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Davide Tedeschi

Nationality: Italian **Date of birth:** 15/07/1990 **Phone number:** (+39) 3461238766

Email address: davide.tedeschi@univaq.it

Work: Dipartimento di scienze fisiche e chimiche Università degli studi dell'Aquila Via Vetoio, Coppito, 67100 L'Aquila (Italy)

WORK EXPERIENCE

University of L'Aquila – L'Aquila, Italy

City: L'Aquila | **Country:** Italy

Assistant professor

[01/11/2024 – Current]

Tenure track researcher (RTT) at the Department of Physics and Chemistry, University of L'Aquila. Member of the nanophotonics group, with a focus on research in the department's ultrafast and Raman laboratories. Main experimental activities are in the field of ultrafast spectroscopies and non-linear optics.

Enea – Roma, Italy

City: Roma | **Country:** Italy

Researcher (III Level)

[01/09/2021 – Current]

Researcher at the ENEA FSN department, within the FISS division in the RNR laboratory, where maintenance and operation tasks are performed on the Casaccia site's two TRIGA and TAPIRO nuclear research reactors. The laboratory conducts experimental work utilizing neutron fluxes generated by the reactors for activities such as neutron activation and tomography experiments, as well as irradiation studies on various devices and materials, particularly focusing on the aerospace sector within the ASIF project.
Additionally, research activities extend to the realms of optoelectronics and photonics at the TECFIS division. Primary experimental pursuits are focused on fast optical spectroscopies, with a specific emphasis on femtosecond coherent Raman techniques such as CARS and ISRS, primarily applied to two-dimensional materials like transition metal dichalcogenides (MX2, where M=Mo,W and X=S,Se). Collaboration with the Nanophotonics group at the University of Rome La Sapienza involves integrating single atomic layers of WSe2 on piezoelectric devices for quantum optics applications.
Moreover, within the framework of the "electrical system research" program agreement, activities encompass Raman and infrared absorption characterization of materials and components pertinent to electrochemical storage systems, including polymeric membranes, carbonaceous materials, and cathode materials. Additionally, as part of the H2020-MSCA-RISE-2020 ChemPGM project, Raman characterization efforts are directed towards catalytic powders composed of platinum group metals, sourced from recycled exhausted catalytic converters.

Aizoon – Roma, Italy

City: Roma | **Country:** Italy

optical engineer

[01/11/2020 – 30/08/2021]

External consultant at Leonardo, Aerospace Division, based in Pomezia and Campi Bisenzio.
Involved in the integration and validation teams for the UV laser power head of the ATLID program, a part of the European EarthCare project (ESA - EarthCARE).
Integration and alignment of both optical and electronic setups related to the laser power head, as well as the ground support equipment. Implementation of a Labview program to manage all telemetry, coming both from the laser head and the optical setup, to characterize its optical properties.
Measurements and performance analysis of the laser head were exploited both in thermal vacuum chambers (pressure 10^-7 mbar, temperatures -30-60 °C) and on vibrating platforms.
Acquisition of work standard in cleanroom conditions (ISO 5 - ISO 7).

On Semiconductor – Avezzano, Italy

City: Avezzano | **Country:** Italy

yield engineer

[31/08/2020 – 30/10/2020]

Performed analysis of methods, processes, tools, and systems required for the production and manufacturing activities of CMOS image sensors for automobiles (CIS). Conducted research and analysis on product developers, customers, and marketing requirements to determine the feasibility of CIS design.

IIS Gregorio da Catino – Poggio Mirteto, Italy

City: Poggio Mirteto | **Country:** Italy

High school teacher

[01/03/2020 – 30/08/2020]

Teacher of mathematics and physics at the Gregorio da Catino High School Institute.

University of Rome "La Sapienza" – Roma, Italy

City: Roma | **Country:** Italy

Post Doc researcher

[28/02/2018 – 29/02/2020]

Postdoctoral researcher at the University of Rome La Sapienza in the NanoPhotonics group led by Prof. Rinaldo Trotta.
He conducted research activities on:

- Quantum optics experiments (entanglement swapping, teleportation, quantum memories in gaseous phase) using semiconductor GaAs quantum dots as a source of non-classical light. The optoeletronics properties of quantum dots were engineered using piezoelectric devices, whose proper integration within closed-cycle cryostats at low temperatures (4 K) was identified by the undersigned.
- Quantum optics experiments (second-order autocorrelation) on single atomic layers of two-dimensional materials like WSe2 integrated on piezoelectric devices, both monolithic and nanostructured, to engineer the optoelectronic properties of emitted photons.

He actively contributed to both administrative management of orders and suppliers, and the installation of various experimental setups (optical tables, pulsed and non-pulsed lasers, monochromators, CCDs, APDs, cryostats, stabilized voltage generators, precision manipulation stages, high-resolution temporal correlator) within the laboratory. Since the laboratory activities began simultaneously with the research grant and its setup started from scratch, he substantially contributed to the commissioning of all the equipment present in the lab. During the research period, he served as supervisor for two master's theses.

University of Rome "La Sapienza" – Roma, Italy

City: Roma | **Country:** Italy

Phd

[01/11/2014 – 17/02/2018]

Ph.D. student at the University of Rome La Sapienza in the group led by Professors Antonio Polimeni and Mario Capizzi.
He conducted research activities on:

- Optoelectronic properties of semiconductor nanowires (InP, GaAs, AlGaAs, GaAsSb, etc.) grown both in different crystal structures (zinc-blende, wurtzite) and as heterostructures, through optical spectroscopy experiments (PL, PLE) under various external perturbations (magnetic field, temperature, light polarization) and via electron microscopy measurements (SEM). The main focus was on studying InP nanowires grown in the wurtzite crystal phase, which is not achievable when the material is in the bulk form.
- Optoelectronic properties of two-dimensional materials such as MX2-type TMDs (M= W, Mo and X= Se, S, Te) and graphene following irradiation with low-energy protons using a Kaufman source. He discovered and rationalized a new technique for producing single atomic layers of TMD in the form of domes following irradiation of multi-layered atomic TMDs. The formation of these domes allowed the study of the physical properties of TMDs under high strain fields (2% biaxial).

During the doctoral period, he participated in the installation of various experimental setups, including a monochromator, a closed-cycle cryostat for microscopy, and laser sources. Throughout the research activity, he supervised four master's thesis students.

EDUCATION AND TRAINING

Executive Master in Advanced Management: Space Economy

Luiss Business School [11/11/2023 – Current]

City: Roma | **Country:** Italy

PhD in Mathematical Models for Engineering, Electromagnetism, and Nanoscience, with a focus on Materials Science.

University of Rome La Sapienza [31/10/2014 – 19/12/2017]

Address: Piazzale Aldo Moro 2, 00185 Roma (Italy) | **Final grade:** Excellent | **Thesis:** Addressing and tailoring the electronic properties of semiconductor nanostructures: nanowires and transition metal dichalcogenides, relatore Prof. Antonio Polimeni

Master in Physics

University of Rome La Sapienza [31/10/2012 – 30/10/2014]

Address: Piazzale Aldo Moro 2, 00185 Roma (Italy) | **Final grade:** 110/110 cum laude | **Thesis:** Dipendenza della termalizzazione di portatori fotoeccitati dalla geometria di nanofili di InP, Relatori Prof. Antonio Polimeni e Mario Capizzi

Bachelor in Physics

University of Rome La Sapienza [30/09/2009 – 29/09/2012]

Address: Piazzale Aldo Moro 2, 00185 Roma | **Final grade:** 110 cum laudee | **Thesis:** Studio sperimentale di nanostrutture semiconduttrici a pozzo quantico, Relatore Prof. Antonio Polimeni

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

Inglese

LISTENING C1 **READING** C2 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** B2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

Data Analysis Software

Origin Pro / Matlab / COMSOL Multiphysics (Intermediate) / Gwyddion / jupiter notebook

Programming language

Labview / Python / Wolfram Mathematica (Intermediate)

office suite

Microsoft Office package: Microsoft Word, Excel, PowerPoint, Access

Operating system

Windows / Conoscenza dei sistemi operativi MacOS iOS

PUBLICATIONS

[2015]

Temperature Dependence of Interband Transitions in Wurtzite InP Nanowires

Zilli A, De Luca M, Tedeschi D, Fonseka HA, Miriametro A, Tan HH, Jagadish C, Capizzi M, Polimeni A

ACS NANO, vol. 9, p. 4277-4287

[2016]

Long-Lived Hot Carriers in III–V Nanowires

Tedeschi D., De Luca M., Fonseka H. A., Gao Q., Mura F., Tan H. H., Rubini S., Martelli F., Jagadish C., Capizzi M., Polimeni A.

NANO LETTERS, vol. 16, p. 3085-3093

[2016]

Effect of the order-disorder transition on the optical properties of Cu2ZnSnS4

Valentini M., Malerba C., Menchini F., Tedeschi D., Polimeni A., Capizzi M., Mittiga A.

APPLIED PHYSICS LETTERS, vol. 108, ISSN: 0003-6951

[2016]

Value and Anisotropy of the Electron and Hole Mass in Pure Wurtzite InP Nanowires

Tedeschi D., De Luca M., Granados Del Águila A., Gao Q., Ambrosio G., Capizzi M., Tan H. H., Christianen P. C. M., Jagadish C., Polimeni A.

NANO LETTERS, vol. 16, p. 6213-6221

[2017]

InP–In x Ga 1− x As core-multi-shell nanowire quantum wells with tunable emission in the 1.3–1.55 μm wavelength range

Fonseka H. A., Ameruddin A. S., Caroff P., Tedeschi D., De Luca M., Mura F., Guo Y., Lysevych M., Wang F., Tan H. H., Polimeni A., Jagadish C.

NANOSCALE, vol. 9, p. 13554-13562

[2018]

Azetidinium lead iodide: synthesis, structural and physico-chemical characterization

Panetta R., Righini G., Colapietro M., Barba L., Tedeschi D., Polimeni A., Ciccioli A., Latini A.

JOURNAL OF MATERIALS CHEMISTRY. A, vol. 6, p. 10135-10148

[2019]

Unusual spin properties of InP wurtzite nanowires revealed by Zeeman splitting spectroscopy

Tedeschi D., De Luca M., Faria Junior P. E., Granados del Águila A., Gao Q., Tan H. H., Scharf B., Christianen P. C. M., Jagadish C., Fabian J., Polimeni A.

PHYSICAL REVIEW. B, vol. 99, 161204(R)

[2019]

Common nonlinear features and spin-orbit coupling effects in the Zeeman splitting of novel wurtzite materials

Faria Junior P. E., Tedeschi D., De Luca M., Scharf B., Polimeni A., Fabian J.

PHYSICAL REVIEW. B, vol. 99, 195205

[2019]

Strain-Tunable Single Photon Sources in WSe2 Monolayers

Iff O.*, Tedeschi D.*, Martin-Sanchez J.*, Moczala-Dusanowska M., Tongay S., Yumigeta K., Taboada-Gutierrez J., Savaresi M., Rastelli A., Alonso-Gonzalez P., Hofling S., Trotta R., Schneider C.

*equally contributed authors.

NANO LETTERS, vol. 19, p. 6931-6936

[2019]

Entanglement Swapping with Photons Generated on Demand by a Quantum Dot

Basso Basset F.*, Rota M.*, Schimpf C.*, Tedeschi D.*, Zeuner K. D., Covre da Silva S. F., Reindl M., Zwiller V., Jöns K. D., Rastelli A., Trotta R.

*equally contributed authors.

PHYSICAL REVIEW LETTERS, vol. 123, 160501

[2019]

Controlled Micro/Nanodome Formation in Proton-Irradiated Bulk Transition-Metal Dichalcogenides

Tedeschi D., Blundo E., Felici M., Pettinari G., Liu B., Yildrim T., Petroni E., Zhang C., Zhu Y., Sennato S., Lu Y., Polimeni A.

ADVANCED MATERIALS, vol. 31, 1903795

[2020]

Evidence of the direct-to-indirect band gap transition in strained two-dimensional WS 2 , MoS 2 , and WSe 2

Blundo E., Felici M., Yildirim T., Pettinari G., Tedeschi D., Miriametro A., Liu B., Ma W., Y. Lu, Polimeni, A.

PHYSICAL REVIEW RESEARCH, vol. 2, 012024

[2020]

Entanglement Teleportation With Photons From Quantum Dots: Toward a Solid-State Based Quantum Network

Rota M., Basso Basset F., Tedeschi D., Trotta R.

IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS, vol. 26, p. 1

[2020]

Hole and electron effective masses in single InP nanowires with a wurtzite-zincblende homojunction

Tedeschi D., Fonseka H. A., Blundo E., Granados Del Águila A., Guo Y., Tan H. H., Christianen P. C. M., Jagadish C., Polimeni A., De Luca M.

ACS Nano, vol. 14, pag. 11613–11622

[2020]

Photoluminescence Spectroscopy Applied to Semiconducting Nanowires: A Valuable Probe for Assessing Lattice Defects, Crystal Structures, and Carriers' Temperature

Tedeschi D., De Luca M., Polimeni A.

Fundamental Properties of Semiconductor Nanowires. p. 289-306, ISBN: 978-981-15-9049-8

[2021]

Quantum teleportation with imperfect quantum dots

Basso Basset F., Salusti F., Schweickert L., Rota M. B., Tedeschi D., Covre da Silva S. F., Roccia E., Zwiller V., Jöns K. D., Rastelli A., Trotta R.

NPJ QUANTUM INFORMATION, vol. 7, 7

[2022]

Toward Gas-Phase Thermometry Using Pure-Rotational Impulsive Stimulated Raman Scattering Spectroscopy with a Low-Energy Femtosecond Oscillator

Falconieri M, Tedeschi D, Gagliardi S, Rondino F, Marrocco M, Kulatilaka W D. D.

APPLIED SCIENCES, vol. 12, 12710

[2025]

High-performance chiral mirrors by twisted anisotropic photonic crystals

Andrea Alessandrini, Leone di Mauro Villari, Luca Assogna, Matteo Silvestri, Matteo Venturi, Carino Ferrante, Paola Benassi, David e Tedeschi, and Andrea Marini.

Phys. Rev. Applied 23, 064027

SOCIAL AND POLITICAL ACTIVITIES

[2022 – 2024]
Elected Representative of the Trade Union (RSU) for the Casaccia Research Center.

[2013 – 2015]
Elected as a student member in the Faculty Assembly of SMFN at Sapienza University of Rome.

CONFERENCES AND SEMINARS

[09/11/2025 – 13/11/2025] Singapore
propagation, spectroscopy and imaging, Topic Chair of IPC 2025
Write here the description...

[08/11/2024 – 11/12/2024] Canberra (Australia)
Invited talk at International Symposium on Semiconductor Optoelectronics and Nanotechnology (ISSON)
Strain-induced exciton transfer among quantum emitters in two-dimensional materials

[05/12/2023 – 07/12/2023] Enea CR Frascati
Local Committee of the International Workshop "Pursuing Quantum Sensing for Reliable Roadmaps"
Write here the description...

[28/02/2023] Department of Physical and Chemical Sciences, University of L'Aquila
Invited seminar at the department of Physics and Chemistry of the University of L'Aquila
Title: "Tailoring the optical properties of semiconductor transition metal dichalcogenides: from fundamental to applied research".

[04/04/2019 – 06/04/2019] Roma
Oral contribution at the Quantum Information and Measurement V conference
Title "All-photonic quantum teleportation and entanglement swapping using on-demand solid-state quantum emitters"

[30/09/2019 – 05/11/2019] Erice
Poster contribution at the summer school "QUANTUM DEVICES FOR NON-CLASSICAL LIGHT GENERATION AND MANIPULATION"
Title: "Site-controlled energy-tuneable single-photon sources in 2 dimensional materials"

[05/12/2018 – 07/12/2018] University of Rome La Sapienza
Local Committee of the Sixth international workshop "Engineering of Quantum Emitter Properties".

[23/09/2018 – 27/09/2018] Berlino
Poster contribution at the 14th International Conference on Nonlinear Optics and Excitation Kinetics in Semiconductors
Title: "Hydrogen-Driven Generation of Atomically Thin, Light Emitting Domes in Transition Metal Dichalcogenides"

[01/10/2017 – 05/10/2017] Trieste
Oral contribution at the conference FisMat 2017
Title: "Spin and transport properties of electrons and holes in InP wurtzite nanowires assessed by magneto-optical measurements and kp calculations"

[29/05/2017 – 02/06/2017] Lund (Svezia)
Oral contribution at the conference Nanowire Week Meeting
Title: "Spin and transport properties of electrons and holes in InP wurtzite nanowires assessed by magneto-optical measurements and kp calculations"

[29/05/2017 – 02/06/2017] Lund (Svezia)

Poster contribution at the conference Nanowire Week Meeting
Title: "Optical studies of a single crystal-phase homostructured InP Nanowire"

[02/05/2016 – 06/05/2016] Lille (Francia)
Poster contribution at European Materials Research Society Spring Meeting
Title: "Light emission in hydrogenated mono-, bi-, and multi-layer MoSe2"

[21/09/2015 – 25/09/2015] Rome
Oral contribution at the conference "101 Congresso Nazionale Societa' Italiana di Fisica"
Title: "Hot carrier in InP nanowires"

[14/09/2015 – 18/09/2015] Porquerolles (Francia)
Poster contribution at the Pulse Epitaxy Updates and promises summer school
Title: "Nanowires Are Not So Cool"

[22/03/2015 – 25/03/2015] Bad Honnef (Germania)
Poster contribution at the conference III-V Nanowire Photonics
Title: "Hot carrier in InP nanowires"

PROJECTS

[2025]
Funding for Avvio Alla ricerca 2025 in the University of L'Aquila
Title: "Highly correlated Inter-layer exciton complexes in transition metal dichalcogenides heterostructures investigated by two-dimensional coherent spectroscopy. " Grant of 2300 euro.

[2019]
Funding for Avvio alla Ricerca 2019 in the University of Rome "La Sapienza".
Title: "Strain tuning of the physical properties of site-controlled quantum emitters in 2-dimensional transition metal dichalcogenides". Grant of 3200 euro.

[2017]
Accepted Research proposal - HFML for magnet time
NSC13-216 (HFMLcode: 2017.077): "Magneto-optical studies of hexagonal GaAsSb/AlGaAs quantum well tubes embedded in GaAs nanowires"

[2016]
Funding for Avvio alla Ricerca 2016 in the University of Rome "La Sapienza".
Title: "Magneto-fotoluminescenza in tubi quantici di GaAsSb/AlGaAs incapsulati in nanofili core-shell di GaAs: alla ricerca dell'effetto Aharanov-Bohm." Grant of 1500 euro.

[2015]
Funding for Avvio alla Ricerca 2015 in the University of Rome "La Sapienza".
Title: "Proprietà di termalizzazione di portatori fotoeccitati in nanofili semiconduttori del gruppo III-V." Grant of 1500 euro.

HONOURS AND AWARDS

[25/09/2016] Società italiana di Fisica
Award "Paolo Mazzoldi per la Fisica della Materia Condensata e/o Nanostrutturata"
"per i suoi interessanti studi sperimentali di spettroscopia ottica e magneto-ottica in semiconduttori nanostrutturati".

BIBLIOMETRIC DATA

updated on 25/06/2025, from scopus

number of publications 21

number of citations 726

h-index 13

TUTOR OF THESIS

[2015]
Gina Ambrosio "Studio delle proprietà ottiche di nanofili semiconduttori di fosfuro di indio cresciuti con epitassia da sito controllato." Master's Thesis

[2016]
Elisa Petroni "Irraggiamento con idrogeno dei dicalcogenuri dei metalli di transizione: studio degli effetti sulle proprietà elettroniche e strutturali." Master's Thesis

[2017]
Silvano Frattesi "Misure di fotoluminescenza di nanostrutture semiconduttrici Zn_3As_2", Master's Thesis

[2017]
Michela Ottaviani "Analisi della polarizzazione della luminescenza emessa da nanofili di GaAsSb/GaAs", Master's Thesis

[2019]
Matteo Savaresi "Studio di materiali bidimensionali come emettitori di singolo fotone ad energia e posizionamento controllati", Master's Thesis (co-relatore)

[2020]
Giuseppe Ronco "Polarization resolved optical spectroscopy of strained monolayer WS2", Master's Thesis (co-relatore)

TEACHING ACTIVITIES AND SCHOLARSHIPS

[2025 – Current]
General Physics at bachelor degree of computer science

Physics Course for Chemistry and Pharmaceutical Technologies at Sapienza University of Rome.

[2018 – 2019]
Lecture "Fluidodinamica"

Engineering Course for Sustainable Construction at Sapienza University of Rome.

[2016 – 2017]
General Physics assistant (9 ECTS)

Optics Course, Department of Physics at Sapienza University of Rome;

[2015 – 2017]
Student tutor in the optic lab

DD 120/2017 of the Physics Department of University of Rome La Sapienza. Title "Ingegnerizzazione delle proprietà ottiche di punti quantici semiconduttori attraverso perturbazioni esterne"

[2017 – 2019]
Assegno di ricerca

N.112/2017 of 23/11/2017 of the Physics Department of University of Rome La Sapienza. Title "“Studio delle proprietà elettroniche di nano strutture semiconduttrici mediante fotoluminescenza”"

[10/01/2018 – 17/02/2018]
Grant for research activity

First classified at PhD scholarship in physics, XXX cycle, at Sapienza University of Rome.

[2014]
Grant for PhD

PhD scholarship in physics, XXX cycle, at University of Roma Tre.

[2014]
Grant for PhD

PhD scholarship in Mathematical Models for Engineering, Electromagnetism, and Nanoscience, XXX cycle, at Sapienza University of Rome.

[2014]
Grant for PhD

EXPERIMENTAL SKILL

Optical Microscopy (PL, Raman)

Optical Spectroscopy (PL, Absorption, IR, Raman)

Designing and building of optical setup

Ultra-high vacuum and cryogenic setup coupled to optic system;

Quantum Optics (second-order autocorrelation, Bell state measurements, single-photon avalanche photodiodes)

Single-mode and multi-mode optical fibers with polarization maintenance.

Ti:Sa, Nd:YAG lasers (both pulsed and continuous wave) and characterization of laser pulses both spectrally and temporally.

Non linear optics (ISRS, CARS)

Utilization of continuous magnetic field sources (up to 30 T) in various configurations (Faraday or Voigt).

Piezoelectric devices and highly stabilized voltage generators

2D Material Transfer Setup

Atomic Force Microscope and Scanning Electron Microscope

SHORT STAY AT INTERNATIONAL LABS

[05/09/2023 – 07/10/2023]
Monolithos Catalyst LTD

Athena (Greece)

[23/01/2017 – 27/01/2017]
Center for Materials and Microsystems (CMM, FBK)

Trento (Italy)

[06/02/2015 – 23/02/2015]
High Field Magnet Laboratory (HFML)

Nijmegen (Netherlands).