Elisa Riceputi

Curriculum of Scientific and Academic Activity

Personal Data

Elisa Riceputi was born in Bergamo (Italy) on August 6 1987.

Education and Academic Appointments:

- **November 2014 – October 2017:** she attends the XXX cycle of the **PhD program in Engineering and Applied Sciences** at the University of Bergamo. On 21st March 2018 Elisa Riceputi obtained her PhD degree with a thesis entitled "Design and Test of Microelectronic System for Particle Detectors and X-ray Imaging for Frontier Research" (Tutor: Prof. Valerio Re).
- **March 2013: Master Degree in Physics**, curriculum in Physics applied to Biology, Environment and Medicine, obtained at the University of Milan Bicocca with a thesis entitled "Very high sensitivity measurements of ^{232}Th e ^{238}U in ultra-pure materials" (Supervisor: Prof. Ezio Previtali, Co-supervisor: Dr. Massimiliano Clemenza) with a score of 109/110.
- **April 2010: Bachelor Degree in Physics**, curriculum in Environmental and Medical Physics, obtained at the University of Milan Bicocca with a thesis entitled "Characterization at very low temperature of the set-up of the MARE experiment for the measurement of the neutrino mass" (Supervisor: Prof. Angelo Nucciotti, Co-supervisor: Dr. Elena Ferri) with a score of 98/110.

Fixed-Term Researcher Type B

- **June 2023 – today:** she won the public selection procedure for a fixed-term researcher position at the University of Bergamo.
  Elisa Riceputi's work concentrate on front-end electronics for strip and pixel silicon sensors.
  The yearly teaching task is 90 h of academic lessons and 260 h of other academic activities.

Group of academic recruitment field: 09/E – Electrical and electronic engineering and measurements
Academic recruitment field: 09/E3 – Electronics
Academic discipline: ING-INF/01 – Electronic engineering

Fixed-Term Researcher Type A

- **June 2020 – May 2023:** she won the public selection procedure for a fixed-term researcher position at the University of Bergamo.
  Elisa Riceputi's work concentrate on front-end electronics for strip and pixel silicon sensors.
  The yearly teaching task is 60 h of academic lessons and 290 h of other academic activities.
  Group of academic recruitment field: 09/E – Electrical and electronic engineering and measurements
  Academic recruitment field: 09/E3 – Electronics
  Academic discipline: ING-INF/01 – Electronic engineering

Research grants:

- **July 2018 – May 2020:** she holds a Supporting Talented Researchers (STaRs) grant entitled "Design of microelectronic systems for antimatter detectors in cosmic ray astrophysics applications" at the University of Bergamo (Tutor: Prof. Massimo Manghisoni). The grant lasts two years, from July 1 2018 to June 30 2020. The Supporting Talented Researchers (STaRs) program is a support tool for young researchers from the University of Bergamo.

Collaborative assignments to research activities:

- **February – June 2018:** she receives an external collaboration contract for technological research activities with the University of Bergamo. Object of the assignment "Design and construction of an instrument for measuring the noise of DEPFET devices".

- **November 2017:** she receives an external collaboration contract for technological research activities with the University of Bergamo. Object of the assignment "Characterization of 5 'large format bare modules' for the XFEL experiment".

- **December 2016 – March 2017:** she receives a position of collaboration for technological research activities with the University of Bergamo. Object of the assignment “Development of algorithms for walking analysis of patients suffering from diseases of the central nervous system”.

Scientific Activity

The scientific activity of Elisa Riceputi focuses on the design and characterization of low-noise analog electronics for high-energy physics experiments, for imaging with latest generation X-ray sources and for low-energy astroparticle physics experiments. In particular, her activity is divided along the following main lines of research:

1. design and testing of circuits for processing signals from radiation detectors;
2. study of the noise and radiation resistance characteristics of individual devices in different CMOS technologies;
3. characterization of modules composed of pixel detectors connected to readout integrated circuits through the use of a mechanical probe station.

1. Design and test of circuits for processing signals from radiation detectors

This line of research focuses on the development of Application Specific Integrated Circuit (ASICs) in CMOS technology, which have the purpose of reading and processing the signals coming from radiation detectors. In addition to the development of such circuits, systems for the characterization and the verification of the correct operation of the ASICs have been developed and optimized.

a. Low-noise analog channel design for signal processing from a Silicon-Lithium, Si(Li) detector

Elisa Riceputi contributed to the development of the readout integrated circuit for the GAPS experiment. She worked on the design of the analog channel, focusing on optimising the noise performance.

One of the main topics of physics in recent decades is the study of the nature of dark matter. The GAPS (General AntiParticle Spectrometer) experiment aims to an indirect study of dark matter by detecting the products of its annihilation. In particular, the experiment aims at the detection of antideuterium particles produced by the annihilation of cold dark matter, i.e. in the kinetic energy range of $\sim 0.06 - 0.21\,\mathrm{GeV/n}$. GAPS is an international collaboration funded primarily

by NASA. In Italy, funding comes from the National Institute of Nuclear Physics (INFN) and the Italian Space Agency (ASI). To achieve the goal, an intrument will be built consisting of 10 layers of 12 × 12 Silicon-Lithium, Si(Li) detectors working as a particle tracker, and an external Time of Flight (ToF) scintillator system that selects interesting events according to the measured energy and triggers the internal detectors. Each Si(Li) detector will be divided into 8 strips and the detectors on adjacent layers will be placed orthogonally to each other in order to be able to reconstruct the 3D trace of the incident particle. The physical process to be studied is very complex and covers an energy range from tens of keV up to 100 MeV, with particular attention to have a resolution better than 4 keV FWHM in the low energy range (up to 100 keV). The expected working temperature for the instrument is approximately $-40\,^{\circ}\mathrm{C}$. For the readout and processing of the signals collected by the sensors, three prototypes of integrated circuits were produced before the mass production of the flight ASIC, two with a reduced number of channels and one full-scale. The ASICs were called SLIDER4, SLIDER8 and pSLIDER32 (prototype Silicon-LIthium DEtector Readout, with $4-8-32$ channels respectively). The circuits in question are able to read and process the signal coming from $4-8-32$ strips (in the latter case corresponding to 4 sensors), respectively. The two small size ASICs were produced first. SLIDER4 has the possibility to access all the analog blocks of the acquisition chain, but it has no ADC and digital backend, whereas SLIDER8 has only the digital outputs generated by the ADC. After validating and optimizing the SLIDER4 and SLIDER8 circuits, pSLIDER32 was produced. This is the full-scale prototype that features both digital outputs and the ability to access single analog blocks for two of the ASIC channels. Finally, the flight ASIC SLIDER32 was successfully produced and experimental results indicate that the chip works correctly with good noise performance.
Elisa Riceputi worked on the design and layout of two blocks of the analogue channel: Charge Sensitive Amplifier (CSA) and Injection Circuit. She also designed the pad rings of both prototypes and flight ASIC.

The CSA is the first signal amplification stage and it is crucial to optimize its design in order to obtain very low noise levels (required by the experiment specifications). Furthermore, the first signal amplification stage must be able to process the whole wide dynamic range of the signals generated by the particles in the detector. As a result, a dynamic signal compression technique has been implemented which makes it possible to expand the input dynamics, while achieving a high gain at low energies.

The second block developed is the injection circuit: this block injects a voltage step signal on an injection capacity, simulating the charge signal generated by the particles in the sensor, thus allowing the entire acquisition chain to be calibrated.

The pad ring is the periphery of a chip which contains all the bond pads. It is fundamental in order to bias and communicate with the ASIC itself. It includes pads for global power supply and separate ones for analog and digital power supplies, I/O drivers, ESD structures, and the bond pads.

For the construction and testing of these integrated circuits, Elisa Riceputi interfaced with the various groups of the collaboration, including the main ones: INFN Trieste, Columbia University, Massachusetts Institute of Technology (MIT) and Oak Ridge National Laboratory (ORNL).

b. Design of electronic interface Printed Circuit Boards (PCBs) for integrated circuits developed by the GAPS experiment

Within the GAPS experiment, Elisa Riceputi developed both the prototypes of the flight boards for the instrument that will be launched from the McMurdo station, Antarctica, at the end of 2023. In the GAPS instrument, the tracker is made up of 10 planes of 12×12 Si(Li) detectors, grouped into modules of 4 sensors each. Every module is therefore composed of 4 Si(Li) detectors, an ASIC (SLIDER32) capable of reading signals coming from 32 channels and an electronic interface PCB between sensors, ASIC and external acquisition systems. Each layer will consist of six rows of 6 modules connected in cascade by means of a second type of a flex-rigid PCB. Elisa Riceputi was responsible for the design of the schematic and layout of the two PCBs in question. In particular she has ensured to obtain an excellent isolation between analog and digital signals, minimizing capacitance and parasitic resistances in order to obtain good results in terms of crosstalk and noise. Furthermore, the isolation of the high voltage power supply of the detectors from the rest of the system has been carefully designed. Elisa Riceputi has created two types of boards: a rigid one of $26\,\mathrm{cm} \times 26\,\mathrm{cm}$ in size intended to house the ASIC and which will be connected to 4 sensors by wire bonding and a flex-rigid one of approximately $3\,\mathrm{cm} \times 5\,\mathrm{cm}$. In the final instrument these two PCBs will alternate, so as to obtain a row of 6 rigid PCBs (6 ASICs and 24 sensors) and 5 flex-rigid PCBs for the transmission of signals. The larger board carries the power supplies for the detectors (high voltage, up to hundreds of Volts), while both carry the power supplies for the ASIC (low voltage, approximately 2.3 V), have pairs of tracks adapted to 100 Ω for the correct transmission of digital signals and minimize parasitic resistances in order to obtain a voltage drop as low as possible between the first and last board of the system.

For the implementation of the complete tracker system, Elisa Riceputi is constantly in touch with the groups of the collaboration, in particular the Columbia University, Massachusetts Institute of Technology (MIT) and the Berkeley Space Sciences Laboratories facility. On July/August 2022 Elisa Riceputi went to the Massachusetts Institute of Technology, Boston, contributing to the integration of the GAPS instrument. A second period is foreseen in January 2023 at the Berkeley Space Sciences Laboratories, California.

c. **Design of an ad-hoc experimental set-up for the characterization of integrated circuits**

In order to validate the correct operation of an integrated circuit it is necessary to outline a test strategy in order to develop an ad-hoc test bench for the Device Under Test (DUT). Elisa Riceputi carried out this type of activity for the DSSC experiment, an international collaboration composed of several European research institutions and universities including the main ones: European XFEL, DESY, Semiconductor Laboratory of the Max-Planck-Society, University of Bergamo, Politecnico di Milano and University of Heidelberg. Elisa Riceputi has developed the electronic boards necessary to interface with the ASICs in the test phase and has acquired data from the ASICs characterizing them. In this work some critical issues due to high contact resistances between ASIC and external acquisition system emerged, and were then solved in the second production.

2. Study of the noise characteristics and radiation resistance of transistors in CMOS technologies

Elisa Riceputi studied the noise performance and radiation hardness of CMOS processes in different technological nodes, in view of their use for the readout of radiation detectors. In order to obtain a better result in terms of performance, it is highly recommended to study in depth the CMOS technology chosen for the realization of an integrated circuit for reading signals from radiation detectors. The models provided by foundries are normally very accurate from the point of view of the realization of digital systems, whereas the analog characteristics, in particular the noise performances, are not always modeled with sufficient accuracy. This is critical especially when a designer needs to develop an analog circuits with excellent noise performance. Furthermore, the models provided by the foundries do not include a characterization of the behavior of transistors after exposure to ionizing radiation: this is also a critical aspect for the design of radiation-hard analog circuits.

a. **Study of the noise characteristics of CMOS transistors before and after exposure to ionizing radiation**
   The new generation of pixel detectors in High-Energy Physics (HEP) experiments at High Luminosity LHC (HL-LHC) or in photon science experiments at new X-ray sources faces new performance challenges. One of the most important is the ability to tolerate extremely high levels of ionizing radiation (up to 1 Grad Total Ionizing Dose). It is therefore of fundamental importance to carry out an in-depth study of the static and noise characteristics of the transistors in the CMOS technologies that will be used by the various experiments. It is also necessary to evaluate the effects given by the exposure to ionizing radiation foreseen in the experiment itself. Elisa Riceputi dealt with this aspect for two different technologies:

   - **65 nm CMOS technology.** This technology is currently used for the realization of integrated circuits for reading hybrid pixels in experiments with high event rates and high radiation doses. In particular, the work was carried out in the context of the RD53 activity. This is an international collaboration, proposed by CERN in Geneva, composed by universities and research centers in Europe and the United States, with the aim to develop an integrated circuit for reading hybrid pixels in the ATLAS and CMS experiments at HL-LHC. Elisa Riceputi has characterized MOSFETs of different geometries and of both polarities belonging to the 65 nm technology chosen by RD53. She also dealt with radiation exposure procedures with X-ray sources up to a Total Ionizing Dose (TID) of 600 Mrad, characterizing the same MOS before and after irradiation. The experimental results confirm the high degree of radiation tolerance typical of the 65 nm node CMOS processes. It is important to note that the goal has been to understand the degradation effects in low-noise analog circuits, where very small transistors are used very rarely. In digital circuits, these are the most critical devices, so much that they can compromise the radiation tolerance of a mixed signal chip at a total dose of several hundred of Mrads (SiO_2). The obtained data, instead, support the prediction that analog circuits can operate up to 600 Mrad of TID with a moderate ($10 - 15\%$) degradation of their noise performance. The main mechanism of damage at doses up to 10 Mrad can be ascribed to NMOSFETs and lateral parasitic transistors, which noise adds to the total noise of the device when they are activated by the positive charge induced by radiation in the isolation oxides (Shallow Trench Isolation - STI). This study shows that, at several hundred of Mrads, the negatively charged interface states compensate for the accumulation of positive charge in the insulation oxides, so that the lateral parasitic transistors are gradually turned off and their noise contribution tends to decrease. At very high doses, the noise behavior of NMOSFETs and PMOSFETs is consistent with the damage mechanisms associated with ionization in the spacer oxides, which become dominant with respect to the noise contribution of the lateral parasitic transistors. As a result, an overall moderate increase in noise at 600 Mrad is observed. This is very promising in view of 65 nm analog front-end applications in environments where an extreme level of ionizing radiation is present.

- **110 nm CMOS technology.** This technology has been considered in view of its possible use for the realization of read-out integrated circuits for detectors of the Swiss Light Source Synchrotron (SLS) at the Paul Scherrer Institute (PSI) and in general for X-ray source imaging of the latest generation. Elisa Riceputi has characterized transistors belonging to the UMC 110 nm CMOS technology of different geometries and for both polarities. Furthermore she has been involved in the procedures of exposure to radiation with X-ray sources up to a Total Ionizing Dose of 5 Mrad, characterizing the same MOS before and after irradiation. The devices under test show a high degree of tolerance to ionizing radiation up to the total dose of 5 Mrad. This behavior can be ascribed to the thin gate oxide. A small shift in the threshold voltage and a negligible increase in transconductance were highlighted. Although there have been hardly any changes in the static characteristics, a degradation of low frequency noise can be observed. In particular, at 5 Mrad PMOSFET devices show a Lorentzian noise term, whereas low current density NMOSFETs show a moderate increase in the flicker noise (1/f noise). Overall, these results lead to the conclusion that the studied technology is appropriate for the design of analog integrated circuits, with a high degree of radiation tolerance up to a total dose of 5 Mrad.

b. Study of the noise characteristics of the input device of the analogue reading channel for the Si(Li) strip detectors for the GAPS experiment

In one of the prototypes of the front-end ASIC of the GAPS experiment, SLIDER8, a single MOS transistor with the same geometry and polarity as the input device of the analog signal acquisition and processing channel was inserted. The study of the static and noise characteristics of this device is of the utmost importance to compare the performance obtained in terms of gain and noise with the data expected from the simulations. Elisa Riceputi obtained experimental results that highlighted some discrepancies between the noise model (in particular with regard to the flicker noise component) provided by the 180 nm CMOS technology and the measured values. Taking into account this difference, it was possible, in the 32-channel flight ASIC, to improve the results obtained in terms of noise.

3. Characterization of modules with pixel sensors connected to readout integrated circuits by using a mechanical probe station

The research activity of Elisa Riceputi was focused on the development of a Bare Module (BM) characterization set-up for the detectors developed by the DSSC consortium. A Bare Module consists of a sensor interconnected by bump bonding to a readout integrated circuit for signal processing.

The DSSC consortium is an international collaboration born with the aim of producing a “Megapixel camera” capable of satisfying the requirements of the experiments foreseen at the European XFEL in Hamburg. A camera was produced consisting of a matrix of 32 silicon sensors, each made of 256 × 128 pixels to which the ASICs are connected by bump bonding for signal readout and processing. Each pixel in the detector corresponds to an electronic cell in the integrated circuit for reading the signal. The activity carried out by Elisa Riceputi as part of the DSSC collaboration concerned the tests of the ASICs and the sensor that compose the module itself. More in detail:

- The correct operation of the ASICs was verified, including the reading and writing of the registers, the calibration circuit and the analog to digital converter (ADC).
- The dark current of each sensor was measured.

Both measurements were carried out through the use of a mechanical probe station which allows you to connect directly to the ASIC or to the sensor without having to connect it via wire bonding to a PCB. The criticalities of the system mainly contist of the correct positioning of the probes themselves (which can damage both sensors and

ASICs) and in the optimization of the shielding of the data acquisition system from the external enviroment. In this way it was possible to identify the most suitable modules for assembling the camera, thus optimizing its performance once installed on the X-ray beam line.

Scientific Publications

Elisa Riceputi is co-author of 74 scientific publications. The list of publications, available at the end of this document, includes:

- **48** works published in international journals
- **26** works published in proceedings of international conferences

Scopus bibliometric indicators:
Entries: 74
Citations: 426
h-index: 11

Reviewer activity

Elisa Riceputi currently serves as a reviewer of the following international journals/conference/PhD thesis in the field of microelectronics and instrumentation:

- IEEE Transactions on Nuclear Science
- Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment
- International Conference on Applications in Electronics Pervading Industry, Environment and Society, 2021 Edition
- 2020 and 2021 IEEE Symposium On Radiation Measurements and Applications (SORMA West)
- Reviewer for the PhD thesis “Development & Characterization of Silicon Drift Detector Arrays & Integrated Readout Electronics for X-ray Detection Applications” of Ata Baniahamad, Supervisor Prof. Carlo Ettore Fiorini, Tutor Prof. Angelo Geraci, XXXIII Cycle, Politecnico di Milano.

International collaborations

Since 2014 Elisa Riceputi has been involved in numerous collaborations with various research groups.

Since 2014, Elisa Riceputi has been part of the RD53 collaboration, organized by CERN, whose purpose is the design of the next generation of hybrid pixel readout chips for the ATLAS and CMS experiments. The activity to which Elisa Riceputi has contributed most in this collaboration is the study of the radiation resistance of the individual transistors in the CMOS 65 nm technology used for the chips designed by RD53.

In 2014 and 2015 Elisa Riceputi collaborated in the INFN experiment - Group V, CHIPIX65. The CHIPIX65 activity took place in the context of RD53 and was aimed at the development of an innovative chip, in CMOS 65 nm technology, for reading hybrid pixels in experiments with very high fluxes of particles and radiation at High Luminosity LHC and in future colliders.

Elisa Riceputi has been collaborating, since 2016, with the DSSC consortium (DEPFET Sensors with Signal Compression), for the development of a detector to be implemented in experiments at the European XFEL. The consortium includes several Italian and German research institutes, including the University of Heidelberg, DESY, the Politecnico di Milano and the University of Bergamo.

Since 2017 Elisa Riceputi has been involved in the international collaboration of the GAPS experiment (experiment of the INFN - Group II), in the context of the design and development of an integrated circuit capable of collecting and processing the signals coming from strip detectors of Silicon-Lithium, Si(Li). The collaboration includes several Italian, US and Japanese research institutes and space agencies, such as MIT, Columbia University, University of Bergamo, National Institute of Nuclear Physics (INFN), Italian Space Agency (ASI), JAXA.

Since 2020 Elisa Riceputi has been involved in the FALCON project carried out by University of Bergamo and Argonne National Laboratory (USA). The project has the objective of developing a top-notch detector for X-ray ptychography which will operate at a frequency as high as 1 MHz with at least a 128×128 pixels frame for each image. A low-noise (200 e-rms), low-power (200 uW) and small pixel (150×150 μm^2) is envisioned to build up the frame. A high throughput combined with the image resolution will jump up the resolution of a 3-D model of a scanned specimen from a micro-meter resolution to a nanometer resolution.

Since 2021 Elisa Riceputi has been involved in the INFN experiment - Group V, FALAPHEL. The main goal is the design of a new circuit solution for an integrated analog readout channel in a 28 nm CMOS technology. This channel will be inserted inside a pixel chip to be used in the construction of trackers at the Future Circular Collider (FCC).

Association with scientific societies and research institutes

2014 - today	**Società Italiana di Elettronica (SIE)** with Università degli Studi di Bergamo.
2014 - today	**Istituto Nazionale di Fisica Nucleare (INFN)** Sezione di Pavia.

Communications at international conferences

- Comminication (oral) at the international conference ”2023 IEEE Nuclear Science Symposium and Medical Imaging Conference - NSS MIC RTSD”, Nov. 4 - 11 2023, Vancouver, Canada. Title: ”Experimental results from the characterization of a 32-channels mixed-signal processor for the GAPS experiment”.

- Communication (poster) at the international conference “Topical Workshop on Electronics for Particle Physics - TWEPP 2023”, Oct. 2 - 6, 2023, Geremeas, Italia. Title: “32-channels mixed-signal processor for the tracking system of the GAPS dark matter experiment”.

- Communication (oral) at the international conference “Topical Workshop on Electronics for Particle Physics - TWEPP 2019”, Set. 2 - 6, 2019, Santiago, Spagna. Title: “The analog readout channel for the Si(Li) tracker of the GAPS experiment”.

- Communication (oral) at the international conference “13th Conference on PhD Research in Microelectronics and Electronics, PRIME 2017”. Giu. 12 - 15, 2017, Giardini Naxos, Italia. Title: “Total Ionizing Dose Effects on CMOS Devices in a 110-nm Technology”.

- Communication (oral) at the international conference “RADFAC Day”, Mar. 26, 2015, Legnaro, Italia. Title: “Noise performance of 65 nm CMOS transistors exposed to ionizing radiation”.

Communications at national conferences

- Communication (poster original) at the national conference “Riunione Annuale dell’Associazione Società Italiana di Elettronica”, Sep. 7 - 9, 2022, Pizzo, Italia.

Title "The 32 analog channels readout for the long flight GAPS balloon experiment tracking system".

- Communication (oral) at the national conference "Riunione Annuale dell'Associazione Società Italiana di Elettronica", Giu. 26 - 28, 2019, Roma, Italia. Title "The analog readout channel for the Si(Li) tracker of the GAPS experiment".

- Communication (poster) at the national conference "IEEE CAS Day", Mar. 6, 2016, Como, Italia. Title "Noise performance of 65 nm and 110 nm CMOS Transistors Exposed to Ionizing Radiation".

Funding for research

Elisa Riceputi has obtained the following funding as a result of participation in internal calls of the University of Bergamo:

- Call for "Visiting Professor and Fellow 2020" - Outgoing Visiting Fellow: **2 keuro**
  The site of the mission was the Nevis Laboratories of the Columbia University, New York USA, but unfortunately the visiting was cancelled due to the Covid 19 hit.

- "Department outgoing visiting 2022" - Outgoing Visiting Fellow: **2 keuro**
  The site of the mission was the Bates Research and Engineering Center of the Massachusetts Institute of Technology, MIT (from July 25 to August 5, 2022).

National and international awards and recognitions

- **June 2018:** Elisa Riceputi receives from the Italian Society of Electronics (SIE) the award for the best PhD thesis in Electronics of the 2016/2017 Academic Year, defended in 2018.

- **December 2018:** Elisa Riceputi receives the second prize ex-aequo Gatti-Manfredi as "Best Ph.D. Thesis Award in Radiation Instrumentation" for her doctoral thesis. The prize is awarded by the IEEE NPS Italy Chapter to researchers who have obtained their doctorate in an Italian university and to researchers of Italian nationality who have obtained their doctorate from a foreign university.

Academic Activity

Teaching Activity

Since 2015, the teaching activity of Elisa Riceputi has been carried out for the Computer Engineering, Mechanical Engineering and Health Technology Engineering degree courses of the University of Bergamo and the Medicine and Surgery courses of the University of Milano Bicocca. The detailed list of courses for which Elisa Riceputi has been responsible or teaching assistant is as follows:

- Responsible for the course: Tecnologie e Dispositivi Elettronici (9CFU) since a.y. 2024/2025;
- Responsible for the course: Sensing devices laboratory (3CFU) sisnce a.y. 2020/2021;
- Responsible for the course: Biosensor and Monitoring (2CFU) since a.y. 2021/2022;
- Teaching assistant for the course: Sensori (6CFU) from a.y. 2020/2021 to 2024/2025;
- Teaching assistant for the course: Strumentazione Elettronica (6CFU) since a.y;
- Teaching assistant for the PhD course: Wearable Sensor Systems since a.y. 2024/2025;
- Teaching assistant for the PhD course: Smart and Wearable Sensor Systems since a.y. 2024/2025.

Teaching Activity at international schools

- E. Riceputi, "Embedded measurement systems", virtual lecture for the 5th Edition of the International Summer School "Nonlinear Life", 25 - 29 July, 2022
- Supervisor of the "Characterization of wearable sensors developed for monitoring environmental and physiological parameters" module of the Internship at the University of Bergamo for the 5th Edition of the International Summer School "Nonlinear Life", 28 August - 03 September, 2022

Tutoring Activity

Elisa Riceputi has been the advisor of 1 B.Sc thesis and co-advisor for 4 M.Sc theses, and for 2 B.Sc theses, at the University of Bergamo.

Dalmine, 11 febbraio 2026

In witness whereof

Elisa Riceputi