Daniel Gustavo Suárez-Forero

Curriculum vitae

PERSONAL INFORMATION

University of Maryland Baltimore County, Department of Physics. Office Number TBD

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WORK EXPERIENCE

October 2024 to August 2025 — Senior Research Scientist

Department of Quantum Matter Physics, University of Geneva

April 2021 to August 2024 — Postdoctoral researcher

Joint Quantum Institute,University of Maryland

December 2019 to December 2020 — Postdoctoral researcher

CNR Nanotec Istituto di Nanotecnologia

September-December 2014 — Temporary lecturer

Universidad Nacional de Colombia. Bogotá-Colombia

EDUCATION AND TRAINING

2016 – 2019 — PhD. Thesis title: Generation and manipulation of single polaritons

CNR Nanotec Istituto di Nanotecnologia, Lecce-Italy

2015 – 2016 — Master degree in science-physics. Thesis title: Entanglement and correlation properties of exciton-polaritons in semiconductor microcavities. (Awarded with distinction of merit)

Grade point average: 4.7/5.0

Universidad Nacional de Colombia, Bogotá-Colombia

2009 – 2014 — Bachelor degree in physics (5 years title)

Grade point average: 4.3/5.0

Universidad Nacional de Colombia, Bogotá-Colombia

- Classical mechanics
- Electromagnetism
- Statistical mechanics
- Quantum mechanics

DISTINCTIONS AND ACADEMIC INCENTIVES

2016-2019 Scholarship of the CNR Nanotec, Institute of Nanotechnology on the topic **polariton devices**.

2016 Distinction of merit for Master degree's thesis.

2015 Teaching assistant scholarship at Universidad Nacional de Colombia.

PERSONAL SKILLS

Research interests

- **Quantum Optics of Correlated Materials.**
- **Optoelectronic properties of semiconductor condensed matter systems.**
- **Physics of the light-matter interaction.**
- **Topological physical systems.**

Research experience

Scientific works in the following platforms:

- Semiconductor polaritonic quantum well-microcavity systems
- Inorganic and organic quantum dots
- Semiconductor polaritonic waveguide-quantum well systems.
- Transition Metal Dichalcogenides
- Graphene
- Topological photonic crystals.

Grants

Simulation of few-particle spin physics in TMD bilayer moiré structures. Seed Funding-FY2023. Funded with 80,000 USD by the National Science Foundation-Quantum Leap Challenge Institute for Robust Quantum Simulation. (Co-Project manager)

Related skills

- **Scientific communication:** Acquired after participation as a contributing or invited speaker in multiple scientific conferences (list attached below).
- **Teamwork:** I have worked in different research groups since my bachelor's studies; collaborating with many different people, always in a good environment and with satisfying scientific results.
- **Experimental techniques:** experience with quantum and classical electro-optical measurements, including first and second-order correlations, quantum tomography of two qubits, polarization-resolved spectral measurements, time-resolved analysis of optical signals, Fourier optics, magneto-optical measurements, etc.
- **Design and management of research laboratories:** experience in installation, use, and maintenance of different scientific equipment including lasers, magnetic cryostats, and advanced detection systems. Experience in the design and construction of a condensed matter laboratory, acquired as a postdoctoral researcher.

Mother tongue(s)

Spanish

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1
Italian	C1	C1	C1	C1	C1
Portuguese	B2	B2	B2	B2	B2
French	A2	A2	A2	A2	A2

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
Common European Framework of Reference (CEF) level

Publications

- D. G. Suárez-Forero, M. Jalali Mehrabad, C. Vega, A. González-Tudela, M. Hafezi. “Chiral quantum optics: recent developments, and future directions” (invited perspective). *arXiv:2411.06495* (under peer review).
- P. Upadhyay, D. G. Suárez-Forero, T. S. Huang, M. Jalali Mehrabad, B. Gao, S. Sarkar, D. Session, K. Watanabe, T. Taniguchi, Y. Zhou, M. Knap, M. Hafezi. Giant enhancement of exciton diffusion near an electronic Mott insulator. *arXiv:2409.18357* (under peer review)
- S. Sarkar, M. Jalali Mehrabad, D. G. Suárez-Forero, L. Gu, C. J. Flower, L. Xu, K. Watanabe, T. Taniguchi, S. Park, H. Jang, Y. Zhou, M. Hafezi. “Sub-wavelength optical lattice in 2D materials”. *arXiv:2406.00464* (under peer review).
- D. G. Suárez-Forero, R. Ni, S. Sarkar, M. Jalali Mehrabad, E. Mechtel, V. Simonyan, A. Grankin, K. Watanabe, T. Taniguchi, S. Park, H. Jang, M. Hafezi, Y. Zhou. “Chiral Optical Nano-Cavity with Atomically Thin Mirrors”. *Science Advances, 10, eadr5904 (2024).*
- D. Session, M. Jalali Mehrabad, N. Paithanker, T. Grass, C. Eckhardt, B. Cao, D. G. Suárez-Forero, K. Li, M. S. Alam, G. S. Solomon, N. Schine, J. Sau, R. Sordan, M. Hafezi. “Optical pumping of electronic quantum Hall states with vortex light”. *Nature Photonics (2024)*.
- C. J. Flower, M. Jalali Mehrabad, L. Xu, G. Moille, D. G. Suárez-Forero, O. Orsel, G. Bahl, Y. Chembo, K. Srinivasan, S. Mittal, M. Hafezi. Observation of topological frequency combs. *Science 384,1356-1361 (2024)*.
- B. Gao, D. G. Suárez-Forero, S. Sarkar, T. S. Huang, D. Session, M. Jalali Mehrabad, R. Ni, M. Xie, J. Vannucci, S. Mittal, K. Watanabe, T. Taniguchi, A. Imamoglu, Y. Zhou, M. Hafezi. Excitonic Mott insulator in a Bose-Fermi-Hubbard system of moiré WS_2/WSe_2 heterobilayer. *Nature Communications* 15, 2305 (2024).
- D. G. Suárez-Forero, D. W. Session, M. Jalali Mehrabad, P. Knüppel, S. Faelt, W. Wegscheider and M. Hafezi. “Spin-selective strong light-matter coupling in a 2D hole gas-microcavity system”. *Nature Photonics 17, 912–916 (2023)*
- J. C. Sell, J. R. Vannucci, D. G. Suárez-Forero, B. Cao, D. W. Session, H-J Chuang, K. McCreary, M. Rosenberger, B. Jonker, S. Mittal, M. Hafezi. “Magneto-Optical Measurements of the Negatively Charged 2S Exciton in WSe_2”. *Phys. Rev. B 106, L081409, (2022)*.
- V. Ardizzone, F. Riminucci, S. Zanotti, A. Gianfrate, M. Efthymiou-Tsironi, D. G. Suàrez-Forero, F. Todisco, M. De Giorgi, D. Trypogeorgos, G. Gigli, K. Baldwin, L. Pfeiffer, D. Ballarini, H. S. Nguyen, D. Gerace and D. Sanvitto. “Polariton Bose–Einstein condensate from a bound state in the continuum”, *Nature 605, 447–452 (2022)*.
- D. G. Suárez-Forero, F. Riminucci, V. Ardizzone, N. Karpowicz, E. Maggiolini, G. Macorini, G. Lerario, F. Todisco, M. De Giorgi, L. Dominici, D. Ballarini, K. West, L. Pfeiffer, G. Gigli, A. S. Lanotte, D. Sanvitto. “Demonstration of dipolar-induced enhancement of parametric effects in polariton waveguides”, *Physical Review Letters 126, 137401 (2021)*.
- D. G. Suárez-Forero, F. Riminucci, V. Ardizzone, M. De Giorgi, L. Dominici, F. Todisco, G. Lerario, L. N. Pfeiffer, G. Gigli, D. Ballarini, and D. Sanvitto, "Electrically controlled waveguide polariton laser", *Optica 7, 1579-1586 (2020)*
- D. G. Suárez-Forero, V. Ardizzone, S. F. Covre da Silva, M. Reindl, A. Fieramosca, L. Polimeno, M. de Giorgi, L. Dominici, L. N. Pfeiffer, G. Gigli, D. Ballarini, F. Laussy, A. Rastelli, D. Sanvitto. "Quantum hydrodynamics of a single particle". *Light: Science & Applications, 9(1), 1–7. (2020).*
- D. G. Suárez-Forero, A. Giuri, M. De Giorgi, L. Polimeno, L. De Marco, F. Todisco, G. Gigli, L. Dominici, D. Ballarini, V. Ardizzone, B. D. Belviso, D. Altamura, C. Giannini, R. Brescia, S. Colella, A. Listorti, C. Esposito Corcione, A. Rizzo and D. Sanvitto. "Quantum nature of light in non-stoichiometric bulk perovskites". *ACS Nano, 13, 9 (2019)*.
- A. Cuevas, J. C. López Carreño, B. Silva, M. De Giorgi, D. G. Suárez-Forero, C. Sánchez Muñoz, A. Fieramosca, F. Cardano, L. Marrucci, V. Tasco, G. Biasiol, E. del Valle, L. Dominici, D. Ballarini, G. Gigli, P. Mataloni, F. P. Laussy, F. Sciarrino and D. Sanvitto. "First observation of the quantized exciton-polariton field and effect of interactions on a single polariton". *Science Advances vol 4, no. 4 (2018)*.
- D. G. Suárez-Forero, G. Cipagauta, H. Vinck-Posada, K. M. Fonseca Romero, B. A. Rodríguez, and D. Ballarini. "Entanglement properties of quantum polaritons". *Physical Review B 93, 205302 (2016)*.

Participation in academic and scientific events

- International Conference on Physics of Excitons and Polaritons in Semiconductors (PEPS 2024). Reykjavík–Iceland, August 2024 (Invited talk).
- The 12th International Conference on Spontaneous Coherence in Excitonic systems (ICSCE-12). Dublin-Ireland, June 2024 (Invited talk).
- 4^{th} International Conference on OPTICS, PHOTONICS, and LASERS (OPL-2023), Hiroshima-Japan, December 2023 (Invited talk).
- International Conference on Quantum Simulation (ICQSIM2023). Paris-France, November 2023 (Contributed talk).
- Optics of Excitons in Confined Systems (OECS18). Lecce-Italy, June 2023 (Contributed talk).
- International Conference on Physics of Light-Matter Coupling in Nanostructures (PLMCN). Medellín-Colombia, April 2023 (Contributed talk).
- Hybrid Photonics and Materials (HPM). October 3rd-7th, 2022. Hydra-Greece (invited talk).
- International Conference on Physics of Light-Matter Coupling in Nanostructures (PLMCN). October 27th-30th, 2020. (contributed talk)
- OSA's Frontiers in Optics / Laser Science APS/DLS. 14-17 September 2020. (contributed talk).
- 4th International Conference on Terahertz Emission, Metamaterials and Nanophotonics, Terametanano-4, Lecce-Italy, May 2019 (contributed talk).
- Quantum Fluids of Light and Matter School, Les Hauches-France, June 2018 (poster presentation).
- 9th Optoelectronics and Photonics Winter School Integrated Quantum Photonics, Folgaria-Italy, March 2017 (poster presentation).
- V Quantum information school, Paraty-Brasil, August 2015 (poster presentation).
- International Workshop on Quantum Coherence and Decoherence II, Medellín-Colombia, August 2014 (contributed talk).
- Quantum Optics VII, Mar del Plata-Argentina, October 2014 (poster presentation)
- Research in Optical Sciences Congress, Berlin-Germany, March 2014 (poster presentation)
- 1st Workshop on metamaterials and photonic crystals, Universidad del Quindío, Armenia-Colombia, October 2013 (contributed talk)
- IV Quantum information school, Paraty-Brasil, August 2013 (poster presentation).
- Quantum Optics VI, Piriápolis-Uruguay, November 2012 (poster presentation).
- International Workshop on Quantum Coherence and Decoherence, Universidad del Valle, Cali-Colombia, September 2012 (poster presentation).
- IV Workshop de Óptica Cuántica, Universidad de Antioquia, Medellín-Colombia, June 2011.

References

- Dr. Mohammad Hafezi, Joint Quantum Institute-University of Maryland.
  hafezi@umd.edu
- Dr. Daniele Sanvitto, Advanced Photonics Laboratory, CNR Nanotec.
  daniele.sanvitto@nanotec.cnr.it
- Dr. You Zhou, Department of Material Science and Engineering, University of Maryland.
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