

Paolo De Vincenzi

PhD Student in Material Sciences | Semiconductor nanowires | Optoelectronics | Single-photon emitters

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RESEARCH PROFILE

Experimental physicist specializing in III–V semiconductor nanostructures, optical spectroscopy and quantum photonics. My research focuses on studying the optical and optoelectronic properties of semiconductor nanowires and embedded quantum emitters, combining cryogenic spectroscopy, time-resolved and single-photon measurements with nanostructure processing and numerical modelling. I develop and optimize experimental platforms for the realization and characterization of tunable single-photon sources based on semiconductor nanowires, with a focus on light–matter interaction, carrier transport and photonic confinement.

ACADEMIC STATUS

PhD in Material Sciences — Sapienza / Department of Basic and Applied Sciences for Engineering
Advisor: Prof. Marta De Luca

RESEARCH FOCUS

III–V semiconductor nanowires
Optical spectroscopy & single-photon sources
Nanomaterials, band structure & optoelectronics

EDUCATION

2023–Present | PhD in Material Sciences

Thesis: “Bandgap Engineering and Single-photon Emission in III-V Semiconductor Nanowires” (provisional)

2021–2023 | MSc in Physics

Sapienza — Thesis: “Bandgap Engineering and Single-photon Emission in Dilute Nitride GaAsN Nanowires”

2017–2021 | BSc in Physics

Sapienza — Thesis: “Studio Sulla Luminescenza delle Perovskiti Ibride”

RESEARCH EXPERIENCE & EXPERTISE

- **Optical spectroscopy:** μ -photoluminescence (μ -PL) and μ -Raman spectroscopy on III–V semiconductor nanowires and quantum-dot nanostructures, from room to cryogenic temperatures; temperature-, power-, wavelength-, polarization- and time-dependent measurements.
- **Experimental optics:** independent design and construction of free-space and fiber-coupled optical setups, including optical coupling, beam conditioning and detector selection.
- **Quantum photonics:** design and implementation of time-resolved PL, photon-correlation and coherence measurements; high-resolution single-photon detection using superconducting nanowire single-photon detectors (SNSPDs).
- **Cryogenics & vacuum:** operation, optimization and maintenance of cryogenic and high-vacuum systems; experience with controlled ion irradiation and thermal annealing using a Kaufman ion source.
- **Nanostructure handling:** sub-micrometer manipulation and positioning of individual semiconductor nanowires on patterned substrates.
- **Data analysis & modelling:** OriginLab for experimental data analysis; nextnano for semiconductor nanostructure modelling.
- **Scientific development:** Design and optimization of semiconductor nanowire platforms for optoelectronic and quantum-photonic applications.
- **Research management:** scientific instrumentation procurement, technical evaluation and supplier negotiation; supervision and support of MSc experimental theses.

SELECTED PUBLICATIONS

1. [1] De Vincenzi, P.; Sorodoc, R. A.; Sharma, A. S.; Roggi, M.; Santanchè, I.; Perrini, L.; Mugnaioli, E.; Riccardo Rurali, R.; Beltram, F.; Sorba, L.; Zannier V. and De Luca, M. *Quantum light emission from growth-tunable GaAsP_{1-x} quantum dots in wurtzite GaP nanowires*. **ACS Appl. Mater. Interfaces** (2026) **18** (25): 35624–35632.
2. [2] De Vincenzi, P.; Santanchè, I.; Riccardo Rurali, R.; Sorodoc, R. A.; Sharma, A. S.; Gopalakrishnan, H.; Roggi, M.; Mugnaioli, E.; Mura, F.; Beltram, F.; Sorba, L.; Zannier V. and De Luca, M. *Direct Band Gap Wurtzite GaAsP_{1-x} Nanowires*. (under submission)

3. Sorodoc, R. A.*; De Vincenzi, P.*; Sharma, A. S.; Bucci, G.; Roggi, M.; Mugnaioli, E.; Sorba, L.; De Luca, M.; Zannier, V. *Tunable GaAs_xP_{1-x} Quantum-Dot Emission in Wurtzite GaP Nanowires*. **ACS Appl. Mater. Interfaces** **2024**, **16** (47), 65222–65232.
4. Denis, N; Sharma, A. S.; Blundo, E.; Santangeli, F.; De Vincenzi, P.; Pallucchi, R.; Yukimune, M.; Vogel, A.; Zardo, I.; Polimeni, A.; Ishikawa, F.; De Luca, M. [PDF] *Bandgap Engineering On Demand in GaAsN Nanowires by Post - Growth Hydrogen Implantation*. **Small** **22** (7), e06091.

CONFERENCES & INVITED PRESENTATIONS

- 2026 — Terzo Congresso Nazionale NQSTI, Napoli — Oral presentation
- 2025 — Nanowire Week, Cambridge — Oral presentation
- 2025 — Quantum Optics and Quantum Materials Summer School, Lecce — Poster
- 2024 — 110° Congresso della Società Italiana di Fisica, Bologna — Oral Presentation
- 2024 — SFO Thematic School on Thermics and Nanophotonics, Chamonix — Poster

AWARDS, GRANTS & DISTINCTIONS

- 2026 — Avvio alla Ricerca Sapienza.
- 2025 — ICRANet: Premio Mersenne 2025

ADDITIONAL INFORMATION

- Completed the European Patent Academy Entry Level training
- Certificate of Advanced English, Cambridge University, Europass level C1
- ICDL Profile Certificate