PHD STUDENT — QUANTUM NANO-OPTOELECTRONICS, ICFO

BIANCA TURINI

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PROFILE

I am a **"la Caixa" Foundation fellow** at ICFO, working in the Quantum Nano-Optoelectronics group led by Prof. Frank Koppens and co-supervised by Prof. Adrian Bachtold (Quantum NanoElectronics and NanoMechanics). My research focuses on **cavity quantum electrodynamics in two-dimensional materials**.
I use deep-subwavelength phonon-polariton cavities in hexagonal boron nitride to confine light to the nanoscale and engineer its coupling to correlated electron systems, which I investigate through transport.

I am a *Normalista*, an alumna of the Scuola Normale Superiore in Pisa, one of Italy's most selective academic institutions. Outside the lab, I am an active member of ICONS (ICFO's Optica, SPIE, and EPS student chapter) and co-founder of the Nanofabrication Seminar Series.

EXPERTISE

DESIGN & SIMULATION	Electromagnetic simulations of nanocavities (COMSOL Multiphysics, Tidy3D)
FABRICATION	Van der Waals heterostructure assembly (graphene, hBN) by dry transfer · electron-beam and optical lithography · reactive-ion etching · metal deposition · cleanroom processing · nano-characterization
MEASUREMENT	Quantum transport · cryogenics · near-field optical microscopy (SNOM) · phototransport · Josephson junctions and supercurrent spectroscopy
CODING	Python for data analysis · instrument control and measurement automation with QCoDeS · version control with Git and GitHub

EDUCATION

2023 — — **PhD in Photonics**
ICFO & Universitat Politècnica de Catalunya
"la Caixa" INPhINIT doctoral fellowship

2020 — 22 — **M.Sc. in Physics and Nanoscience**
Scuola Normale Superiore, Pisa
Thesis: *Josephson diode effect in high-mobility InSb nanoflags* — NEST Laboratory, groups of Stefan Heun and Francesco Giazotto

2017 — 20 — **B.Sc. in Physics**
University of Pisa
Thesis: development of a low-cost eye tracker for EEG experiments with visual stimuli — NEST Laboratory, group of Gian Michele Ratto

RESEARCH STAYS

APR 2026 — Invited for a one-week research visit to the **Collège de France** in Paris, hosted by Dr. Gian Marcello Andolina.

APR–JUN 2022 — Laboratoire de Physique de l'École Normale Supérieure (LPENS), Paris
Hybrid Quantum Circuits group of Takis Kontos
Project: 2.5D GHz cavities for cavity-integrated quantum materials

FELLOWSHIPS & AWARDS

APR 2026 — **Honorable Mention**, poster prize
Frontiers of Cavity Quantum Electrodynamics, Rice Center for Cavity QED — Paris, France — *Forbidden Landau-level transitions and mode hybridization via phonon-polariton nanocavities*

2023 — — **"la Caixa" Foundation INPhINIT doctoral fellowship**
Competitive Europe-wide PhD fellowship

PUBLICATIONS

[4] G. M. Andolina, M. Ceccanti, **B. Turini**, R. Riolo, M. Polini, M. Schirò, F. H. L. Koppens. **Quantum electrodynamics of graphene Landau levels in a deep-subwavelength hyperbolic phonon-polariton cavity**. *Physical Review Research* 8, 023044 (2026) · doi:10.1103/69jg-sq8r · cited by 12

[3] **B. Turini**, S. Salimian, M. Carrega, F. Paolucci, V. Zannier, L. Sorba, S. Heun. **Side-gate modulation of supercurrent in InSb nanoflag-based Josephson junctions**. *Physica Status Solidi (b)* 262, 2400534 (2025) · doi:10.1002/pssb.202400534 · cited by 5

[2] A. Iorio, A. Crippa, **B. Turini**, S. Salimian, M. Carrega, L. Chirolli, V. Zannier, L. Sorba, E. Strambini, F. Giazotto, S. Heun. **Half-integer Shapiro steps in highly transmissive InSb nanoflag Josephson junctions**. *Physical Review Research* 5, 033015 (2023) · doi:10.1103/PhysRevResearch.5.033015 · cited by 22

[1] **B. Turini**, S. Salimian, M. Carrega, A. Iorio, E. Strambini, F. Giazotto, V. Zannier, L. Sorba, S. Heun. **Josephson diode effect in high-mobility InSb nanoflags**. *Nano Letters* 22, 8502 (2022) · doi:10.1021/acs.nanolett.2c02899 · cited by 141

INVITED TALKS

JUL 2025 — **Graphene quantum Hall electrodynamics in deep-subwavelength phonon-polariton cavities**
FisMat 2025 — Ca' Foscari University, Venice, Italy

APR 2025 — **Graphene quantum Hall electrodynamics in deep-subwavelength phonon-polariton cavities**
Collège de France — Paris, France · Hosted by Prof. Marco Schirò

CONTRIBUTED TALKS

APR 2026 — **Hyperbolic cavity electrodynamics with graphene electrons in the quantum Hall regime**
QUANTUMatter 2026 — Barcelona, Spain

MAR 2024 — **Exploring cavity-induced effects in 2D quantum materials**
APS March Meeting 2024 — Minneapolis, USA

POSTERS

APR 2026 — HONORABLE MENTION
Forbidden Landau-level transitions and mode hybridization via phonon-polariton nanocavities
Frontiers of Cavity Quantum Electrodynamics, Rice Center for Cavity QED — Paris, France

MAY 2025 — **Graphene quantum Hall electrodynamics in deep-subwavelength phonon-polariton cavities**
Gordon Research Conference: Topological and Correlated Matter — Castelldefels, Spain

JUN 2024 — **Graphene Landau level cavity QED with phonon-polaritonic cavities**
Challenges and perspectives in resonator-mediated quantum many-body physics, ETH Zürich — Zürich, Switzerland

MAY 2024 — **Graphene Landau level cavity QED with phonon-polaritonic cavities**
Workshop: Cavity Control of Quantum Materials, CFEL / DESY — Hamburg, Germany

SCHOOLS

APR 2023 — **Optomechanics & Nanophononics**
Spring school, École de Physique des Houches — Les Houches, France

JUL 2022 — **Quantum Fluids of Light and Matter**
International School of Physics "Enrico Fermi" — Varenna, Italy
Poster: *Non-reciprocal supercurrent in InSb nanoflag-based ballistic Josephson junctions*

SERVICE

2024 – — **ICONS — ICFO Student Chapter**
Secretary (current) · formerly President

2025 – 26 — **Nanofabrication Seminar Series**
Co-founder

OCT 2024 — **SCOP24 — Student Conference in Optics and Photonics**
Co-organiser with ICONS, the ICFO student chapter · Secretary of the organising committee — ICFO, Castelldefels

2023 – 25 — **Diversity & Inclusion Committee**
Member, ICFO

OUTREACH

FEB 2026 — **#científiques — BIST**
School talk for the Day of Women and Girls in Science
Institut Escola Elisabets, Barcelona