu, M. Davanco, J. E. Bowers, and K. Srinivasan. **Dissipative Kerr Solitons in a III-V Microresonator**. LASERS & PHOTONICS REV 14.8 (2020).

2019

- X. Lu, G. Moille, Q. Li, D. A. Westly, A. Singh, A. Rao, S.-P. Yu, T. C. Briles, S. B. Papp, and K. Srinivasan. *Efficient Telecom-to-Visible Spectral Translation through Ultralow Power Nonlinear Nanophotonics*. NATURE PHOTONICS 13.9 (2019).
- G. Moille, Q. Li, T. C. Briles, S.-P. Yu, T. Drake, X. Lu, A. Rao, D. Westly, S. B. Papp, and K. Srinivasan. *Broadband Resonator-Waveguide Coupling for Efficient Extraction of Octave-Spanning Microcombs*. OPTICS LETTERS 44.19 (2019).

2018

- G. Moille, Q. Li, S. Kim, D. Westly, and K. Srinivasan. *Phased-Locked Two-Color Single Soliton Microcombs in Dispersion-Engineered Si₃N₄ Resonators*. OPTICS LETTERS 43.12 (2018).

Book Chapter

- P. Colman, S. Combr  , A. De Rossi, A. Martin, and G. Moille. *Nonlinear Meta-Optics. "Nonlinear Photonic Crystals", pp. 199–250 . 2020.*
- G. Moille, S. Combr  , and A. De Rossi. *Green Photonics and Electronics. "Nanophotonic Approach to Energy-Efficient Ultra-Fast All-Optical Gates", pp. 107–137 . 2017.*

Conferences

2024

- G. Moille. *"Synchronization Regimes of Multi-Pumped Integrated Octave Spanning Frequency Comb". (Invited) SIAM Conference on Nonlinear Waves and Coherent Structures. (2024).*
- G. Moille. *"Kerr-Induced Synchronized Integrated Frequency Combs for Optical Atomic Clocks". (Invited) IEEE Summer Topical Meeting. (2024).*
- P. Shandilya, G. Moille, J. Stone, U. A. Javid, G. D'Aguanno, K. Srinivasan, and C. R. Menyuk. *"Suppression of Microcomb Thermorefractive Noise Using Kerr Induced Synchronization". CLEO 2024 (2024), Paper SM1M.4. (2024).*
- M. Chojnacky, U. Javid, G. Moille, and K. Srinivasan. *"Terahertz frequency comb generation from Kerr-induced synchronization". Laser Resonators, Microresonators, and Beam Control XXVI. (2024).*

2023

- C. Li, D. Westly, K. Srinivasan, and G. Moille. *"Dispersion Engineering and Low-Loss Optimization of Footprint-Efficient and Rotationally Asymmetric Resonators". CLEO: Science and Innovations. (2023).*
- G. Moille, J. Stone, M. Chojnacky, C. Menyuk, and K. Srinivasan. *"All-Optical Kerr Synchronization of a Dissipative Kerr Soliton Microcomb to an Optical Reference". (Invited) Nonlinear Optics. (2023).*
- G. Moille. *"Dissipative Kerr Soliton for Microcomb Optical Clock: From Dispersion Engineering to Nonlinear Synchronization". (Invited) IEEE Research and Applications of Photonics in Defense Conference (RAPID). (2023).*
- G. Moille, J. Stone, M. Chojnacky, C. Menyuk, and K. Srinivasan. *"All-Optical Kerr Synchronization of a Dissipative Kerr Soliton Microcomb to an Optical Reference for Clockwork Operation". (Postdeadline) CLEO: Science and Innovations. (2023).*

2022

- G. Moille, E. F. Perez, Y. K. Chembo, C. Menyuk, and K. Srinivasan. *"Temporal Binding of a Coherent Spectrally Translated Pulse from a Dissipative Kerr Soliton in a Synthetic Frequency Lattice". CLEO: QELS_Fundamental Science. (2022).*

2021

- G. Moille, E. F. Perez, A. Rao, X. Lu, Y. K. Chembo, and K. Srinivasan. *"Ultra-Broadband Dissipative Kerr Soliton Microcomb through Dual Pumping Operation". (Highlighted) CLEO: Science and Innovations. (2021).*

2020

- G. Moille, L. Chang, W. Xie, X. Lu, M. Davanco, J. E. Bowers, and K. Srinivasan. *"Stable Dissipative Kerr Solitons in a AlGaAs Microresonator through Cryogenic Operation". (Highlighted) CLEO: Science and Innovations. (2020).*

DATE: SEPTEMBER 19, 2024
Washington, D.C.

