

## **Loredana Parlato**

Associate Professor of Experimental Physics of Matter

Dept. of Physics “Ettore Pancini”, University of Naples Federico II (UNINA), Naples, Italy

### **Education and training:**

1997 Ph.D. Degree in Physics, University of Naples Federico II, Naples, Italy

1993 Masters Degree in Physics (cum laude) University of Naples Federico II, Naples, Italy

### **Work experience:**

- From Apr. 2021-present *Associate Professor* of experimental physics of matter, Dept. of Physics, University of Naples Federico II, Naples, Italy
- From Jan. 2004 to Apr.2021 *Permanent Researcher*, Dept. of Physics, University of Naples Federico II, Naples, Italy
- From Sept. 2003 to Jan. 2004 *Researcher*, Istituto Nazionale Fisica della Materia (INFN)-Coherentia, Naples, Italy
- From Nov. 1999 to Aug. 2003, Postdoctoral fellow, Seconda Università degli Studi di Napoli, Italy
- From Nov. 1996 to Oct. 1999 *Contract Researcher*, Osservatorio Astronomico di Capodimonte, Naples, Italy

### **Visiting academic positions:**

- Nov. 1997 *Visiting scientist* Electrotechnical Laboratory, Tsukuba, Japan (Prof. Akoh )
- From Oct. 1995 to Febr.1996 *Visiting Scientist* Technical University Munchen, Garching, Germania

### **Prizes and awards:**

P. Bassi Award of S.I.F in 1993

### **Teaching activities and supervision of graduate students and PhD supervision, member of PhD committee:**

- From 2005 Lecturer in General Physics at University of Naples Federico II
- From 2023 Lecturer in Nanoscale Processing and Characterization for Advanced Devices in Quantum Science and Engineering at University of Naples Federico II
- Lecturer at the summer school on superconducting electronics organized by the FLUXONICS Society (September 2022, Creta and October 2024, Corse)
- From 2005 to present: supervisor of 6 Master students, thesis in Physics, 5 Master Students in Electronic Engineering and Material Engineering; advisor of 5 PhD students
- In 2024 member of the judging Committee (D.R. n. 2769 of 28.6.2024) of the Ph.D. on Quantum Technologies
- January 2025 member of the judging Committee (D.R. 19.20.2024 rep. 3478, prot. n° 390998) of the Ph.D. Matematica, Fisica ed Applicazioni at University of Salerno

### **Scientific organisations/Coordination of academic activities**

- Since 2006 LP has been in charge (RADRL) of the laboratory “Deposition of thin films” at the Department of Physics of the University of Naples Federico II.
- Since 2022 LP is the scientific manager for the Center of Advanced Measurements and Technology Services (CESMA) of UNINA of a collaboration agreement with Photon Technology (PRC)
- Since December 2022 LP is the scientific referee for DFUNINA for Collaborative Scientific Research and Development Agreement (CSRADA) between Division of Superconducting Electronics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences hereafter (SIMIT-CAS), Department of Physics “E. Pancini”, University of Naples Federico II (DFUNINA) and Photon Technology Ltd. hereafter (PHOTEC) for the Development of superconducting single photon detectors (SSPDs).

- From 2009 to 2010 leader of the research activity on “Superconducting and magnetic systems: Physics aspects and applications (MDP\_04\_017)” within the Research and Development Center INFM COHERENTIA and then CNR-SPIN.

### **Responsibility of research projects**

Coordinator of the project “ Superconducting microstrips for Mid-InfraRed Novel single photon detectors (SMIRNe)” of the “Programma per il Finanziamento della Ricerca di Ateneo- 2024” (December 2024- Duration: 24 months)

Local Coordinator of the international project "IRON-SEA Establishing the basic science and technology for iron based superconducting electronics applications”, Seventh Framework Program FP7 EU-JAPAN G.A.N.28314. (Duration: 36 months)

National Coordinator of the international project "Hybrid nanostructures for high performance superconducting photodetectors", MAE Program of Cooperation in the Field of Science and Technology Italy-USA (Duration: 36 months)

Local Coordinator of the project “Fast Superconductive Optical Detectors” SEED - CRS COHERENTIA. (Duration:24 months)

### **Membership of scientific societies**

Since 2019 member of Comitato Elettrotecnico Italiano (CEI) CT 90 “Superconductivity”

Since 2021 member of AIMagn (Associazione Italiana Magnetismo)

Since 2023 member of SEG 14: Quantum Technologies of International Electrotechnical Commission

Since 2024 member of Comitato Elettrotecnico Italiano (CEI) CT 327 “Tecnologie quantistiche”

### **Member of committee:**

Since 2019 member of committee “Outreach and Dissemination” of CNR-SPIN

Since 2022 member of committee “Outreach and Dissemination” of Dept. of Physics, UNINA, Italy

### **Research Interests/Area of Expertise**

- *Superconducting nano/microstrips for single photon detectors (UV-near IR)*: nano/microstrips have been realized using conventional and innovative superconducting materials (NbN, NbTiN, MoSi, NbRe), hybrids (NbN / Ferromagnet), and HTS (YBCO) for single photon detectors, in collaboration with Chalmers University, SIMIT (China), Saitama University (Japan). The aim of this research is the development new nano and microdevices based on superconducting materials for single photon detectors capable of operating with high quantum efficiencies, low levels of dark counts and time response <100ps for applications currently in the environmental field using LIDAR, in quantum technologies and in Mid-IR experiments
- *Josephson tunnel junctions*: the properties of the Josephson current in non-equilibrium regime have been studied using both three-terminal devices and ultra-fast laser sources for application in the field of superconducting detectors and superconducting electronics. They are currently making Josephson junctions with the presence of ferromagnetic layers with areas up to 4  $\mu\text{m}^2$  with the goal of further reducing the dimensions to the nanoscale size. The purpose is to use Josephson junctions as cryogenic memories and in quantum technologies applications.
- *organic transistors (OFET)*: n-channel devices based on compounds belonging to the family of Perylene Diimides functionalized with cyano groups were fabricated and characterized. Specifically, devices with channels up to 50 nm with Au and hybrid (Superconductor (YBCO) / Au) electrodes were developed for organic electronics also on flexible substrates and photo-transistors at visible wavelengths.
- *"pump and probe" spectroscopy in superconductors*: the research activity was aimed at the study of fast relaxation processes using ultra-fast laser pulses (100 fs) in superconducting films at high and low critical temperature, and structures hybrid S / F as well as of non-conventional superconducting materials (pnictides). The aim of this research was the investigation of innovative materials for ultra-fast optical detectors, particularly promising both in fundamental experiments in quantum optics and in quantum computing and telecommunications.

### **Project-related expertise**

Skills in advanced cryogenics down to 7 mK, very low noise electronics, UHV thin films deposition facilities, micro and nano lithography systems

LP is author of 120 publications in peer reviewed international journals and conference proceedings, and over 20 conference presentations in the last fifteen years.

Representative Presentations in the last years:

- 2025 “Superconducting Nano/Microstrip Single Photon Detectors for quantum communications” FISMAT 2025, Venice, Italy, July 2025. Invited for oral presentation
- 2025 “Single photon detectors based on superconducting nano/microstrips for applications at short-wavelength infrared” SPIE Optics and Optoelectronics Conference, Prague, Czech Republic, 7th-10th April 2025. Invited for oral presentation
- 2024 “Single photon detection up to 2  $\mu\text{m}$  in pair of parallel microstrips based on NbRe ultrathin films” Single Photon Workshop 2024, Edinburg, 28th-22th November 2024. Oral presentation.
- 2023 “Ultrathin superconducting microstrips for single photon detectors” SURFINT- SREN VIII), Bratislava, Slovakia, 20th to 23rd, 2023. Invited for oral Presentation
- 2023 “Investigation of NbRe for superconducting microstrips single photon detectors” SPIE Optics and Optoelectronics Conference, Prague, Czech Republic, 24th-27th 2023. Invited for oral Presentation.
- 2023 “NbRe microstrips for single photon detectors” 16<sup>th</sup> European Conference on Applied Superconductivity- EUCAS, Bologna, Italy, September 3-7, 2023. Invited for oral Presentation.
- 2021 “Investigation of fluctuations in superconducting molybdenum silicide nanostrips for single photon detectors” International Conference on Low Temperature Detectors LTD19, July 19-29, 2021, virtual event, NIST. Oral presentation.
- 2021 “Superconducting Molybdenum Silicide nanowires for single photon detectors” International Workshop on Low Temperature Electronic Wolte14, April 12-15, 2021, virtual event. Oral presentation.
- 2019 “Intrinsic dark counts in superconducting nanostrip single photon detectors: the role of multiple fluctuation events in NbN and NbTiN.” International Conference on Low Temperature Detectors LTD18, Milan, Italy, July 22-26, 2019. Invited for oral presentation.
- 2018 “Material aspects for Superconducting Nanowire Single-Photon Detectors”. International Workshop on Low Temperature Electronic Wolte13, Sorrento, Italy, September 10-13, 2018. Oral presentation.
- 2017 “Investigation of dark counts in innovative materials for superconducting nanowire single photon detector applications”. SPIE Optics and Optoelectronics Conference, Prague, Czech Republic, from April 24-27, 2017. Oral presentation.
- 2015 “S/F nanostructures for superconducting photon detectors”. International workshop on Top Spin: Spin and Topological phenomena in nanostructures Salerno, Italy, May 14-15, 2015. Oral presentation.
- 2015 “YBCO nanowires for optical-photon detection”. SPIE Optics and Optoelectronics Conference, Prague, Czech Republic. Oral presentation
- 2014 “SNSPD: configuration and material aspects”. Fotonica Conference, Naples, Italy, May 12-14, 2014.
- 2013 “Photoresponse Studies of Proximitized Superconductor/Ferromagnet (YBCO/LSMO) Nanostructures for Optical-Photon Detection”. Italian National Conference on Condensed Matter Physics FisMat., September 9-13, 2013. Oral presentation
- 2013 “Establishing the basic science and technology for Iron-based superconducting electronics applications”. 3rd International IRON-SEA meeting, Osaka, Japan, March 5-7, 2013. Oral Presentation
- 2012 “Time-resolved optical response of all-oxide YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7</sub>/La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> proximitized bilayers”. International First Conference on Superconductivity and Functional Oxides, Como, Italy, June 19-22, 2012. Oral presentation.
- 2011 “Transport properties and photo-response experiments on proximitized NiCu/NbN superconducting nanostripes”. EUCAS 2011 European Conference on Applied Superconductivity, Superconductivity Centennial Conference The Hague, The Netherlands, September 18-23, 2011. Oral presentation
- 2010 “Superconducting/Ferromagnetic nanostructured films for advanced optical devices” CNR-SPIN Kick-off Meeting, Genova, Italy, June 10-11, 2010. Oral presentation

#### **Partecipation to conference committees:**

Local Committees “Single Photon Workshop 2026” Naples, Italy June 2026

Scientific Committees “16<sup>th</sup> Workshop on LowTemperature Electronics - WOLTE 16” –Cagliari, Italy, June 2024

Local Committees “16th European Conference on Applied Superconductivity- EUCAS 2023, Bologna, Italy, September 3-7, 2023

Co-chairman “15th Workshop on LowTemperature Electronics - WOLTE 15" –Matera, Italy, 6-9 June 2022

Local Committees “14th Workshop on LowTemperature Electronics - WOLTE 14" –12-15 Aprile 2021

Local Committees “13th Workshop on LowTemperature Electronics - WOLTE 13" – Sorrento (NA) Italy, 10-13 Settembre 2018

Local Committees “16th International Superconductive Electronics Conference- ISEC” -Sorrento (NA) Italy, dal 12-16 giugno 2017

Local Committees "MAMA-Trend: Trends, challenges and emergent new phenomena in multifunctional materials" - Sorrento (NA) Italy, 20-23 maggio 2013

Local Committees “6th EUropean Conference on Applied Superconductivity - EUCAS 2003” - Sorrento (NA) Italy, 14-18 setttembre 2003

Naples, June 3<sup>th</sup>, 2025