

Prof. Luca Pasquali

Modena, 27 Nov 2020

Scientific/academic career:

- **2017** National qualification to Full Professor of Experimental Physics of Matter (SSD FIS/01, SC 02/B1).
- **2014 Nov 1 - present:** Associate Professor of Experimental Physics (SSD FIS/01) at the University of Modena and Reggio Emilia. Responsible of the laboratory of surface science – materials and surface physics – of the Dept. of Engineering 'E. Ferrari'; teacher of regular courses of "General Physics", "Spectroscopic Methods" and "Physics of Materials" at the Department of Engineering E.Ferrari of Modena
- **2005 Jan. 18 – 2014 Oct. 31:** *Ricercatore Universitario* (Assistant Professor) of Experimental Physics (SSD FIS/01) at the University of Modena and Reggio Emilia; responsible of the laboratory of surface science – materials and surface physics – of the Dept. of Engineering 'E. Ferrari'; teacher of regular courses of "General Physics", "Spectroscopic Methods" and "Physics of Materials" at the Department of Engineering E.Ferrari of Modena
- **1999 Apr. 1 – 2005 Jan. 17:** Post-doctoral position at the University of Modena and Reggio Emilia with the operational responsibility of the laboratory of surface science of the Dept. of Materials and Environmental Engineering.
- **1998 Jul 1 – 1999 Mar 30:** Research contract with the INFN to participate in the design and realization of the BEAR beamline at the Elettra synchrotron radiation facility (Trieste, Italy).
- **1997 Nov. 15– 1998 Jun 30:** Research fellowships with 'Istituto Nazionale per la Fisica della Materia' (INFN) for activity in the field of surface science and investigation of the surface electronic properties of semiconductor interfaces.
- **1998 May 18:** PhD in 'Materials and Information Engineering' with an experimental thesis titled "Metastable deexcitation spectroscopy in the study of low dimensional systems".
- **1994 Jul 28:** Degree in Physics at the Department of Physics of the University of Modena with an experimental thesis on the investigation of the surface electronic properties of GaAs(110), Sb/GaAs(110) and Yb/GaAs(110) by metastable atom deexcitation spectroscopy. Vote: 110/110 cum laude.

Other titles:

- **Responsible** of *Laboratorio di Fisica dei Materiali e delle Superfici* (LFMS) of Dept. of Engineering E. Ferrari of the University of Modena and Reggio Emilia.
- Member of the **research group (GdR)** and **scientific deputy responsible** of the BEAR beamline at the Elettra synchrotron radiation facility in Trieste (Italy). In charge of the Surface Science experimental activity of the beamline.
- **Visiting Associate Professor at Nagoya University – Graduate school of Engineering:** Subject: "Nano-process Technology for Highly Functional Materials and Devices". Periods: Nov-Dic 2010; Nov-Dic 2011; Nov-Dic 2012.
- **2013 – 2022: Visiting Senior Research Associate** at the Department of Physics of the University of Johannesburg, South Africa.
- **2018 – present: Coordinator of tutoring and orientation actions** for students of the Department of Engineering E. Ferrari of the University of Modena and Reggio Emilia

- **2015 – present:** member of the Quality Assurance Commission of the Department of Engineering E. Ferrari of the University of Modena and Reggio Emilia
- **1995 – present:** Associate with the National Institute for Matter Physics (INFM) since 1995. After the merging of INFM with National Research Council (CNR), associate with the IOM-CNR Institute (*Istituto Officina dei Materiali*) of Trieste (Italy)

Participation/coordination in research projects

- Project XMOSS of INFM for the design and construction of a synchrotron radiation beamline at ELETTRA – years 1997-2000 (resp. Prof. S.Nannarone).
- Project PAIS of the INFM entitled SPASM – Spectral properties of adsorbed systems on metal surfaces: Auger lineshape and metastable deexcitation spectroscopy - Years 2002-2003.
- NATO project entitled Magnetically ordered hetero- and nanostructures on semiconductors: basic aspects and potential applications (participants: Italy - resp. Prof. S. Nannarone, Spain – resp. Prof. R. Miranda, Finland – resp. Dr. S.V. Novikov, Russia – resp. Dr. N.S. Sokolov) – Years 2002-2003.
- Bilateral collaboration project between Italy and Russia entitled Nanostructured systems at surfaces (resp. Prof. E. Molinari) – Years 2003-2004
- Responsible of Short term mobility project of CNR with Laboratoire des Collisions Atomiques et Moléculaires (LCAM), Université Paris Sud, ORSAY 91405, FRANCE. Year 2008
- National PRIN project entitled Development of electrochemical micro- and nano- systems for specific and non-specific analyses of real matrices (resp. Prof. R. Seeber) – Years 2006 – 2007 -
- National PRIN project entitled Implementation of synthesis processes of nanopowders in presence of microwaves, characterisation and surface functionalisation (resp. Prof. A. Corradi) – Years 2008-2009
- National PRIN project entitled From raw materials of system earth to technological applications: structural and crystal-chemical studies (Resp. Prof. Maria Franca Brigatti, Università di Modena e Reggio Emilia). Years 2010-2011
- Project FP7-SEC-2009-1.3-02 - n. 242387 CUSTOM - Drugs and Precursor Sensing by Complementing Low Cost Multiple Techniques
- Coordinator of the European project ONDA within the FP7-PEOPLE-2009-IRSES scheme. Project n. 247518 Title: Ordered hetero- and Nano-structures with Epitaxial Dielectrics for magnetic and electronics Applications.
- Responsible of several ‘synchrotron light’ usage research projects at ELETTRA (Trieste). Years 2002-2014.
- Responsible of a Short-Mobility Action between Italy and Russia 2012 promoted by the University of Modena and Reggio Emilia.
- Project PIK-ELETTRA 2012: EX-PRO-REL: EXcitation PROCesses and RELaxation in condensed matter and nanostructures: methodological, instrumental, and scientific challenges
- Project funded by Fondazione Cassa Risparmio di Modena “Studio dei materiali e delle interfacce alla base delle celle solari a perovskite (persolar)” 2015.
- Responsible of project FAR 2015 Department project - Potenziamento sistema XPS per analisi di materiali (PoXAM)
- WP leader in FAR2017 project “NO (UNI)MORE FIBRES!”

- Responsible of project FAR 2019 interdisciplinary project - LUMINA

Research outputs:

- Co-author of 127 publications in international high impact peer-reviewed journals in the field of low dimensional materials (surfaces and interfaces). H-index: 24, N. Citations 1926 (source: Scopus)
- More than 60 presentations at international conferences and seminars.
- <https://orcid.org/0000-0003-0399-7240>
- Scopus Author ID: 7004304861

Research experience:

Large experience in the setup, use and control of experimental facilities for surface science in ultra-high-vacuum (UHV). Expert in the experimental investigation of the electronic properties of surfaces, interfaces and thin films, with particular attention to the interplay between atomic structure and electronic properties. Expert in the design of experimental apparatuses for surface science. Skilled in the techniques of electron spectroscopies (Auger, energy loss, photoemission – XPS and UPS, metastable atom De-excitation Spectroscopy) and optical spectroscopies in the X-ray range; expert in the thin-films growth technique by molecular beam epitaxy. Advanced experience in the use of synchrotron radiation for high resolution photoemission studies, x-ray absorption and reflectivity. He contributed to the design and realization of the BEAR beamline of the INFM at Elettra synchrotron in Trieste, being responsible for the design and realization of the experimental end-station.

Principal research topics/activities developed during the career include: i) *surface electronic properties of semiconductors* and related interfaces with high surface sensitive probes; ii) contribution to the development of metastable deexcitation spectroscopy in the study of semiconductor surfaces and interfaces; iii) study of interface formation between metals and semiconductors; iv) study of the interface formation (crystal structure, nanostructures, electronic properties) between dielectrics (ionic fluorides) and semiconductors; v) study of chemistry and structure of high dielectric constant oxides on semiconductors; vi) *chemisorption* at surfaces: the Cl/Ag system; vii) study of the *magnetic properties* of metallic stratified nanostructured systems and relationships with structural and electronic properties; viii) structural and magnetic properties of antiferromagnetic fluorides on semiconductors; ix) study of interface formation between *organic thin films* and inorganic substrates for molecular-electronics applications and sensoristics; x) study of the electronic properties of stratified organic materials through soft-X-ray techniques; xi) application of density functional theory to simulate the structure, electronic properties and spectroscopic response of organic thin films at surfaces.

Responsible of the laboratory of Materials and Surface Science of the Department of Engineering of the University of Modena and Reggio Emilia, Italy. The laboratory includes two experimental stations in UHV for the preparation and characterization of surfaces and low dimensional systems. The laboratory also acts as a facility for chemical characterization of advanced materials (polymeric, ceramic, coatings) produced by different research groups in the department.

Responsible of several research-commercial contracts with private and public national and international institutions for the characterization of advanced materials.

Deputy responsible of the BEAR synchrotron radiation beamline of IOM-CNR at Elettra (<https://www.elettra.trieste.it/it/lightsources/elettra/elettra-beamlines/bear/bear.html>)

Different periods abroad as visiting scientist at international laboratories and universities: Advanced Light Source (Berkeley, USA); BESSY synchrotron radiation laboratory (Berlin, Germany), Centre Universitaire de Paris-Sud (Paris, France), Venture Business Laboratory of Nagoya University (Japan), Dept. of Physics, University of Johannesburg (South Africa); IOFFE physical-technical Institute, St. Petersburg (Russia).

Teaching activity

- 1998-2003 Tutor in General Physics Courses at the Faculty of Engineering of the University of Modena and Reggio Emilia, Italy
- 2004-present Coordinator of courses of 'General Physics', 'Physics laboratory' and 'Physics of Materials' at the Faculty of Engineering of the University of Modena and Reggio Emilia
- 2008-2010 Course coordinator of 'General Physics B' at the Faculty of Engineering of the University of San Marino.