ELENA STELLINO
Curriculum Vitae

Place Roma
Date 20-06-2023

Part I – General Information

Full Name	Elena Stellino
Date of Birth	
Place of Birth	
Citizenship	
Permanent Address	
Mobile Phone Number	
E-mail	
Spoken Languages	Italian, English* *(Cambridge certificate in Advanced English (CEFR level C1), 08/2021)

Part II – Education

Type	Year	Institution	Notes
University graduation	2018	Sapienza University, Rome, Italy Department of Physics	110/110 cum laude Title of the thesis: Angle Resolved Photoemission Spectroscopy on Transition Metal Dichalcogenides; supervisor prof. Paolo Postorino
PhD	2018/22	University of Perugia, Italy Department of Physics and Geology	Curriculum: Physics Title of the thesis: Lattice dynamics and electronic properties in Transition Metal Dichalcogenides under high-pressure; supervisor prof. Caterina Petrillo

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
2022	today	University of Perugia, Italy Department of Physics and Geology	Post-doctoral researcher PI prof. Caterina Petrillo

Part IV – Tutoring and dissemination activity

Theses

A/A	Institution	
2022/2023	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor of the Master's Degree thesis of Andrea Arabito

		(ongoing)
2022/2023	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor of the Master's Degree thesis of Mattia Capeccia (ongoing)
2021/2022	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor of the Master's Degree thesis of Angelo Tavella Title: Infrared study of the Fano resonance in phonon mode of Transition Metal Dichlcogenides
2020/2021	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor of the Master's Degree thesis of Beatrice D'Alò Title: Photoluminescence of compressed MoS_2 and WS_2: excitonic transitions in the high pressure regime
2020/2021	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor of the Bachelor's Degree thesis of Michele Bagaglini Title: Studio della risonanza di Fano su sistemi bidimensionali

Tutoring activities

2022/2023	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor for the exam of Physics Laboratory of Paolo Bilisco and Martina Fedele Title: Studio in Polarizzazione dello Spettro Raman di Perovskiti 2D
2022/2023	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor for the exam of Physics Laboratory of Clelia Filesi and Guglielmo Mennella Title: Analisi dello spettro Raman e di fotoluminescenza del $MoSe_2$ al variare del numero di layers
2021/2022	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor for the exam of Physics Laboratory of Federica Verde and Paolo De Vincenzi Title: Studio in Polarizzazione dei Picchi Raman della Perovskite $FaPbI_3$
2020/2021	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor for the exam of Physics Laboratory of Alice Margherita Finardi Title: Spettroscopia Raman ad alta pressione su MoS_2
2020/2021	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor for the exam of Physics Laboratory of Daniele Angelini Title: Analisi dello spettro Raman di MoS_2 e WS_2 al variare del numero di layers
2019/2020	Sapienza University, Rome, Italy Department of Physics	Co-Supervisor for the exam of Physics Laboratory of Beatrice D'Alò Title: Spettroscopia di fotoluminescenza su cristalli TMD al variare del numero di layers

Dissemination activities (III mission)

2023	Primary school IC Elsa Morante, Giardinieri, Rome, Italy	Co-organizer and participant in the laboratory project “La Scienza dell’Acqua”

Part V - Society memberberships, Awards and Honors

Year	Title
2023	First and corresponding author of a publication selected for the SOLEIL highlights: “Broadband infrared study of pressure-tunable Fano resonance and metallization transition in 2H-$MoTe_2$”
2019	Award for best presentation at the National Congress of the Italian Physical Society
2018	Scholarship for the PhD position at - Department of Physics and Geology, university of Perugia (accepted) - Department of Physics, university of Roma Tre - Department of Sciences, university of Roma Tre

Part VI – International Schools and Conferences

Year	Title	Notes
2019	Hercules, European School of Neutron and Synchrotron Radiation, Grenoble (France)	Hercules is a five-week course coordinated by the Université Grenoble Alpes (UGA). The school provides training for selected young researchers from international universities and laboratories, in the field of Neutrons, X-ray Synchrotron Radiation, and Free Electron Laser for condensed matter studies.
2020	ICONS: International School on Nonlinear Vibrational Spectro-Microscopy, Roma (Italy)	ICONS is structured around comprehensive review talks from world leading experts in complementary areas of nonlinear Raman spectroscopy both on theory, experiments and applications.
2019	Oral Presentation at the Italian national conference on the physics of matter, Catania (Italy)	Title of the presentation: Infrared study of the pressure-induced metallization in bulk 2H-MoTe2
2019	Oral Presentation at the National Congress of the Italian Physical Society, L'Aquila (Italy)	Title of the presentation: Infrared study of the pressure-induced metallization in 2H-$MoTe_2$
2022	Oral Presentation at the European High Pressure Research Group Meeting, Uppsala, Sweden	Title of the presentation Far Infrared Study of Pressure-Tunable Fano Resonance and Metallization Transition in semiconducting Transition Metal Dichalcogenides

Part VII – Accepted proposals for beamtimes at large scale facilities

Year	Facility	Notes
2023 (to be carried out in November)	Soleil synchrotron, St. Aubin (France) Beamline: SMIS Proposal number: 20230582	Role: principal investigator Title: Broadband infrared study of the pressure-induced metallization transition in $SnSe_2$
2022	Soleil synchrotron, St. Aubin (France) Beamline: AILES Proposal number: 20210996	Role: principal investigator Title: Searching for Fano resonance in the longitudinal infrared modes of Transition Metal Dichalcogenides through grazing-angle spectroscopy
2020	Soleil synchrotron, St. Aubin (France) Beamline: SMIS Proposal number: 20200824	Role: principal investigator Title: High-pressure and low-temperature study of the Fano resonance in semiconducting Transition Metal Dichalcogenides (TMDs)
2020	Soleil synchrotron, St. Aubin (France) Beamline: AILES Proposal number: 20191765	Role: principal investigator Title: Investigation of the $MoTe_2$ electronic properties by low-temperature and high-pressure infrared spectroscopy
2020	Fermi Free-Electron-Laser, Trieste (Italy) Beamline: TIMEX Proposal number: 20194032	Role: investigator Title: Thomson scattering at low momentum in warm dense matter: a pivotal pump and probe experiment
2019	Diamond synchrotron, Didcot (UK) Beamline: I05 Proposal number: SI21703-1	Role: investigator Title: Nano ARPES Study of Black Phosphorus
2018	Soleil synchrotron, St. Aubin (France) Beamline: AILES Proposal number: 20171166	Role: investigator Title: Infrared study of the pressure induced metallization in the transition metal dichalcogenide $MoTe_2$
2018	Elettra synchrotron, Trieste (Italy) Beamline: APE-LE Proposal number: 20175336	Role: principal investigator Title: Magnetic proximity effects in few layers TMDs systems

Part VIII – Research Activities

Key words

Transition metal dichalcogenides
Synchrotron-based infrared spectroscopy

Semiconductor-to-metal transition
High-pressure

Collaborations:

- HPS group, Sapienza University

- AILES and SMIS beamlines, synchrotron SOLEIL

Hybrid perovskites
Optical spectroscopy
Functional materials

Low-dimensional materials
Inelastic scattering of light
Lattice vibrational modes
Excitonic properties

Collaborations:

-HPS, IRS2 and OPERA groups, Sapienza university

- TIMEX beamline, FEL FERMI

Collaborations:

Brief Description

My research activity has been mainly focused on the study of the lattice vibrational modes and the electronic properties of low-dimensional and semiconducting materials by means of optical spectroscopic techniques. Most of the experiments were carried out either in beamtimes at large scale facilities or in collaboration with the HPS (high-pressure spectroscopy) group at the Sapienza University of Rome.

High-pressure infrared spectroscopy on transition metal dichalcogenides

A significant part of my PhD thesis was devoted to the infrared study of the pressure-induced semiconductor-to-metal transition in transition metal dichalcogenides (TMD) crystals. We carried out an extensive investigation considering both the electronic transitions across the band gap, in the near infrared range, and the phonon spectrum in far infrared range. In the latter case, we could observe a peculiar Fano resonance mechanism arising from the interplay between the E_{1u} vibrational mode and low energy electronic transitions from intra-gap doping levels. The pressure response of this Fano resonance was exploited for the first time as spectroscopic benchmark to understand the doping-related electronic processes ruling the metallic transition. Combining the results obtained on different TMD semiconductors, we could define a new scenario for the pressure-induced metallization process in this class of materials comprising two distinct charge delocalization processes: the first one, at low pressure, driven by the overlap between doping and conduction band states; the second one, at higher pressure, driven by the closure of the band-gap.

Optical spectroscopy and scattering studies on low-dimensional materials

I carried out further investigation of the vibrational spectrum of low-dimensional materials analysing the response of the Raman spectrum on varying the characteristics of the incident radiation. In this framework, we studied the polarization dependence of the second order Raman spectrum of $MoTe_2$ and we investigated the Raman modes in $MoSe_2$ at different laser excitation energies, down to 1.16 eV, to rule out the resonance effects with the indirect band gap at 1.14 eV. In a similar vein, we studied the Raman spectrum of graphene on decreasing the excitation photon energy, to probe the coupling of phonons with electronic transitions near the Dirac cone.
Graphite was also the object of a Thomson scattering experiment in the extreme UV at the FERMI free electron laser (FEL). We observed a nonlinear behaviour described in terms of the coherent nature of both the exciting FEL beam and the scattered radiation, which produces an intensity dependent enhancement of the scattering cross section and triggers the generation of coherent, low-momentum, low energy phonons.

- HPS and IRS1 groups, Sapienza University

- VIRGO Coating Research and Development collaboration

- Energy and Material Chemistry Group, Pavia University

This study was object of an article, which has been positively received by the referees of PNAS (Proceeding of National American Society) and is currently re-submitted with minor revisions. Parallelly, we are addressing a second work on graphite, also based on an experiment at FERMI FEL, specifically dedicated to the extension of the previous investigation to the time domain, in the pump-probe scheme.
My research line on low-dimensional systems, at the moment, verts on different ongoing projects, in both stationery and time-resolved conditions, in which we are trying to modulate the excitonic response of mono- and few-layer samples through a combination of different approaches, including the application of pressure and strain, the hBN encapsulation, and the assembly of novel heterostructures.

Optical spectroscopy on functional materials

Besides the large family of graphene-like crystals, in the last years, my activity has started to include several projects aimed at the investigation of the optical properties of functional materials for applicative purposes, including nanoalloys for photocatalysts, Si-based mirrors for gravitational wave detectors, and perovskite compounds. In more detail, I have taken part in the Virgo Coating Research and Development collaboration, in which I have studied the optical response of different coatings for gravitational-wave revealers to help improve the quality of the detection. I have also had the chance of participating in several projects on perovskite semiconductors, which are particularly renowned as optimal candidates for photovoltaic applications. These include the spectroscopic investigation of hybrid organic-inorganic 3D compounds in both their spurious and perovskite phases at ambient conditions and high-pressure, and, more recently, the study of diamine-based 2D perovskites, which exhibit a broadband emission in the visible range ascribed to the distortion of the inorganic layer by the diamine molecules. In this case, we are currently planning to apply high pressure to modulate the interaction between the organic and inorganic frame and study the variation in the response of the sample through wavelength-dependent Raman and photoluminescence spectroscopy.

I have included in my application three presentation letters written by renowned exponents of the scientific community, who attest to the activity I described above.

Part IX – Summary of Scientific Achievements

Product type	Number	Data Base	Start	End
Papers [international]	10 published papers, 2 proceedings, 1 accepted paper	Web of Science	2018	2023

Total Impact factor	45.67 (calculated including all papers)
Total Citations	34
Average Citations per Product	2.8=34/12 (without the accepted paper)
Hirsch (H) index	3
Normalized H index*	0.6=3/5

***H index** divided by the academic seniority.

Part X– Selected Publications

List of the publications selected for the evaluation. For each publication report title, authors, reference data, journal IF (if applicable), citations, press/media release (if any).

High-pressure infrared spectroscopy on Transition Metal Dichalcogenides

- Far-Infrared Signatures for a Two-Step Pressure-Driven Metallization in Transition Metal Dichalcogenides, E. Stellino, B. D'Alò, F. Capitani, M. Verseils, J.-B. Brubach, P. Roy, A. Nucara, C. Petrillo, P. Postorino, J. Phys. Chem. Lett. 2023, 14, 8, 2133–2140, DOI 10.1021/acs.jpclett.3c00199, publication date 20-02-2023, IF J. Phys. Chem. Lett. 6.888, number of citations 0 (web of science)

- Broadband infrared study of pressure-tunable Fano resonance and metallization transition in 2H-$MoTe_2$, E. Stellino, F. Capitani, F. Ripanti, M. Verseils, C. Petrillo, P. Dore, P. Postorino, Sci. Rep. 12, 17333, DOI 10.1038/s41598-022-22089-0, publication date15-10-2022, IF Sci. Rep. 4.997, number of citations 1 (web of science)

- Infrared Study of the Pressure-Induced Isostructural Metallic Transition in $Mo_{0.5}W_{0.5}S_2$, E. Stellino, F. Ripanti, G. Nisini, F. Capitani, C. Petrillo, P. Postorino, J. Phys. Chem. C 2021, 125, 28, 15503–15509, DOI 10.1021/acs.jpcc.1c02315, publication date 22-07-2021, IF J. Phys. Chem. C 4.126, number of citations 2 (web of science)

- Pressure evolution of the optical phonons of $MoTe_2$, E. Stellino, Il Nuovo Cimento C, 43, 116, DOI 10.1393/ncc/i2020-20116-2, publication date 17-11-2020, number of citations 1 (web of science)

Optical spectroscopy and scattering studies on low-dimensional materials

- Probing enhanced electron-phonon coupling in graphene by infrared resonance Raman spectroscopy, T. Venanzi, L. Graziotto, F. Macheda, S. Sotgiu, T. Ouaj, E. Stellino, C. Fasolato, P. Postorino, V. Mišeikis, M. Metzelaars, P. Kögerler, B. Beschoten, C. Coletti, S. Roddaro, M. Calandra, M. Ortolani, C. Stampfer, F. Mauri, and L. Baldassarre, accepted paper on Phys. Rev. Letters, acceptance date 15-05-2023, IF Phys. Rev. Letters 9.185, number of citations 0

- Raman scattering with infrared excitation resonant with the MoSe2 indirect band gap, S. Sotgiu, T. Venanzi, F. Macheda, E. Stellino, M. Ortolani, P. Postorino, and L. Baldassarre, Phys. Rev. B, 106, 085204**,** DOI 10.1103/PhysRevB.106.085204, publication date 16-08-2022, IF Phys. Rev. B 3.908, number of citations 2 (web of science)

- Raman scattering with near infrared excitation selectively resonant with the indirect bandgap of bulk $MoSe_2$, S. Sotgiu, T. Venanzi, F. Macheda, E. Stellino, P. Postorino, M. Ortolani, L. Baldassarre, DOI 10.1109/IRMMW-THz50927.2022.9895730, publication date 26-09-2022, proceeding paper, number of citations 0 (web of science)

- First- and second-order Raman scattering from $MoTe_2$ single crystal, S. Caramazza, A. Collina, E. Stellino, F. Ripanti, P. Dore, P. Postorino, Eur. Phys. J. B, 91, 35 DOI 10.1140/epjb/e2017-80399-5, publication date 12-02-2018, IF Eur. Phys. J. B 1.536, number of citations 12 (web of science)

Optical spectroscopy on functional materials

- High-Pressure Behavior of δ-Phase of Formamidinium Lead Iodide by Optical Spectroscopies, V. Carpenella, F. Ripanti, E. Stellino, C. Fasolato, A. Nucara, C. Petrillo, L.

Malavasi, and P. Postorino, J. Phys. Chem. C, 127, 5, 2440–2447, DOI 10.1021/acs.jpcc.2c08253, publication date 27-01-2023, IF J. Phys. Chem. C 4.126, number of citations 0 (web of science)

- Laser Ablation Nanoarchitectonics of Au-Cu Alloys Deposited on TiO_2 Photocatalyst Films for Switchable Hydrogen Evolution from Formic Acid Dehydrogenation, D. Hong, A. Sharma, D. Jiang, E. Stellino, T. Ishiyama, P. Postorino, E. Placidi, Y. Kon, K. Koga, ACS Omega, 7, 35, 31260–31270**,** DOI 10.1021/acsomega.2c03509, publication date 06-09-2022, IF ACS Omega 4.132, number of citations 3 (web of science)

- Argon and Other Defects in Amorphous SiO_2 Coatings for Gravitational-Wave Detectors, A. Paolone, E. Placidi, E. Stellino, M. G. Betti, E. Majorana, C. Mariani, A. Nucara, O. Palumbo, P. Postorino, M. Sbroscia, F. Trequattrini, M. Granata, D. Hofman, C. Michel, L. Pinard, A. Lemaitre, N. Shcheblanov, G. Cagnoli and F. Ricci, Coatings, 12(7), 1001, DOI 10.3390/coatings12071001, publication date 07-2022, IF Coatings 3.24, number of citations 4 (web of science)

- Effects of the annealing of amorphous Ta_2O_5 coatings produced by ion beam sputtering concerning the effusion of argon and the chemical composition, A. Paolone, E. Placidi, E. Stellino, M. G. Betti, E. Majorana, C. Mariani, A. Nucara, O. Palumbo, P. Postorino, I. Rago, F. Trequattrini, M. Granata, J. Teillon, D. Hofman, C. Michel, A. Lemaitre, N. Shcheblanov, G. Cagnoli, F. Ricci, J. Non-Cryst. Solids, 557, 120651, DOI 10.1016/j.jnoncrysol.2021.120651, publication date 01-04-2021, IF J. Non-Cryst. Solids 3.53, number of citations 9 (web of science)