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**ANTONIO POLIMENI**  
*Curriculum Vitae*

Place Rome  
Date 17 July 2024

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has led to important discoveries, such as the passivation of nitrogen impurities in III-V alloys and the creation of spatially controlled strain fields in two-dimensional materials. An important asset of the activities of OPERA concerns the use of high magnetic fields that has provided the group with important international recognitions.

The candidate is deputy-coordinator of **SMART** (Spectro-Microscopy lAboRaTory), a departmental laboratory established thanks to the “Departments of Excellence 2018-2022” funding scheme of the Ministry of University and Research. The laboratory is open to external users on proposal-based applications. SMART is meant to address several scientific and technological challenges related to novel materials of use in diverse contexts. These comprise nanostructures for quantum and green technologies and flexible electronics; dielectric coatings of mirrors in interferometers employed for gravitational wave detection; detectors for high-energy physics and dark matter; superconductors. The scientific approach of SMART is holistic in character and lies on the possibility to perform treatments and functionalisation by hydrogen and alkali metals of the sample surfaces and nanostructures and to study them with integrated spectroscopic techniques within the same ultra-high-vacuum environment ( $10^{-11}$  mbar). At SMART, micro-PL and micro Raman spectroscopy with few hundred-nanometre spatial resolution, and X-Ray Photoelectron Spectroscopy (XPS) with tens of micron spatial resolution can be carried out within the same contaminant-free environment before and after in-situ treatments.

**Part IV – Teaching activity**

<i>Year</i>	<i>Institution</i>	<i>Lecture/Course</i>
<b>Courses and tenures</b>		
1998/1999	<i>School of Physics and Astronomy, Nottingham University, United Kingdom</i>	<i>Tutor (4 students)</i>
1999/2000	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Laboratory classes <i>Physical Experimentations II</i> Exercise classes <i>General Physics II</i>
2000/2001	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Exercise classes <i>General Physics I</i> Series of lectures for the Doctorate in Physics ( <i>Advanced Methods for Condensed Matter Physics</i> )
2001/2002	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Exercise classes <i>General Physics II</i> Series of lectures for the Doctorate in Physics ( <i>Advanced Methods for Condensed Matter Physics</i> )
2002/2003	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Exercise classes <i>Electricity/Magnetism and Electromagnetism</i> courses
2003/2004	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Exercise classes <i>Electricity/Magnetism</i> course and Laboratory classes <i>Optics and Electromagnetism</i> course
2004/2005	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Laboratory classes <i>Optics and Electromagnetism</i>
2005/2006	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Electromagnetism</i> course
2006/2007	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	Exercise classes <i>Thermodynamics</i> Laboratory classes <i>Optics and Electromagnetism</i> Series of lectures for the Master course <i>Physics of surfaces and nanostructures</i>
2007/2008	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Electromagnetism</i> course
2008/2009	<i>Dipartimento di Biologia Ambientale, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Physics</i> course
2009/2010	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course Series of <u>lectures for the Doctorate in Physics</u> ( <i>Advanced Methods for Condensed matter Physics</i> )
2010/2011	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course Series of <u>lectures for the Doctorate in Physics</u> ( <i>Advanced Methods for Condensed matter Physics</i> )
2011/2012	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course Series of <u>lectures for the Doctorate in Physics</u> ( <i>Experimental Methods for Determining the Structural and Electronic of Low-Dimensional systems</i> )

2012/2013	<i>Dipartimento di Fisica, Sapienza Università di Roma Dipartimento di Ingegneria dell'Informazione, elettronica e Telecomunicazioni, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course  <u>Tenure</u> of the <i>Advanced Physics (Fisica Superiore)</i> course
2013/2014	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course
2014/2015	<i>Dipartimento di Fisica, Sapienza Università di Roma  Dipartimento di Chimica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course  <u>Tenure</u> of the <i>Physics I and Laboratory</i> course
2015/2016	<i>Dipartimento di Fisica, Sapienza Università di Roma  Dipartimento di Ingegneria dell'Informazione, elettronica e Telecomunicazioni, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course  <u>Tenure</u> of the <i>Quantum and Solid State Physics</i> course
2016/2017	<i>Dipartimento di Fisica, Sapienza Università di Roma  Dipartimento di Ingegneria dell'Informazione, elettronica e Telecomunicazioni, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course  <u>Tenure</u> of the <i>Quantum and Solid State Physics</i> course
2017/2018	<i>Dipartimento di Fisica, Sapienza Università di Roma  Dipartimento di Ingegneria dell'Informazione, elettronica e Telecomunicazioni, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Optics and Laboratory</i> course  <u>Tenure</u> of the <i>Quantum and Solid State Physics</i> course
2018/2019	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Condensed Matter Physics</i> course <u>Tenure</u> of the <i>Optics and Laboratory</i> course
2019/2020	<i>Dipartimento di Fisica, Sapienza Università di Roma  Dipartimento di Ingegneria Civile e Ambiente e Territorio, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Condensed Matter Physics</i> course Laboratory assistant of the <i>Optics and Laboratory</i> course  Teaching assistant of the course <i>Physics I</i> course
2020/2021	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Condensed Matter Physics</i> course <u>Tenure</u> of the <i>Solid State Sensors</i> course Laboratory assistant of the <i>Optics and Laboratory</i> course
2021/2022	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Condensed Matter Physics</i> course <u>Tenure</u> of the <i>Solid State Sensors</i> course Laboratory assistant of the <i>Optics and Laboratory</i> course

2022/2023	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Condensed Matter Physics</i> course <u>Tenure</u> of the <i>Solid State Sensors</i> course Laboratory assistant of the <i>Optics and Laboratory</i> course - Series of experimental demonstrations in the Departmental Laboratory SMART for the students of the course of <i>Laboratory of Matter Physics</i> - Lectures for the mini-course “ <i>Quantum Mechanics and Nanotechnologies</i> ” devoted to students of the “Excellence path in Physics”
2023/2024	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<u>Tenure</u> of the <i>Condensed Matter Physics</i> course <u>Tenure</u> of the <i>Solid State Sensors</i> course Laboratory assistant of the <i>Optics and Laboratory</i> course - Series of experimental demonstrations in the Departmental Laboratory SMART for the students of the course of <i>Laboratory of Matter Physics</i> - Organisation and Lectures for the mini-course “ <i>Quantum Mechanics and Nanotechnologies</i> ” devoted to students of the “Excellence path in Physics”
2000-present	<i>Dipartimento di Fisica, Sapienza Università di Roma</i>	<i>Tutor</i> of groups of students within the laboratory activity of the course of <i>Laboratory of Condensed Matter Physics</i>

## **Supervision of Bachelor's, Master's and PhD thesis**

Supervisor of **10 Laurea** thesis (4-years duration)  
Supervisor of **32 Bachelor's** thesis (*dissertazioni*)  
Supervisor of **16 Master's** thesis  
Supervisor of **2 Internship** within the Erasmus framework.

Supervisor of **15 PhD thesis** in Physics (7), Materials Sciences (7), Nanotechnologies (1, at UniSalento).  
The list of the tutees and the PhD Thesis titles are reported below.

Giorgio Baldassarri Höger von Högersthal (Physics XV cycle)

*Tuning of the electronic and lattice properties of (InGa)(AsN)/GaAs heterostructures induced by atomic hydrogen irradiation*

Matteo Bissiri (Materials Science XVI cycle)

*Hydrogen induced changes in the electronic and lattice properties of dilute nitrides*

Marco Felici (Materials Science XIX cycle)

*Isoelectronic Traps in Semiconductors: Fundamental Properties and Interaction with Atomic Hydrogen*

Francesco Masia (Physics XIX cycle)

*III-V-N compounds: the role of N in GaAsN and H in InN*

Giorgio Pettinari (Materials Science XXI cycle)

*Electronic properties and response to hydrogen incorporation in novel semiconductor materials: GaAsN, GaAsBi and InN*

Rinaldo Trotta (Materials Science XXI cycle)

*Hydrogen-assisted defect engineering in dilute nitride semiconductors*

Marta De Luca (Materials Science XXVII cycle)

*Optical and magneto-optical studies of III-V semiconductor nanowires*

Simone Birindelli (Physics XXVII cycle)

*Fabrication, characterization, and applications of novel nanostructures based on dilute nitride semiconductors*

Davide Tedeschi (Mathematical Models for Engineering, Electromagnetism and Nanosciences XXX cycle)

*Addressing and tailoring the electronic properties of semiconductor nanostructures: nanowires and transition metal dichalcogenides*

Mike Saeed Younis (Physics XXXI cycle)

*Single-Photon Emitters Based on Selective Hydrogenation of (In)GaAsN*

Mayank Shekhar Sharma (Physics XXXI cycle)

*Laser writing of nanostructures based on dilute nitrides*

Aswathi Kanjampurath Sivan (Physics XXXIII cycle)

*Carrier dynamics in semiconductor nanowires*

Elena Blundo (Physics XXXV cycle)

*Dome-shaped two-dimensional crystals: A playground for the study of the crystal mechanical and optoelectronic properties*

Federico Tuzi (Mathematical Models for Engineering, Electromagnetism and Nanosciences XXXIX cycle)

Zain Ashfaq (Nanotechnologies at UniSalento XXXIX cycle)

## Mentoring

Listed below are former students trained and mentored by the candidate (having carried out their PhD as well as Master's Degree work under the candidate guidance) having an academic or research career:

**Prof. Marco Felici**, (former Laurea and PhD student), presently *Associate Professor* at the Department of Physics, Sapienza University of Rome

The thesis work of Marco Felici received the following *award*

- 2006 Award for best Laurea degree in Physics by the Italian Physical Society.

**Prof. Francesco Masia**, (former Laurea and PhD student), *Lecturer* at the School of Biosciences, University of Cardiff (UK)

The thesis work of Francesco Masia received the following *awards*

- 2005 Italo Federico Quercia Prize at XCI Italian Physics Society National Conference.

- 2004 Young Scientist Award by the European Material Research Society.

**Dr. Giorgio Pettinari**, (former Laurea and PhD student), presently *Primo Ricercatore* at the Institute of Photonics and Nanotechnologies, National Research Council

The thesis work of Giorgio Pettinari received the following *awards*

- 2007 Young Scientist Award by the European Material Research Society.

- 2007 Award for best Laurea degree in Physics by the Italian Physical Society.

**Prof. Rinaldo Trotta**, (former Laurea and PhD student), presently *Associate Professor* at the Department of Physics, Sapienza University of Rome

The thesis work of Rinaldo Trotta received the following *award*

- 2009 "Giuseppe Turilli Prize", awarded by the Institute for Magnetic and Electronic Materials (CNR) for the best Italian PhD thesis in Materials Science (2009).

**Prof. Marta De Luca**, (former Master's and PhD student), presently *Associate Professor* at the Department of Physics, Sapienza University of Rome

The thesis work of Marta De Luca received the following *awards*:

- 2014 "Piero Brovetto" award by the Italian Society of Physics for the best work during the PhD in experimental condensed matter field in Italy in 2014. The award, in particular, was given for the magneto-optical studies in III- V nanowires.

- 2016 "Emerging leaders" award from IOP (Institute of Physics) for young scientists expected to shape the direction of research.

- 2015 "Best PhD thesis 2015" prize by Sapienza University for the best PhD thesis in 2015.

**Dr. Davide Tedeschi** (former Bachelor's, Master's and PhD student), presently *Researcher* at Centro Ricerche Casaccia, ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development)

The thesis work of Davide Tedeschi received the following *award*

- 2016 "Paolo Mazzoldi" Award by the Italian Physical Society for Condensed and Nanostructured Matter Physics for his experimental studies by magneto-optical spectroscopy in nanostructured semiconductors.

**Dr. Elena Blundo** (former Bachelor's, Master's and PhD student), presently *Alexander von Humbolt and distinguished Postdoc Fellow* at the Walter Schottky Institute (Technical University of Munich, Germany).

The thesis work of Blundo received the following *awards*:

- 2024 *European Magnetic Field Laboratory (EMFL) Prize* "for exceptional achievements in science done in high magnetic fields".

- 2023 *con.Sienze Prize for the best PhD thesis* in Physics awarded by the "Conferenza Nazionale dei Presidenti e dei Direttori delle Strutture Universitarie di Scienze e Tecnologie".

- 2023 *Applied Sciences Best PhD Thesis Award* (<https://www.mdpi.com/journal/applsci/awards/2441>).

- 2023 *Quantum Reports Best PhD Thesis Award*

(<https://www.mdpi.com/journal/quantumrep/awards/2551>).

- 2022 *Nano Letters Seed Grant by the American Chemical Society* for her research on two-dimensional materials.

- 2021 *Prize "Michele Cantone"* for young graduated students by the Italian Physical Society.

- 2019 First prize for the *Best oral communication* at the 105° national conference (Physics of Matter section) by the Italian Physical Society.



**Part V – Funding Information [grants as PI-principal investigator or I-investigator]**

<i>Year</i>	<i>Title</i>	<i>Program</i>	<i>Grant value (€)</i>
2002 present	User at high magnetic field facilities	Euromagnet, EuromagnetII, and ISABEL funded by the EU	About half million euros (see details below)
2023	National Recovery and Resilience Plan (PNRR)	Co-PI of the A4.1 task of the Spoke 4 of the National Quantum Science and Technology Institute	
2022	hybiD pErovskite nanowires For LasEr appliCaTion (DEFLECT)	Pregetti di Ateneo 2022 (PI)	38 890
2021	EQUAISE (Enabling QUAntum Information by Scalability of Engineered quantum materials) comprising 7 European partners	<i>QuantERA (European Research Area Network ERA-NET)</i> in the field of Quantum Technologies (PI)	1 824 632 (149 000 to Rome unit)
2020	A Multi-purpose Low-Energy hydrogen source for Tailoring the properties of advanced materials (AMLET)	Progetti Attrezzature di Ateneo (PI)	38 000
2020	A two-day meeting on the progress of two-dimensional materials (2Day)	Finanziamenti per convegni, seminari, workshop Ateneo Sapienza (PI)	4000
2018	SINFONIA (Trattamento sicuro dei dati mediante l'informazione con singoli fotoni a richiesta)	Regione Lazio (L.R. 13/2008 - art. 7 Progetti di Gruppi di Ricerca) (PI)	149 000
2018	Strain-driven patterning of two-dimensional materials	Progetti Grandi di Ateneo 2018 (with external referee) Sapienza Università di Roma (PI)	63 800
2017	Role of the lattice environment in the hydrogen activity in highly mismatched semiconductor alloys	Progetti di Ateneo 2017 (PI)	3800
2016	Caratterizzazione ottica di film sottili per dispositivi fotovoltaici a base di CZTS	Ministero dello Sviluppo Economico and ENEA (PI of the Sapienza activities)	35 000
2015	PROMIS, Postgraduate Research on Dilute Metamorphic Nanostructures and Metamaterials in Semiconductor Photonics	Work package <i>leader</i> of a EU project (Innovative Training Network) in Horizon 2020 (I)	516 122
2015	Exploring the tunability of electronic and vibrational properties of few-layer transition metal dichalcogenides via light atom incorporation and intercalation	Progetti di Ateneo 2015 (PI)	12 000
2014	Improving light emission efficiency in semiconductor nanowires by hydrogen-assisted surface and hetero-interface	Progetti Awards Sapienza (PI)	53 000

	passivation		
2013	Untangling the electronic band structure of InP nanowires by photoluminescence and photoluminescence excitation spectroscopy	Progetti di Ateneo 2013 (PI)	7700
2011	SITELiTE-Deterministic coupling between SITE-controlled, dilute nitride-based Light Emitters and tailor-made photonic-crystal structures	Marie Curie Action—Intra-European Fellowship by EU (coordinator)	193 726
2009	Semiconduttori inorganici e organici nanostrutturati	Progetti di Ateneo 2009 (PI)	36 600
2006	Punti e fili quantici in nitruri diluiti: un nuovo metodo per la loro realizzazione	Progetti di Ateneo 2006 (PI)	23 000
2005-2006	Study of the physical properties of strategic materials for telecommunications and high efficiency conversion of solar energy	“Programma Vigoni” funds by the Italian Ministry of University and <i>Deutscher Akademischer Austauschdienst</i> (Germany) (PI)	4000
2005	Studio di fattibilità di nuove strutture nanometriche semiconduttrici e loro caratterizzazione	Progetti di Ateneo 2005 (PI)	23 750
2004	Studio della massa efficace e del fattore giromagnetico dei portatori in composti II-VI (III-V) contenenti l'impurezza isoelettronica ossigeno (azoto) e degli effetti di un irraggiamento con idrogeno.	Progetti di Ateneo 2004 (PI)	25 000
2002	Study of the band structure of (InGa)(AsN) alloys	“Young Researcher Project” by the Italian Ministry of University and Scientific and Technological Research (PI)	10 316

As part of the funding information, the successful applications as PI or I for magnet time at the High Field Magnet Laboratory (HMFL; Grenoble, France and Nijmegen, The Netherlands) and European Magnetic Field Laboratory (EMFL; Nijmegen, The Netherlands) are reported below

2002, *Magnetophotoluminescence spectroscopy of (InGa)(AsN)/GaAs heterostructures*, 40 hrs (HMFL, Grenoble) (PI)

2007, *Determination of the electron effective mass in highly degenerate indium nitride*, 45 hrs (EMFL, Nijmegen) (PI)

2008, *Carrier effective mass and gyromagnetic factor in GaAsBi highly mismatched alloys*, 24 hrs (EMFL) (I)

2009, *Electron effective mass measurement in degenerate Indium Nitride*, 40 hours (EMFL, Nijmegen) (PI)

2009 and 2011, *Magneto-optical studies of novel dilute nitride-based nanostructures*, 40 + 30 hrs (EMFL, Nijmegen) (PI)

2011 and 2012, *Carrier mass and g-factor determination in wurtzite GaAs*, 35 hrs (EMFL, Nijmegen) (I)

2013, *Probing the band structure parameters of InP nanowires*, 40 hours (EMFL, Nijmegen) (I)

2019, *Probing the direct/indirect band gap structure of mechanically deformed WS<sub>2</sub> single layers*, 30 hrs (EMFL, Nijmegen) (PI)

2021, *Strain tuning of the spin/valley physics of k-space direct and indirect excitons in transition-metal dichalcogenides*, 40 hrs (EMFL, Nijmegen) (I)

2022, *Spin and valley physics of quantum emitters in strained 2D materials*, 2 weeks (EMFL, Warsaw) (I)

2023, *To moiré or not to moiré*, 2 weeks (EMFL, Warsaw). Further experiments will be carried out in Nijmegen (I)

2024, *Adding strain to moiré*, to be carried out in Warsaw (PI)

The total grant value amounts to about half million euros (equivalent to a cost of about € 3500 per hour).

**Part VI – Research highlights**

The candidate coordinates the group of “**Optical Spectroscopy of Nanostructured Materials**” (OPERA) at the Physics Department, Sapienza Università di Roma (<https://antoniopolimeni-physics.weebly.com/>).

He is also Deputy Coordinator of the Departmental Laboratory **Spectro-Microscopy IAbORaTory** (SMART) at the Physics Department, Sapienza Università di Roma (<https://sites.google.com/uniroma1.it/smartlab>) founded as “Department of Excellence” 2018-2022 by the Ministry of Research and University. The laboratory is open to external users on proposal-based applications.

He is co-PI within Spoke 4 of the **National Quantum Science and Technology Institute**.

The research activity of the candidate revolves around the fascinating field of nanostructured materials and the engineered modulation of their electronic properties. The candidate’s interests have encompassed the study of various systems, including inorganic semiconductors in the bulk and reduced-dimensionality form (quantum wells, quantum wires, quantum dots and nanowires) and the exploitation of self-assembled quantum dots as active medium in laser devices and tunnelling devices. Two-dimensional materials obtained from van der Waals crystals concern the most recent activity of the candidate. The electronic, optical, vibrational, transport and spin properties of those systems are addressed by optical spectroscopy techniques also under the presence of high magnetic fields (30 T) and hydrostatic pressure (10 kbar). A hallmark of the main scientific achievements of the candidate concerns the effects of low-energy (10-100 eV) hydrogen-ion irradiation on various materials. In particular, the candidate demonstrated the possibility to control spatially the incorporation of hydrogen as to modify controllably the material characteristics down to the nanometer scale. This has enabled the fabrication of site-controlled quantum emitters, and the observation of strain-driven intriguing quantum mechanical effects, such as exciton level hybridisation.

During his scientific activity, the candidate set-up various optical spectroscopy, optoelectronic (for laser characterisation) and transport apparatuses including superconducting magnets both in UK and Rome. He implemented cryogenics systems with diffraction-limited photoluminescence and Raman set-ups. He is expert in both continuous-wave and time-resolved photoluminescence measurements, as well as second harmonic generation spectroscopy and second-order correlation measurements for quantum light characterisation. Noticeably, he developed the use of a Kaufman source for low-energy (10-500 eV) light-ion (H, He) irradiation of many semiconductor materials. The candidate coordinated a project for the integration of a similar Kaufman in the SMART laboratory permitting the treatment of samples and subsequent studies by micro-electronic/optical spectroscopies within the same contaminant-free environment.

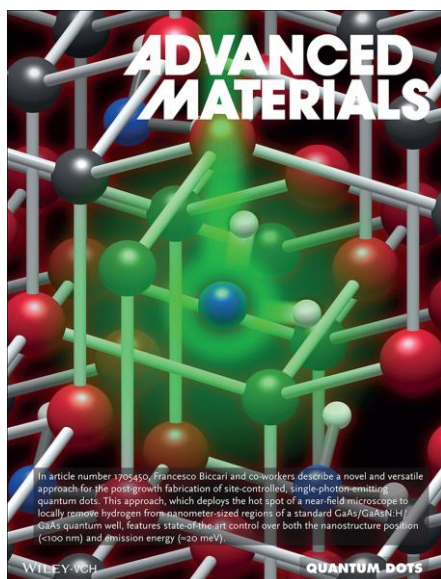
Semiconductor nanostructures and devices

During the PhD in Physics (1993-1996), the activity of the candidate concerned the effects of compositional and morphological disorder on the **optical properties of semiconductor quantum wells [8] and quantum dots [12]**.

In the group of “*Quantum Transport and Spectroscopy of Semiconductors*” at the University of Nottingham, from 1997 to 1999, as a Research Assistant, he investigated the **transport [19], structural [18], and magneto-optical properties of quantum dots [27] and their application as active medium in lasers [18,31] and quantum tunnelling devices [51,52]**.

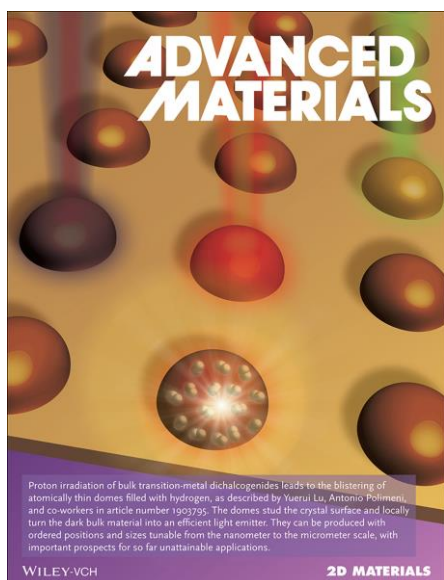
Semiconductor nanostructuring by hydrogen irradiation

In Rome, as Researcher (since 2000) and Associate Professor (since 2010), the candidate **discovered the hydrogen-induced passivation of nitrogen atoms in dilute nitrides**. He **conceived and pioneered the hydrogen-assisted fabrication of novel nanostructures [63,112,149,200]** with planar architecture that paved the way to the recent realization of site-controlled single photon sources embedded in photonic structures [200], as depicted in the next picture.



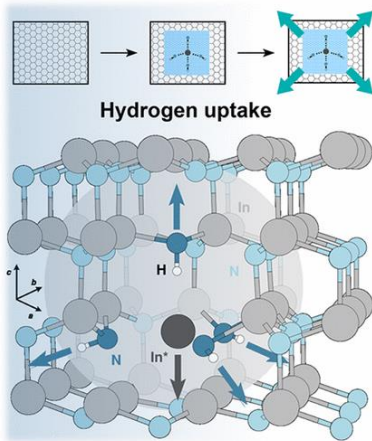
- <https://universityofflorence.medium.com/quantum-technologies-getting-closer-with-quantum-dots-made-in-florence-15d280eda9e2>
- [https://www.ansa.it/canale\\_scienza\\_tecnica/notizie/fisica\\_matematica/2018/05/28/dallitalia-i-cristalli-per-le-comunicazioni-del-futuro-\\_c4d10784-e6a5-459e-85af-a2b2cf31233c.html](https://www.ansa.it/canale_scienza_tecnica/notizie/fisica_matematica/2018/05/28/dallitalia-i-cristalli-per-le-comunicazioni-del-futuro-_c4d10784-e6a5-459e-85af-a2b2cf31233c.html)
- <https://www.unifimagazine.it/tecnologie-quantistiche-piu-vicine-quantum-dot-realizzati-firenze/>
  - <https://www.cnr.it/it/news/8143/tecnologie-quantistiche-piu-vicine-con-i-quantum-dot-realizzati-a-firenze>
- <https://www.wired.it/scienza/lab/2018/05/29/nuovi-nanocristalli-fotonici-ancora-piu-potenti-futuro-informatica/>
- <https://www.vice.com/it/article/evkamw/questi-microcristalli-sono-un-nuovo-tassello-verso-linformazione-quantistica>

The use of hydrogen has become an asset of the group coordinated by candidate. In 2019, he **pioneered the strain engineering of the electronic and mechanical properties of two-dimensional materials by hydrogen irradiation** aimed at quantum technology applications [210]. In particular, the candidate and his group observed that the low-energy hydrogen-ion irradiation of van der Waals crystals (*e.g.*, transition metal dichalcogenides and hexagonal boron nitride) leads to the formation of hydrogen-filled, nanometer/micrometer-sized, spherical bubbles made of a single monolayer directly lifted from the underlying lattice, as highlighted in the next figure. Owing to the membrane curvature and hydrogen internal pressure of tens to hundreds of atm, the atomically thin membranes experience unprecedentedly high strain values (up to about 10%) [216] that has led to a plethora of interesting phenomena [244,243,239,237,232,] and provided a tool for addressing the mechanical properties of those materials [227].



- [https://www.agi.it/scienza/bolle\\_idrogeno\\_semiconduttori-6297600/news/2019-10-05/](https://www.agi.it/scienza/bolle_idrogeno_semiconduttori-6297600/news/2019-10-05/)
  - <https://fidest.wordpress.com/2019/10/08/bolle-di-idrogeno-un-nuovo-meccanismo-per-generare-luce-dai-cristalli/>
- <https://www.radio24.ilsole24ore.com/programmi/smart-city/puntata/nano-cupole-inventato-nuovo-modo-creare-materiali-bidimensionali-210415-ACpxr56>
  - <https://www.uniroma1.it/it/notizia/bolle-di-idrogeno-un-nuovo-meccanismo-generare-luce-dai-cristalli>

Very recently, the candidate collaborated with other groups for the use of low-energy irradiation for energy storage applications [251] (see next figure), thus witnessing the breath of interest of this technique in various materials and applicative fields.



- <https://www.synchrotron-soleil.fr/en/news/exceptional-hydrogen-uptake-crystalline-indium-gallium-nitride-semiconductors-new-strategy-h>

Magneto-optical spectroscopy applied to low-dimensional systems

A significant part of the candidate’s activity regarded the exploitation of **high magnetic fields to address the spin and transport properties of various material systems comprising dilute nitride III-V semiconductors** [86,108,116,120] and **III-V nanowires** [196]. The latter are filamentary crystals with unique crystal phase properties that reflects on the exciton magnetic moment and effective mass, as the candidate showed in the studies he performed and coordinated [208,207,197,191,179,172].

Recently, he **unveiled strain-induced hybridisation effects on the electronic properties of two-dimensional crystals** by high-field Zeeman-splitting measurements of the exciton magnetic moment in mechanically deformed membranes [239], as reported below.

- [https://emfl.eu/emflwebsite/wp-content/uploads/2022/11/emfl\\_newsletter\\_n3\\_22\\_web.pdf](https://emfl.eu/emflwebsite/wp-content/uploads/2022/11/emfl_newsletter_n3_22_web.pdf)

The candidate further revealed how magnetic fields are a tool of uttermost importance to understand the properties of novel 2D systems consisting in twisted-bilayer-heterostructures. In these systems, a **moiré effect** is created, leading to the trapping of carriers in the moiré potential minima. The candidate research is highlighting how **moiré-trapped excitons feature peculiar characteristics that differ from those of excitons in 2D materials**, making them of interest for quantum applications or for collective phenomena [249].

In addition to III-V, III-nitride-V, II-VI semiconductors and two-dimensional materials, the candidate investigated also the optical properties of perovskites [198,226,230,238,242] and nano-porous graphene [221,235,246].

A summary of the highlights of the candidate’s research activity follows.

Topic	Highlights of the research activity [reference list in Part XII]
Disorder effects in low-dimensional semiconductors (1992-1996)	Experimental characterization and modeling of the effects of microscopic disorder on the optical properties of semiconductor quantum wells [8,9,11] and pioneering studies on self-assembled quantum dots [12].
Laser applications of quantum dots (1997-1999)	Engineering, realization, characterization, and optimization of lasers based on InGaAs self-assembled quantum dots with top-notch performances [18,31,42,54]. <i>Performed at the School of Physics and Astronomy, University of Nottingham (UK)</i>
Electronic properties of quantum dots (1997-1999)	Investigation of the thermal stability of the optical properties of quantum dots and their implementation in devices [32,41,48,50]. <i>Performed at the School of Physics and Astronomy, University of Nottingham (UK)</i>
Transport properties of devices embedding quantum dots (1997-1999)	Capacitance-voltage and magneto-tunneling spectroscopy applied to n-i-n/p-i-p and resonant tunneling diodes incorporating quantum dots [19,51,52]. <i>Performed at the School of Physics and Astronomy, University of Nottingham (UK)</i>
Electronic properties of dilute nitrides (2001-2013)	Optical studies of dilute nitrides (relevant for telecom and photovoltaic applications) under high magnetic field and hydrostatic pressure and determination of the fundamental transport and spin properties [108,116,120].
Electronic properties of oxygen containing II-VI semiconductors (2004-2006)	Compositional-driven anomalies in the electronic properties of dilute oxide II-VI semiconductors [94-107].
Hydrogen in semiconductor materials and nanostructures (2000-present)	Discovery of the N passivation effects in hydrogenated dilute nitrides [62,63,76,156,229] and III-nitrides [163,185,251]; observation of H doping effects in GaAsBi [155]; observation of H-tunable ferromagnetism in ZnO [188,203]; exploitation of defect passivation in Si/Ge nanostructures [190]; discovery of H-induced variations of the electronic properties of free-standing graphene [246,235,221].
Nano-photonics (2014-present)	Pioneer of the realization of single-photon sources and their implementation in photonic structures by hydrogen-assisted engineering in dilute nitrides [112,149,176,200,201,206,214].
Electronic properties of nanowires (2012-present)	Comprehensive study of the crystal-phase, optical and magneto-optical properties of nanowires [172,179,182,183,191,192,196,197,207,208,218].
Optoelectronic and mechanical properties of two-dimensional materials (2019-present)	Pioneer of the creation of strain-engineered two-dimensional crystals and heterostructures via the formation of hydrogen bubbles. These latter exhibit quantum light emission and exceptional mechanical properties [210,211,216,220,225,227,228,232,234,239,243,244,245,248,252].
Moiré and 2D heterostructures (present)	Observation of localised-to-delocalised moiré exciton transition in two-dimensional heterostructures and measurement of the moiré exciton magnetic moment and its unprecedented dependence on the local atomic registry [249]. Hydrogen-induced interfaces in SnS/SnS <sub>2</sub> heterostructures [237].
Materials for photovoltaics (2016-present)	Optical studies of materials for new generation solar cells [187,198,226,230,238,242].

**Research activities at qualified international institutions**

October 2005                      Philipps-University of Marburg (Germany)

*The following stays were granted on an international competitive basis upon scientific proposal review*

2001                                  European Synchrotron Radiation Facility (ESRF), Grenoble (France)

2002                                  Grenoble High Magnetic Field Laboratory (GHMLF), Grenoble (France)

2009 and 2019                      Synchrotron SOLEIL Paris (France)

A significant part of the scientific activities of the candidate has concerned experiments carried out at high magnetic field facilities, specifically the High Field Magnet Laboratory in Nijmegen (The Netherlands) and at the Faculty of Physics of the University of Warsaw. The experiments were funded by the European Commission through different research programs (EuroMagnet and ISABEL).

*High Field Magnet Laboratory (HMFL), Nijmegen (The Netherlands)*

2008, January 28<sup>th</sup> to February 10<sup>th</sup>

2009, March 1<sup>st</sup> to March 9<sup>th</sup>

2009, October 4<sup>th</sup> to October 19<sup>th</sup>

2011, February 22<sup>nd</sup> to March 7<sup>th</sup>

2012, November 28<sup>th</sup> to December 13<sup>th</sup>

2015, February 8<sup>th</sup> to February 22<sup>nd</sup>

2019, October 30<sup>th</sup> to November 11<sup>th</sup>

2022, November 14<sup>th</sup> to November 16<sup>th</sup>

*Institute of Experimental Physics, Faculty of Physics, University of Warsaw (Poland)*

2021, September 19<sup>th</sup> to September 27<sup>th</sup>

2022, October 23<sup>rd</sup> to October 26<sup>th</sup>

2023, July 23<sup>rd</sup> to July 28<sup>th</sup>

2024 May 5<sup>th</sup> to May 17<sup>th</sup>

The experiments addressed diverse topics regarding the electronic properties of highly mismatched alloy materials and nanostructures, nanowires and two-dimensional materials as referenced next (refer to the list of publications on page 26):

- Carrier effective mass and Landau levels in highly degenerate InN [138]
- Confinement in artificial nanostructures in N-dilute III-V semiconductors [149,156,157]
- Carrier effective mass in GaAsBi [133,143,170,184]
- Transport and spin properties of III-V nanowires [172,179,191,196,197,207,208,218]
- Exciton magnetic moment and related carrier spin and valley properties of two-dimensional materials and heterostructures [239,240,244,249]



### **Main current scientific international collaborations**

- The School of Physics and Astronomy, The University of Nottingham, United Kingdom (Prof. Amalia Patanè).
- High Field Magnet Laboratory, Nijmegen, The Netherlands (Prof. Peter C. M. Christianen).
- Institute of Experimental Physics, Faculty of Physics, University of Warsaw, Poland (Prof. Adam Babinski and Prof. Maciej Molas).
- Department of Complex System Modeling, Institute of Theoretical Physics, Faculty of Physics, University of Warsaw, Poland (Dr Tomasz Woźniak).
- Institute of High Pressure Physics "UNIPRESS", Polish Academy of Sciences, Warsaw, Poland (Prof. Czesław Skierbiszewski).
- Laboratory of Molecular Beam Epitaxy, University of Warsaw, Faculty of Physics, Poland (Prof. Wojciech Pacuski).
- Layered Materials Laboratory, University of Warsaw, Faculty of Physics, Poland (Prof. Andrzej Wysmolek).
- Wrocław University of science and Technology, Department of Experimental Physics Nonlinear Quantum Photonics group, Wrocław, Poland (Dr. Marcin Syperek).
- Institute for Theoretical Physics, University of Regensburg, Germany (Prof. Jaroslav Fabian and Dr. Paulo Faria).
- Walter Schottky Institute, Technical University of Munich, Germany (Prof. Jonathan Finley and Prof. Andreas Stier).
- Universität Münster, Quantum Nanophotonics group, Germany (Jun.-Prof. Dr. Iris Niehues).
- Carl von Ossietzky Universität Oldenburg, Fakultät V - Institut für Physik, Germany (Prof- Christian Schneider).
- Departamento de Física, Universidad de Oviedo, Spain (Prof. Pablo Alonso Gonzalez and Dr. Javier Martín-Sánchez).
- 2D Foundry at the Materials Science Institute of Madrid, Spain (Dr. Andres Castellanos-Gomez and Dr. Carmen Munuera).
- Universidad Autónoma de Madrid, UAM Departamento de Física de Materiales, Spain (Prof. Fabrice Leardini).
- Laboratoire de Physique des Solides, Centre National de la Recherche Scientifique, Université Paris-Saclay, Orsay, France (Prof. Marco Aprili).
- Université de Toulouse, Institut National des Sciences Appliquées -CNRS, Toulouse, France (Prof. Xavier Marie and Prof. Laurent Lombez).
- Laboratoire National des Champs Magnétiques Intenses, CNRS, Grenoble, France (Prof. Clement Faugeras)
- University of Chemistry and Technology Prague, Faculty of Chemical Technology, Department of Inorganic Chemistry, Czech Republic (Prof. Zdenek Sofer).
- Research School of Electrical Energy and Materials Engineering, The Australian National University, Canberra, Australia (Prof. Chennupati Jagadish and Prof. Yureui Lu).
- Center for Functional Sensor and Actuator (CFSN), National Institute for Materials Science (NIMS), Japan (Dr. Tanju Yildirim).
- QuantaLab, Department of Electrical & Computer Engineering, University of Florida, Gainesville, USA (Prof. Philip Feng).

- Condensed Matter Theory Group, Departamento de Física, Universidade Federal do Ceará, Fortaleza, Brazil (Prof. Andrey Chaves).
- Universidade Federal de Minas Gerais, Departamento de Física, Belo Horizonte, Brazil (Prof. Marcos A. Pimenta).
- International Center for Materials Nanoarchitectonics and Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan (Prof. Takashi Taniguchi and Prof. Kenji Watanabe).
- Department of Physics, National Sun Yat-sen University, Taiwan (Dr. Arkadeb Pal).

**Main current scientific national collaborations**

- Institute of Photonics and Nanotechnologies Rome, National Research Council (IFN-CNR) (Dr. Giorgio Pettinari).
- Physics Department, University of Rome Tor Vergata (Prof. Maurizia Palumbo).
- Physics Department, University of Salerno (Prof. Maurizio Bobba).
- Istituto Officina dei Materiali, National Research Council (IOM-CNR) Trieste (Dott.ssa Cinzia Di Giorgio).
- Istituto di Struttura della Materia Trieste, National Research Council (ISM-CNR) Trieste (Dr. Emmanuele Cappelluti).
- Advanced Photonics Laboratory, National Research Council (Nanotec-CNR) Lecce (Dr. Daniele Sanvitto)

**Part VII – Awards, Honors and Society memberships***Year*

- 2000 “Umberto Maria Grassano” Prize of the Italian Physical Society to a young researcher working on Solid State Physics.
- 2000 First prize for the *best oral presentation* at the LXXXVI National Conference of the Italian Physical Society (Palermo) (Condensed Matter Physics section).
- 2002 Appointment of a two year grant “Young Researcher Project” by the Italian Ministry of University and Scientific and Technological Research for the study of the band structure of (InGa)(AsN) alloys.
- 2003 “Ugo Campisano” Prize of the National Institute of Matter Physics awarded to young researchers in the field of Materials Science.
- 2009 “Premio Tomassoni” by Sapienza Università di Roma to Sapienza graduate.
- 2015 Prize for “Excellence in University Teaching” by Facoltà di Scienze Matematiche, Fisiche e Naturali, Sapienza Università di Roma.
- 2017 Outstanding referee 2017, Institute of Physics (London, UK).
- 2017 “Somiya Award for international collaboration” for “understanding the fundamental properties of nanowires (semiconductor nanostructures with a filamentary shape) and their exploitation in practical optoelectronic devices, such as lasers, detectors and sensors” (Kyoto, Japan) by the *International Union of Materials Research Societies* and the *Materials Research Society of Japan*.
- 2021 Outstanding referee of the Physical Review journals (American Physical Society).
- present Member of the *Italian Physical Society*.

**Part VIII – Institutional Activities (Department, Faculty, University)**

<i>Start</i>	<i>End</i>	<i>Institution</i>	<i>Role</i>
2009	2010	Dipartimento di Fisica, Sapienza Università di Roma	Coordinator of the participation of the Physics Department to the program “Scientist Around Youth” promoted by the European Commission.
2011	2012	Dipartimento di Fisica, Sapienza Università di Roma	Member of the Committee for the Autonomy and Innovation of Teaching at the Physics Department of Sapienza Università di Roma.
2013	2015	Dipartimento di Fisica, Sapienza Università di Roma	<u>Member of the Department Council (Giunta).</u>
2013	2015	Facoltà di Scienze Matematiche, Fisiche e Naturali, Sapienza Università di Roma	<u>Member of the Faculty Council (Giunta).</u>
2015		National agency for the evaluation of universities and research institutes (ANVUR)	Reviewer ANVUR 2011-2014.
2019	2019	Dipartimento di Fisica, Sapienza Università di Roma	Member of the work group subjected to the assessment of the didactic activity by ANVUR.
2021		National agency for the evaluation of universities and research institutes (ANVUR)	Reviewer ANVUR 2015-2019.
2021	2024	Istituto Struttura della Materia (ISM) del CNR e Dipartimento di Fisica, Sapienza Università di Roma	Delegate for the Physics Department of the bilateral agreement between the two institutions.
2005	present	Dipartimento di Fisica, Sapienza Università di Roma	<u>Responsible for the management of liquid nitrogen supply for the experimental groups of the Department.</u>
2012	present	Sapienza Università di Roma	<u>Member of the Council of the Doctorate in Mathematical Models for Engineering, Electromagnetism and Nanosciences.</u>
2014	present	Dipartimento di Fisica, Sapienza Università di Roma	<u>Member of Maintenance Commission of the Department buildings.</u>
2019	present	Dipartimento di Fisica, Sapienza Università di Roma	<u>Chair of the “Spazio e ospiti” Commission.</u>
2022	present	Sapienza Università di Roma	Departmental responsible for Gestionale Integrato Spazi Sapienza (GISP), which is the structure supervising the information system for the integrated management of University spaces.

2022	present	Dipartimento di Fisica, Sapienza Università di Roma	<u>Deputy Scientific Coordinator of the Departmental Laboratory SmartLab (Spectro-Microscopy Laboratory).</u>
2023		Dipartimento di Fisica, Sapienza Università di Roma	<i>Member of the Commission for the Physics Department Strategic Plan 2023- 2025.</i>

**Outreach activities**

September 2009		Facoltà di Scienze MM.FF.NN. dell'Università di Roma "La Sapienza"	Coordinator of the activities for the Faculty of Science and the Physics Department for the Researchers' Night 2009, Frascati September 25 <sup>th</sup> 2009. Participation and preparation of simple experiments devoted to children and general public ( <a href="https://archivio.frascatiscienza.it/pagine/notte-europea-dei-ricercatori-2009/credits/">https://archivio.frascatiscienza.it/pagine/notte- europea-dei-ricercatori-2009/credits/</a> ).
2008	2019	Dipartimento di Fisica, Sapienza Università di Roma	Coordinator of the Guidance Activities ( <i>Orientamento</i> ) provided to freshmen and students by the Physics Department.
September 2010		Dipartimento di Fisica, Sapienza Università di Roma	Coordinator of the activities for the Faculty of Science and the Physics Department for the Researchers' Night 2009, Frascati September 24 <sup>th</sup> 2010. Participation and preparation of interactive experiments devoted to children and general public ( <a href="https://archivio.frascatiscienza.it/pagine/notte-europea-dei-ricercatori-2010/credits/">https://archivio.frascatiscienza.it/pagine/notte- europea-dei-ricercatori-2010/credits/</a> )
February 2012		Dipartimento di Fisica, Sapienza Università di Roma	Series of lectures for the training of high- school students participating in the Physics Olympic Games 2012.
2016	2017	Facoltà di Scienze Matematiche, Fisiche e Naturali, Sapienza Università di Roma	Participant to the Lab2go project (outreach activity in secondary schools) by the Physics Department and National Institute of Nuclear Physics (INFN). The candidate coordinated the restoration of demonstrative instruments and the preparation of new experiments at Liceo Scientifico Cavour and at Istituto Istruzione Superiore Papareschi in Rome.
January 2018		Dipartimento di Fisica, Sapienza Università di Roma	Lectures for the training of high-school students participating in the Physics Olympic Games 2018.
2020		Dipartimento di Fisica, Sapienza Università di Roma	Involvement of Master's students in the International Workshop "A two-day meeting on the progress of two-dimensional materials (2Day)" organized by the candidate.

April 2022		Dipartimento di Fisica, Sapienza Università di Roma	Italian Quantum Weeks: Tour of the OPERA lab with demonstrative experiments on quantum materials. Illustration of superposition and interference phenomena in quantum physics by promotional posters.
January 2020		Dipartimento di Fisica, Sapienza Università di Roma	Lectures for the training of high-school students participating in the Physics Olympic Games 2020.
2010	2022	Dipartimento di Fisica, Sapienza Università di Roma	<i>Editor</i> of the promotional booklet describing the Laurea courses in Physics and scientific activity of the Department. The booklet is devoted to freshmen.
May 2023		Sapienza Università di Roma	European Researchers night. Visits to the OPERA laboratory: 130 people. Demonstrative experiments on nanotechnologies.
May 2024		Sapienza Università di Roma	European Researchers night. Visits to the OPERA laboratory: 80 people. Promotion of quantum physics and its implementation in two-dimensional materials.
2008	present	Dipartimento di Fisica, Sapienza Università di Roma	Participation to Porte Aperte happening, which is devoted to high-school students interested to university studies in Physics. During this event, the presence of professors is meant to provide students with information about the content of the Physics Course and its future job opportunities.

**Exam and selection procedure commissions**

2008	Dipartimento di Fisica, Università degli Studi di Firenze	Member of the committee of the Physics Doctorate final exam XXI cycle.
2009	Sapienza Università di Roma	Member of the committee for the admission exam XXV cycle Doctorate in Materials Science.
2011	Sapienza Università di Roma	Member of the committee for the admission exam XXVII cycle Doctorate in Physics.
2012	Sapienza Università di Roma	Member of the committee of the admission exam for the training school devoted to high school teachers in Physics (Tirocinio Formativo Attivo).
2014	Dipartimento di Fisica, Sapienza Università di Roma	Member of the committee of the Doctorate in Physics final exam XXVI cycle.
2014	Sapienza Università di Roma	Member of the committee for the admission exam for the training school devoted to high school teachers in Physics (Tirocinio Formativo Attivo).
2015	Dipartimento di Fisica, Sapienza Università di Roma	Member of the committee for the appointment of 6 Departmental “assegni di ricerca”.
2015	Indian institute of Science Education and Research Kolkata	Referee of the PhD thesis in Physics “Picosecond Dynamics in Optically Excited Semiconductors: Exciton Dephasing, Ionization Equilibrium and Pauli Blocking” by Richarj Mondal.
2015	Sapienza Università di Roma	Member of the committee for the admission exam XXXI cycle Doctorate in Physics.
2017	Dipartimento di Fisica, Università degli Studi di Roma, Tor Vergata	Member of the committee of Doctorate final exam XXIX cycle.
2017	Dipartimento di Ingegneria dell'Innovazione Università del Salento	Reviewer of the PhD thesis in “Ingegneria dei materiali, delle strutture e nanotecnologie” XXIX cycle “A spectroscopic study of MOVPE-grown GaAs/AlGaAs core-shell and core-multishell nanowire heterostructures by Roberta Rosato”
2017	CNR Institute Nanosciences (Pisa)	Member of the exam committee for Researcher position at the NEST institute in Pisa.

2019	Dipartimento di Fisica, Università degli Studi di Firenze	Member of the committee of the Doctorate in Physics final exam XXXI cycle.
2019	Universidad de Cádiz (Spain), Department of Materials Science and Metallurgic Engineering and Inorganic Chemistry	Referee and Member of the committee of the Doctorate final exam Doctor of Philosophy “Epitaxial and colloidal quantum dots, and lead halide perovskites for the third generation of solar cells: structural characterization at nanoscale” by Natalia Fernandez Delgado.
2020	CNR Institute for Microelectronics and Microsystems	Member of the selection committee for a research fellowship.
2022	Sapienza Università di Roma	Chair of the committee for the admission exam XXXVIII cycle Doctorate in Physics.
2024	Aalto University (Finland) School of Electrical Engineering, Department of Electronics and Nanoengineering Photonics	Referee and Member of the committee of Doctorate final exam Doctor of Science (Tech.) “Engineering the Optical Properties of Semiconducting Two-Dimensional Materials” by Mikko Turunen.
2024	Sapienza Università di Roma	Member of the committee for the admission exam to XXXIX cycle Doctorate in Mathematical Models for Engineering, Electromagnetism and Nanosciences.



**Part IX – Professional and Organizational Activities**

## Reviewer activities

*Scientific journals:* Nature Materials, Nature Photonics, Nature Communications, npj 2D Materials & Applications, npj Flexible Electronics, Scientific Reports, Physical Review Letters, Physical Review B, Physical Review Materials, Physical Review Applied, Advanced Materials, Advanced Materials applied materials & interfaces, Advanced Materials Interfaces, Nano Letters, ACS Nano, Semiconductor Science and Technology, Nanotechnology, Applied Physics Letters, Journal of Applied Physics, Journal of Physics D, Materials Research Express.

*Funding agencies:*

European Commission:

*Project reviewer FET-Quantum Technologies Flagship  
Innovation Expert of Quantum Technologies Flagship.*

Academy of Sciences of the Czech Republic.

Engineering and Physical Sciences Research Council (EPSRC, UK).

Romanian National Council for Scientific Research (Romania).

Israel Science Foundation (Israel).

National Science Center (Poland).

SêrCymru (Welsh Government).

Deutscher Akademischer Austausch Dienst (DAAD) German Academic Exchange Service (Germany).

Beacon of Excellence Support Form Scheme (The University of Nottingham, UK).

Irish Research Council (Ireland).

Deutsche Forschungsgemeinschaft (German Research Foundation).

Agenzia Regionale per la Tecnologia e l'Innovazione (Regione Puglia, Italy).

*Scientific committees:*

- |              |  |
|--------------|--|
| 2005         | Member of the Campisano Prize committee (Istituto Nazionale di Fisica della Materia).  |
| 2008         | Member of the organizing committee of the 22nd conference of the Condensed Matter Division of the European Physical Society (2008).  |
| 2008         | Member of the international advisory committee of the international conference “ <i>Recent Advances of Low Dimensional Structures and Devices</i> ” ( <a href="https://www.nottingham.ac.uk/~ppzmmh/WRA_LDSD/">https://www.nottingham.ac.uk/~ppzmmh/WRA_LDSD/</a> ). |
| 2009-2013    | Member of the EU COST Action MP0805 “ <i>Novel gain materials and devices based on III-N-V compounds</i> ”.  |
| 2015         | Member of the organizing committee of the 101 <sup>st</sup> conference of the Italian Physical Society (2015).   |
| 2017         | Organizer of the International Workshop on “ <i>Characterisation of Photonic Materials and Devices</i> ” ( <a href="https://promis-photonicmaterials.weebly.com/">https://promis-photonicmaterials.weebly.com/</a> ).  |
| 2012-present | Member of the Engineering and Physical Sciences Research Council (EPSRC) Peer Review College (UK).   |
| 2014-present | Member of the European Magnetic Field Laboratory User Committee.   |

- 2020-present *Member of the Expert Panel* for the evaluation of proposals for the National Science Centre (Poland).
- 2020 *Chairperson* of the International Workshop “A two-day meeting on the progress of two-dimensional materials (2Day)” (<https://2d-meeting.weebly.com/>).
- 2023 *Member of the Advisory Committee* of the International Conference on "High Magnetic Fields in Semiconductor Physics".

*Scientific journals:*

- 2016-2020 Member of the Editorial board of Journal of Semiconductors (Institute of Physics, London UK).
- 2018-2020 Member of the International Advisory Board of Materials Research Express (Institute of Physics, London UK).
- 2018 present Editorial board member of Materials (MDPI, Basel Switzerland).
- 2024 One-time Divisional Associate Editor for Physical Review Letters.

**Part X – Bibliometric data****Total**Product type

Papers (international)	<b>254</b> (including invited; sources: Google Scholar, Scopus, WoS)
Papers (invited)	<b>11</b>
Books	<b>5</b> (book chapters)
Invited talks and seminars	<b>46</b>
Papers (proceedings)	<b>40</b>

Total Impact factor **1067**<sup>1</sup>; average impact factor: 4.4 (source WoS/Clarivate)

Total Citations **6551** (Google Scholar); **5234** (Scopus); **4867** (WoS)

Average Citations per Product<sup>2</sup> **18.8** (Google Scholar); **18.5** (Scopus); **17.1** (WoS)

Hirsch (H) index **45** (Google Scholar); **40** (Scopus); **39** (WoS)

Normalised H index\* **1.41** (Google Scholar); **1.25** (Scopus); **1.22** (WoS)

\*H index divided by the academic seniority<sup>3</sup>

*First author: 27*

*Corresponding author: 78*

*Last author: 33*

**From January 2009 to July 2024** (according to the call announcement)Product type

Papers (international)	<b>119</b> (including invited; sources: Google Scholar, Scopus, WoS)
Papers (invited)	<b>9</b>
Books (scientific)	<b>3</b> (book chapters)
Invited talks and seminars	<b>32</b>
Papers (proceedings)	<b>5</b>

2009-2024 impact factor **745.9**<sup>1</sup> (average impact factor: 7.3 source WoS/Clarivate)

Total Citations **2410** (Google Scholar); **1913** (Scopus); **1812** (WoS)

Average Citations per Product **15.5** (Google Scholar); **16.9** (Scopus); **14.7** (WoS)

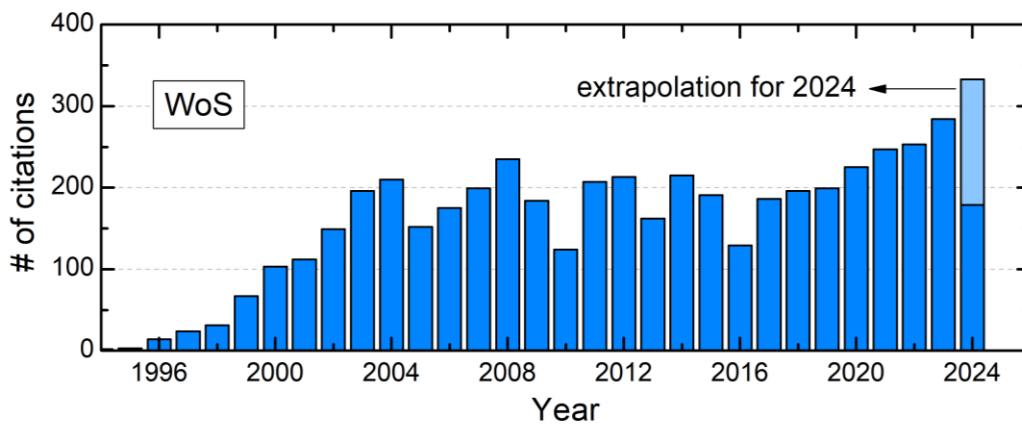
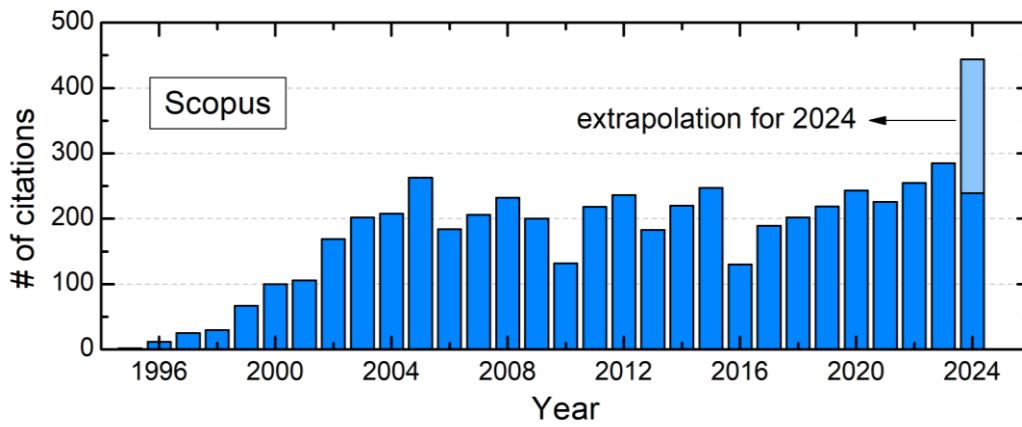
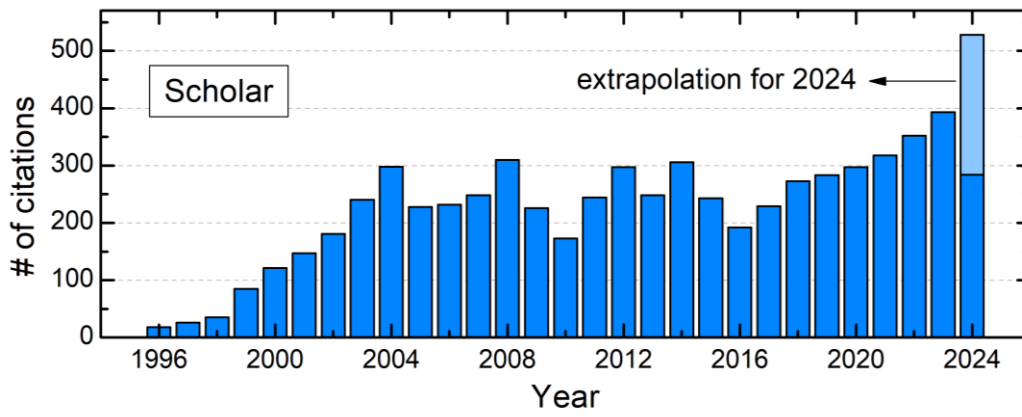
Hirsch (H) index **27** (Google Scholar); **25** (Scopus); **24** (WoS)

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<sup>1</sup> Derived from JCR-Clarivate Analytics databases. For years <1997, the impact factor of a given journal was given the value in 1997 for ease of evaluation. For year 2024 (for which the journal impact factor is not available), the impact factor of 2023 was used.

<sup>2</sup> Evaluated over a number of 349 (Google Scholar), 283 (Scopus) and 285 (WoS) products.

<sup>3</sup> The seniority is 32 years, calculated from July 1993 (*Laurea* degree date) to July 2024.



**Part XI – Selected publications**

1) Elena Blundo, Federico Tuzi, Salvatore Cianci, Marzia Cuccu, Katarzyna Olkowska-Pucko, Łucja Kipczak, Giorgio Contestabile, Antonio Miriametro, Marco Felici, Giorgio Pettinari, Takashi Taniguchi, Kenji Watanabe, Adam Babiński, Maciej R. Molas, Antonio Polimeni

“*Localisation-to-delocalisation transition of moiré excitons in WSe<sub>2</sub>/MoSe<sub>2</sub> heterostructures*”

Nature Communications **15**, 1057 (2024)

IF: 14.7, cit.: 1 (Scholar), 0 (Scopus), 0 (WoS)

2) Salvatore Cianci, Elena Blundo, Federico Tuzi, Giorgio Pettinari, Katarzyna Olkowska-Pucko, Eirini Parmenopoulou, Djero BL Peeters, Antonio Miriametro, Takashi Taniguchi, Kenji Watanabe, Adam Babinski, Maciej R Molas, Marco Felici, Antonio Polimeni

“*Spatially Controlled Single Photon Emitters in hBN-Capped WS<sub>2</sub> Domes*”

Advanced Optical Materials **11**, 2202953 (2023)

IF: 8.0, cit.: 10 (Scholar), 8 (Scopus), 7 (WoS)

3) Boqing Liu, Tanju Yildirim, Tieyu Lü, Elena Blundo, Li Wang, Lixue Jiang, Hongshuai Zou, Lijun Zhang, Huijun Zhao, Zongyou Yin, Fangbao Tian, Antonio Polimeni\*, Yuerui Lu\*

“*Variant Plateau’s law in atomically thin transition metal dichalcogenide dome networks*”

Nature Communications **14**, 1050 (2023)

\*: corresponding authors

IF: 14.7, cit.: 4 (Scholar), 5 (Scopus), 5 (WoS)

4) Elena Blundo, Paulo E Faria Junior, Alessandro Surrente, Giorgio Pettinari, Mikhail A Prosnikov, Katarzyna Olkowska-Pucko, Klaus Zollner, Tomasz Woźniak, Andrey Chaves, Tomasz Kazimierzczuk, Marco Felici, Adam Babiński, Maciej R Molas, Peter CM Christianen, Jaroslav Fabian, Antonio Polimeni

“*Strain-Induced Exciton Hybridization in WS<sub>2</sub> Monolayers Unveiled by Zeeman-Splitting Measurements*”

Physical Review Letters **129**, 067402 (2022)

IF: 8.6, cit.: 24 (Scholar), 18 (Scopus), 18 (WoS)

**Media/press release**

[https://emfl.eu/emflwebsite/wp-content/uploads/2022/11/emfl\\_newsletter\\_n3\\_22\\_web.pdf](https://emfl.eu/emflwebsite/wp-content/uploads/2022/11/emfl_newsletter_n3_22_web.pdf)

5) Cinzia Di Giorgio, Elena Blundo, Giorgio Pettinari, Marco Felici, Fabrizio Bobba, Antonio Polimeni

“*Mechanical, Elastic, and Adhesive Properties of Two-Dimensional Materials: From Straining Techniques to State-of-the-Art Local Probe Measurements*”

Advanced Materials Interfaces **9**, 2102220 (2022)

Invited

IF: 5.4, cit.: 37 (Scholar), 30 (Scopus), 28 (WoS)

6) Elena Blundo, Alessandro Surrente, Davide Spirito, Giorgio Pettinari, Tanju Yildirim, Carlos Alvarado Chavarin, Leonetta Baldassarre, Marco Felici, Antonio Polimeni

“*Vibrational Properties in Highly Strained Hexagonal Boron Nitride Bubbles*”

Nano Letters **22**, 1525 (2022)

IF: 10.8, cit.: 42 (Scholar), 35 (Scopus), 36 (WoS)

7) Elena Blundo, Tanju Yildirim, Giorgio Pettinari, Antonio Polimeni  
 “Experimental Adhesion Energy in van der Waals Crystals and Heterostructures from Atomically Thin Bubbles”  
 Physical Review Letters **127**, 046101 (2021)

IF: 9.2, cit.: 53 (Scholar), 43 (Scopus), 42 (WoS)

8) Elena Blundo, Emanuele Cappelluti, Marco Felici, Giorgio Pettinari, Antonio Polimeni  
 “Strain-tuning of the electronic, optical, and vibrational properties of two-dimensional crystals”  
 Applied Physics Reviews **8**, 021318 (2021)  
*invited*

IF: 19.5, cit.: 94 (Scholar), 76 (Scopus), 76 (WoS)

9) Cinzia Di Giorgio, Elena Blundo, Giorgio Pettinari, Marco Felici, Antonio Polimeni, Fabrizio Bobba  
 “Exceptional Elasticity of Microscale Constrained MoS<sub>2</sub> Domes”  
 ACS Applied Materials & Interfaces **13**, 48228 (2021)

IF: 10.4, cit.: 18 (Scholar), 17 (Scopus), 16 (WoS)

10) Elena Blundo, Cinzia Di Giorgio, Tanju Yildirim, Marco Felici, Yuerui Lu, Fabrizio Bobba, Antonio Polimeni  
 “Engineered creation of periodic giant, non-uniform strains in MoS<sub>2</sub> monolayers”  
 Advanced Materials Interfaces **7**, 2000621 (2020)

IF: 6.1, cit.: 52 (Scholar), 46 (Scopus), 46 (WoS)

11) Elena Blundo, Marco Felici, Tanju Yildirim, Giorgio Pettinari, Davide Tedeschi, Antonio Miriametro, Boqing Liu, W. Ma, Yuerui Lu, Antonio Polimeni  
 “Evidence of the direct-to-indirect band gap transition in strained two-dimensional WS<sub>2</sub>, MoS<sub>2</sub>, and WSe<sub>2</sub>”  
 Physical Review Research (Rapid Communication) **2**, 012024 (2020)

IF: 3.8 (five-year IF, the IF is not available for 2020), cit.: 135 (Scholar), 112 (Scopus), 100 (WoS)

12) Davide Tedeschi, Elena Blundo, Marco Felici, Giorgio Pettinari, Boqing Liu, Tanju Yildirim, Elisa Petroni, Chris Zhang, Yi Zhu, Simona Sennato, Yuerui Lu, Antonio Polimeni  
 “Controlled micro/nanodome formation in proton-irradiated bulk transition-metal dichalcogenides”  
 Advanced Materials **31**, 1970314 (2019)

IF: 27.4, cit.: 92 (Scholar), 72 (Scopus), 72 (WoS)

#### **Media/press release**

[https://www.agi.it/scienza/bolle\\_idrogeno\\_semiconduttori-6297600/news/2019-10-05/](https://www.agi.it/scienza/bolle_idrogeno_semiconduttori-6297600/news/2019-10-05/)

<https://fidest.wordpress.com/2019/10/08/bolle-di-idrogeno-un-nuovo-meccanismo-per-generare-luce-dai-cristalli/>

<https://www.radio24.ilsole24ore.com/programmi/smart-city/puntata/nano-cupole-inventato-nuovo-modo-creare-materiali-bidimensionali-210415-ACpxr56>

<https://www.uniroma1.it/it/notizia/bolle-di-idrogeno-un-nuovo-meccanismo-generare-luce-dai-cristalli>

13) Francesco Biccari, Alice Boschetti, Giorgio Pettinari, Federico La China, Massimo Gurioli, Francesca Intonti, Anna Vinattieri, MayankShekhar Sharma, Mario Capizzi, Annamaria Gerardino, Luca Businaro, Mark Hopkinson, Antonio Polimeni, Marco Felici  
 “Site-Controlled Single-Photon Emitters Fabricated by Near-Field Illumination”  
 Advanced Materials **30**, 1705450 (2018)

IF: 25.8, cit.: 30 (Scholar), 24 (Scopus), 23 (WoS)

#### **Media/press release**

<https://www.uniroma1.it/en/notizia/quantum-dots-made-italy-step-forward-quantum-technology>

<https://medium.com/@UniversityofFlorence/quantum-technologies-getting-closer-with-quantum-dots-made-in-florence-15d280eda9e2>  
[http://www.ansa.it/canale\\_scienza\\_tecnica/notizie/fisica\\_matematica/2018/05/28/dallitalia-i-cristalli-per-le-comunicazioni-del-futuro-\\_c4d10784-e6a5-459e-85af-a2b2cf31233c.html](http://www.ansa.it/canale_scienza_tecnica/notizie/fisica_matematica/2018/05/28/dallitalia-i-cristalli-per-le-comunicazioni-del-futuro-_c4d10784-e6a5-459e-85af-a2b2cf31233c.html)  
<https://it.businessinsider.com/i-nanocristalli-made-in-italy-per-le-comunicazioni-del-futuro-un-passo-in-avanti-verso-le-tecnologie-quantistiche/>  
<http://www.unifimagazine.it/tecnologie-quantistiche-piu-vicine-quantum-dot-realizzati-firenze/>  
<https://www.uniroma1.it/it/notizia/quantum-dot-made-italy-un-passo-avanti-le-tecnologie-quantistiche>  
<https://www.cnr.it/it/news/8143/tecnologie-quantistiche-piu-vicine-con-i-quantum-dot-realizzati-a-firenze>  
<https://www.wired.it/scienza/lab/2018/05/29/nuovi-nanocristalli-fotonici-ancora-piu-potenti-futuro-informatica/>  
<https://motherboard.vice.com/it/article/evkamw/questi-microcristalli-sono-un-nuovo-tassello-verso-linformazione-quantistica>

14) Davide Tedeschi, Marta De Luca, H Aruni Fonseka, Qian Gao, Francesco Mura, Hark Hoe Tan, Silvia Rubini, Faustino Martelli, Chennupati Jagadish, Mario Capizzi, Antonio Polimeni  
“*Long-Lived Hot Carriers in III–V Nanowires*”  
Nano Letters **16**, 3085 (2016)

IF: 12.7, cit.: 50 (Scholar), 43 (Scopus), 41 (WoS)

15) Attilio Zilli, Marta De Luca, Davide Tedeschi, H. Aruni Fonseka, Antonio Miriametro, Hark Hoe Tan, Chennupati Jagadish, Mario Capizzi, Antonio Polimeni  
“*Temperature Dependence of Interband Transitions in Wurtzite InP Nanowires*”  
ACS Nano **9**, 4277 (2015)

IF: 13.3, cit.: 53 (Scholar), 45 (Scopus), 43 (WoS)

16) Marta De Luca, Attilio Zilli, H. Aruni Fonseka, Sudha Mokkalapati, Antonio Miriametro, Hark Hoe Tan, Leigh Morris Smith, Chennupati Jagadish, Mario Capizzi, Antonio Polimeni  
“*Polarized Light Absorption in Wurtzite InP Nanowire Ensembles*”  
Nano Letters **15**, 998 (2015)

IF: 13.8, cit.: 52 (Scholar), 41 (Scopus), 39 (WoS)

**Part XII– Seminars, invited talks, and full list of publications****Invited talks**

November 2023 “*Heterostructuring in Mechanically Deformed van der Waals Crystals*”  
Symposium on “2Ds Go Hybrid—Properties and Applications of Dimensionally Hybrid Systems” Materials Research Society Fall Meeting (Boston, USA)

September 2023 “*Magneto- and quantum-optical properties strain-engineered transition metal dichalcogenide domes*”  
8<sup>th</sup> Polish Conference “Graphene and other 2D materials” (Torun, Poland)

August 2023 “*Heterostructuring in mechanically deformed van der Waals materials*”  
Keynote speaker of the 36<sup>th</sup> European Conference on Surface Science (Lodz, Poland)

November 2022 “*Strain-induced exciton hybridization in WS<sub>2</sub> monolayers unveiled by Zeeman splitting measurements*”  
Workshop on the “Physics of 2D materials” (Warsaw, Poland)

May 2022 “*Site-controlled single photon sources in 2D crystals by hydrogen-irradiation*”  
Webinar by Nanomaterial journal

June 2019 “*Controlled micro/nano-dome formation in proton-irradiated bulk transition-metal dichalcogenides*”  
4<sup>th</sup> International Conference on Physics of 2D Crystals 2019 (Hangzhou, China)

December 2018 “*Position-controlled patterning of the electronic and structural properties of bulk transition-metal dichalcogenides by proton-driven micro/nano-dome formation*”  
Nanoscience & Nanotechnology 2018 (Frascati, Italy)

May 2018 “*Proton-driven patterning of bulk transition-metal dichalcogenides*”  
International Workshop on Electronic Structure of Superconductors and Novel Materials (Rome, Italy)

December 2017 “*Proton-driven generation of atomically thin, light emitting domes in transition metal dichalcogenides*”  
Psi-k workshop, 2D layered materials for opto-electronics: a theoretical/computational perspective (Rome, Italy)

September 2017 “*Nano-micro domes produced in bulk transition metal dichalcogenides by proton irradiation*”  
NanoInnovation 2017 (Rome, Italy)

September 2017 “*Transport and spin properties of excitons, electrons, and holes in wurtzite nanowires*”  
15<sup>th</sup> International Conference on Advanced Materials by the Materials Research Society (Kyoto, Japan)

September 2014 “*Addressing carrier confinement, mass and gyromagnetic factor in semiconductor nanostructures*”  
Workshop on Optical Properties of Individual Nanowires and Quantum Dots in High Magnetic Field, (Toulouse, France)

August 2014 “*Magneto-Optical Properties of Wurtzite-Phase Semiconductor Nanowires*”  
8<sup>th</sup> Nanowire Growth Workshop and Nanowires 2014, (Eindhoven, The Netherlands)

July 2013 “*H effects in dilute III-N-V alloys: from defect engineering to nanostructuring*”  
27<sup>th</sup> International Conference on Defects in Semiconductors, (Bologna, Italy)

June 2012 “*Band structure of high-quality wurtzite GaAs in InGaAs-GaAs core-shell nanowires*”  
Nano-structures self-assembly (Nano-Sea) 2012, S. Margherita di Pula (Sardinia, Cagliari, Italy)



- July 2011 “*Nanostructures and novel materials investigated by magneto-photoluminescence spectroscopy at HFML (Nijmegen)*”  
EuroMagnet meeting, Laboratoire National des Champs Magnétiques Intenses, Toulouse (France)
- July 2010 “*Unusual compositional dependence of the exciton reduced mass in GaAsBi*”  
1<sup>st</sup> International Workshop on Bismuth Containing Semiconductors, University of Michigan (USA)
- February 2010 “*Hydrogen-mediated nanostructuring of dilute nitride semiconductors*”  
XVIII Ural International Winter School on the Physics of Semiconductors, Ekaterinburg (Russia)
- December 2009 “*Polarization control by strain-engineering in GaAsN/GaN:H heterostructures*”  
COST Action MP0805 meeting “Growth of dilute nitrides on patterned surfaces”, Toulouse (France)
- June 2009 “*Hydrogen-induced defect engineering in dilute nitrides semiconductors*”  
15th Semiconducting and Insulating Materials Conference, Vilnius (Lithuania)
- April 2007 “*Hydrogen-induced nitrogen passivation in dilute nitrides: a novel approach to defect engineering*”  
Material Research Society spring Meeting, San Francisco (CA, USA)
- January 2005 “*Carrier localization in (InGa)(AsN) alloys*”  
Optoelectronics 2005, San Jose (CA, USA)
- July 2004 “*Probing the electronic properties of dilute nitrides by carrier localization and effective mass measurements*”  
General Conference of the Condensed Matter Division, European Physical Society, Prague (Czech Republic)
- July 2003 “*Hydrogen related effects in diluted nitrides*”  
XXII International Conference on Defects in Semiconductors  
Aarhus (Denmark)
- June 2002 “*Hydrogen as a probe for studying the electronic properties of (InGa)(AsN)/GaAs heterostructures*”  
International symposium on “N-containing III-V semiconductors: Fundamentals and Applications” of the European Materials Research Society, E-MRS, Strasbourg (France)
- April 2002 “*Hydrogen as a probe of the nitrogen charge distribution in (InGa)(AsN)/GaAs*”  
19th General Conference of the Condensed Matter Division of the European Physical Society, Brighton (United Kingdom)
- February 2002 “*Interplay of Nitrogen and Hydrogen in (InGa)(AsN)/GaAs heterostructures*”  
XIV “Ural International Winter School on the Physics of Semiconductors Electronic properties of low-dimensional semi- and superconductor structures”, Ekaterinburg (Russia)

### **Invited seminars**

- June 2024 “*Strain and Heterostructuring in van der Waals Crystals*”  
Walter Schottky Institut, Technical University of Munich
- May 2024 “*Strain in Flatlands*”  
Universidad Autonoma de Madrid
- April 2024 “*Two-dimensional crystal domes: an all-surface platform for exploring the elastic, electronic, optical and quantum-optical properties of two-dimensional materials*”  
Dipartimento di Fisica, Università di Pavia
- June 2022 “*Two-dimensional crystal bubbles as a platform for exploring the elastic, electronic and optical properties of two-dimensional crystals*”  
Solid State Seminar series, Faculty of Physics, University of Warsaw

- December 2019 “*Proton-induced mechanical deformations of transition metal dichalcogenides*”  
Department of Physics, University of Basel (Switzerland)
- May 2018 “*Hydrogen-driven generation of atomically thin, light emitting domes in transition metal dichalcogenides*”, Dipartimento di Fisica, Università di Roma “Tor Vergata”
- October 2017 “*Nano-micro domes produced in bulk transition metal dichalcogenides by proton irradiation*”, National Research Council, Institute for Microelectronics and Microsystems (Rome, Italy).
- September 2017 “*Proton irradiation in bulk transition metal dichalcogenides*”  
Electronic Engineering Department, Tor Vergata University (Rome, Italy).
- July 2017 “*Proton irradiation in bulk transition metal dichalcogenides*” and “*Addressing the fundamental electronic properties of wurtzite GaAs nanowires by magneto-optical spectroscopy*” Department of Physics, Regensburg University (Regensburg, Germany)
- January 2014 “*Optical and Magneto-Optical Studies of III-V Semiconductor Nanowires*” Scuola Normale Superiore, Pisa.
- December 2009 “*Polarization control by strain-engineering in GaAsN/GaAsN:H heterostructures*”  
Laboratory of Analysis and Architecture of Systems (CNRS), Toulouse, France.
- May 2009 “*Spatial nanostructuring of dilute nitrides by hydrogen*” University of Essex, United Kingdom.
- April 2008 “*Defect Engineering in Dilute Nitride Semiconductors*” TASC National Laboratory, Trieste (Italy).
- May 2003 “*Effects of hydrogen on the electronic and lattice properties of (InGa)(AsN)*” Department of Physics and Material Sciences Center, Philipps-University, Marburg (Germany).
- July 1999 “*Carrier hopping in self-assembled quantum dots*” Nippon Telegraph and Telephone (NTT), Tokyo (Japan).
- February 1999 “*Carrier hopping in InAs/Al<sub>y</sub>Ga<sub>1-y</sub>As self-organized quantum Dots*” Max-Planck Institute of Microstructure Physics, Halle (Germany).
- February 1998 “*Next generation laser diodes*”, Department of Physics, University of Sheffield (United Kingdom).
- January 1998 “*Optical and Microstructural Studies of Heterostructures and Injection Lasers incorporating (InGa)As Quantum Dots*”, Institut für Festkörperphysik, TU Berlin (Germany).
- October 1996 “*Disorder and localization effects in InGaAs/GaAs quantum heterostructures*” Department of Physics, University of Nottingham, Nottingham (United Kingdom).

### **Invited papers (chapters) in reviews (books)**

Elena Blundo and Antonio Polimeni

“*Alice (and Bob) in Flatland*”

Invited Perspective paper by Nano Letters (2024)

Salvatore Cianci, Elena Blundo, Federico Tuzi, Daniele Cecchetti, Giorgio Pettinari, Marco Felici, Antonio Polimeni

“*Fine-Tuning of the Excitonic Response in Monolayer WS<sub>2</sub> Domes via Coupled Pressure and Strain Variation*”

Journal of Applied Physics 135, 244304 (2024)

Invited paper in Special Collection “*Two-Dimensional Materials and Heterostructures Under Strain*”

Salvatore Cianci, Elena Blundo, Marco Felici, Antonio Polimeni, Giorgio Pettinari  
“*Tailoring the optical properties of 2D transition metal dichalcogenides by strain*”  
Optical Materials **125**, 112087 (2022)

Cinzia Di Giorgio, Elena Blundo, Giorgio Pettinari, Marco Felici, Fabrizio Bobba, Antonio Polimeni  
“*Mechanical, elastic and adhesive properties of two-dimensional materials*”  
Advanced Materials Interfaces **9**, 2102220 (2022)

E. Blundo, E. Cappelluti, M. Felici, G. Pettinari, A. Polimeni  
“*Strain-tuning of the electronic, optical, and vibrational properties of two-dimensional crystals*”  
Applied Physics Review **8**, 021318 (2021)

D. Tedeschi, M. De Luca, A. Polimeni  
“*Photoluminescence Spectroscopy Applied to Semiconducting Nanowires: A Valuable Probe for Assessing Lattice Defects, Crystal Structures, and Carriers' Temperature*”, in  
Fundamental Properties of Semiconductor Nanowires, edited by N. Fukata and R. Rurali, Springer Nature Singapore Pte Ltd. (2020).

M. De Luca and A. Polimeni  
“*Electronic properties of wurtzite-phase InP nanowires determined by optical and magneto-optical spectroscopy*” in  
Applied Physics Review **4**, 041102 (2017)

G. Pettinari, M. Capizzi, A. Polimeni  
“*Carrier masses and band-gap temperature sensitivity in Ga(AsBi) alloys*”  
Semiconductor Science and Technology **30**, 094002 (2015)

G. Pettinari, A. Polimeni, M. Capizzi  
“*Effects of Hydrogenation on the Electronic Properties of Dilute Nitrides*”, in  
Hydrogenated dilute nitride semiconductors: theory, properties, applications, edited by G. Ciatto (Pan Stanford Publishing, Singapore, 2014)  
ISBN 978-981-4463-45-4

A. Polimeni, F. Masia, G. Baldassarri Höger von Högersthal, M. Felici and M. Capizzi  
“*Measurement of Carrier Localization Degree, Electron Effective Mass, and Exciton Size in  $In_xGa_{1-x}As_{1-y}N_y$  Alloys*”, in  
Semiconductor Research, Experimental Techniques, edited by A. Patanè and N. Balkan (Springer, Berlin, Germany, 2012)

E. P. O'Reilly, A. Lindsay, P. J. Klar, A. Polimeni, and M. Capizzi  
“*Trends in the electronic structure of dilute nitride alloys*” in  
Semiconductor Science and Technology **24**, 033001 (2009)

R. Trotta, A. Polimeni, M. Capizzi  
“*Hydrogen-induced defect engineering in dilute nitride semiconductors*”  
Physica Status Solidi C **6**, 2644 (2009)

A. Polimeni, F. Masia, G. Baldassarri Höger von Högersthal, M. Felici and M. Capizzi  
“*Measurement of Carrier Localization Degree, Electron Effective Mass, and Exciton Size in  $In_xGa_{1-x}As_{1-y}N_y$  Alloys*”, in  
Dilute Nitrides Semiconductors, edited by M. Henini (Elsevier, Oxford, UK, 2005)

A. Polimeni and M. Capizzi  
“*Role of Hydrogen in Dilute Nitrides*”, in  
Physics and applications of dilute nitrides, edited by I. A. Buyanova and W. M. Chen (Taylor and Francis Editors 2004)

A. Polimeni, F. Masia, G. Baldassarri Höger von Högersthal, M. Capizzi

*“Magnetophotoluminescence studies of  $In_xGa_{1-x}As_{1-y}N_y$ : a measurement of the electron effective mass, exciton size, and degree of carrier localization”*, in

Journal of Physics: Condensed Matter **16**, S3186 (2004)

A. Polimeni, G. Baldassarri, M. Bissiri, M. Capizzi, A. Frova, M. Fischer, M. Reinhardt, A. Forchel

*“Role of hydrogen in III-N-V compound semiconductors”*, in

Semiconductors Science and Technology **17**, 797 (2002)

**Publications in International refereed journals****2024**

254. Elena Blundo and Antonio Polimeni  
“Alice (and Bob) in Flatland”  
Invited Perspective in Nano Letters (2024)
253. Salvatore Cianci, Elena Blundo, Federico Tuzi, Daniele Cecchetti, Giorgio Pettinari, Marco Felici, Antonio Polimeni  
“Fine-Tuning of the Excitonic Response in Monolayer  $WS_2$  Domes via Coupled Pressure and Strain Variation”  
Journal of Applied Physics **135**, 244304 (2024)
252. Elena Stellino, Beatrice D’Alò, Elena Blundo, Paolo Postorino, Antonio Polimeni  
“Fine-Tuning of the Excitonic Response in Monolayer  $WS_2$  Domes via Coupled Pressure and Strain Variation”  
Nano Letters **24**, 3945 (2024)
251. Gianluca Ciatto, Francesco Filippone, Antonio Polimeni, Giorgio Pettinari  
“Exceptional Hydrogen Uptake in Crystalline  $In_xGa_{1-x}N$  Semiconductors”  
ACS Applied Materials and Interfaces **16**, 27268 (2024)
250. Sammar Tayyab, Alice Apponi, Maria Grazia Betti, Elena Blundo, Gianluca Cavoto, Riccardo Frisenda, Nuria Jiménez-Arévalo, Carlo Mariani, Francesco Pandolfi, Antonio Polimeni, Ilaria Rago, Alessandro Ruocco, Marco Sbroscia, Ravi Prakash Yadav  
“Spectromicroscopy Study of Induced Defects in Ion-Bombarded Highly Aligned Carbon Nanotubes”  
Nanomaterials **14**, 77 (2024)
249. Elena Blundo, Federico Tuzi, Salvatore Cianci, Marzia Cuccu, Katarzyna Olkowska-Pucko, Łucja Kipczak, Giorgio Contestabile, Antonio Miriametro, Marco Felici, Giorgio Pettinari, Takashi Taniguchi, Kenji Watanabe, Adam Babiński, Maciej R. Molas, Antonio Polimeni  
“Localisation-to-delocalisation transition of moiré excitons in  $WSe_2/MoSe_2$  heterostructures”  
Nature Communications **15**, 1057 (2024)
248. Cinzia Di Giorgio, Elena Blundo, Julien Basset, Giorgio Pettinari, Marco Felici, Charis HL Quay, Stanislas Rohart, Antonio Polimeni, Fabrizio Bobba, Marco Aprili  
“Imaging the Quantum Capacitance of Strained  $MoS_2$  Monolayers by Electrostatic Force Microscopy”  
ACS Nano **18**, 3405 (2024)

**2023**

247. J. S. Lemos, E. Blundo, A. Polimeni, M. A. Pimenta, A. Righi  
“Exciton–Phonon Interactions in Strained Domes of Monolayer  $MoS_2$  Studied by Resonance Raman Spectroscopy”  
Nanomaterials **13**, 2722 (2023)
246. Maria Grazia Betti, Dario Marchiani, Andrea Tonelli, Marco Sbroscia, Elena Blundo, Marta De Luca, Antonio Polimeni, Riccardo Frisenda, Carlo Mariani, Samuel Jeong, Yoshikazu Ito, Nicola Cavani, Roberto Biagi, Peter N. O. Gillespie, Michael Hernandez Bertran, Miki Bonacci, Elisa Molinari, Valentina De Renzi, Deborah Prezzi  
“Dielectric Response and Excitations of Hydrogenated Free-standing Graphene”  
Carbon Trends **12**, 100274 (2023)
245. Boqing Liu, Tanju Yildirim, Elena Blundo, Domenico de Ceglia, Ahmed Raza Khan, Zongyou Yin, Hieu T Nguyen, Giorgio Pettinari, Marco Felici, Antonio Polimeni, Yuerui Lu  
“Extraordinary second harmonic generation modulated by divergent strain field in pressurized monolayer domes”  
Applied Physics Reviews **10**, 021414 (2023)
244. Salvatore Cianci, Elena Blundo, Federico Tuzi, Giorgio Pettinari, Katarzyna Olkowska-Pucko, Eirini Parmenopoulou, Djero BL Peeters, Antonio Miriametro, Takashi Taniguchi, Kenji Watanabe, Adam Babinski, Maciej R Molas, Marco Felici, Antonio Polimeni  
“Spatially Controlled Single Photon Emitters in  $hBN$ -Capped  $WS_2$  Domes”  
Advanced Optical Materials **11**, 2202953 (2023)

243. Boqing Liu, Tanju Yildirim, Tiejun Lü, Elena Blundo, Li Wang, Lixue Jiang, Hongshuai Zou, Lijun Zhang, Huijun Zhao, Zongyou Yin, Fangbao Tian, Antonio Polimeni, Yuerui Lu  
 “Variant Plateau’s law in atomically thin transition metal dichalcogenide dome networks”  
 Nature Communications **14**, 1050 (2023)
242. Lorenza Romagnoli, Andrea D’Annibale, Elena Blundo, Atanu Patra, Antonio Polimeni, Daniele Meggiolaro, Iryna Andrusenko, Danilo Marchetti, Mauro Gemmi, Alessandro Latini  
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