

Curriculum Vitae – Giorgio Rossi



Personal data: born 10-03-1956 in Milano (Italy), married, three children,
work languages: English, French, Italian
Present work addresses:
Dipartimento di Fisica, Università di Milano, via Celoria 16, 20133 Milano,
Istituto Officina dei Materiali, Laboratorio TASC, in Area Science Park Basovizza,
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Scientific degrees: Laurea in Nuclear Engineering (Materials) (1981, Politecnico di Milano)
Doctorat d'Etat es Sciences Physiques, (1984, Université Pierre et Marie Curie, Paris)

Current academic position:

Full professor (Professore Straordinario) of Physics of Matter (FIS-03) at the University of Milano (since 2011). Teaching courses: Thermodynamics; Surface Physics

Previous positions:

- Research Associate at Electrical Engineering Department of Stanford University (California, 1981-1983);
- Collaborateur Scientifique Etranger Commissariat à l'Energie Atomique (CEA, Saclay, France 1983-1984);
- Chargé de Recherche 1ere Classe, CNRS (Laboratoire pour l'Utilisation du Rayonnement Electromagnétique LURE, Orsay, France 1985-1995);
- Oberassistent 50% ETH-Zürich, Laboratorium für Festkörperphysik (Zürich, CH, 1988-1995);
- Associate Professor of General Physics (FIS-01), Dipartimento di Fisica dell'Università di Modena e Reggio Emilia, 1994-2011)
- Director of Laboratorio Nazionale TASC – INFN (2000-2009)

Research activity: Experimental research on the structural, electronic and magnetic properties of surfaces and nanostructured matter. The main activity is conducted coordinating a research group, first at Orsay (CNRS, ETH-Z), later at Trieste (INFN, ETH-Z, CNR, Universities) that is responsible for the construction and operation of the Advanced Photoelectric effect Experiment Laboratory including two variable polarization synchrotron radiation beam-lines on the Elettra storage ring. Highlights are the 3D tomography of the Fermi Surface by Angular Resolved Photoelectron Spectroscopy, Mott-scattering for Spin Polarization measurements of surface photoelectrons, X-ray magnetic circular dichroism (XMCD), atomic-resolution Scanning Tunnelling Microscopy and Spectroscopy. Systems of

interest are nanostructured surfaces and ultrathin films of inorganic and organic matter aiming at the understanding of electronic and magnetic interactions.

Publications and invited conferences:

GR is co-author of more than **180 papers** in international refereed scientific journals. H=29

GR has given more than **90 invited talks** at international conferences, schools and workshops.

5 selected publications:

- 1. d and f Metal Interface Formation on Silicon**
G. Rossi, **Surface Science Reports**, **7**, 1, (1987). ISSN 0167-5729
- 2. Evidence for Eightfold Coordination at the CoSi₂/Si(111) Interface;**
G. Rossi, X. Jin, A. Santaniello, P. De Padova, and D. Chandesris,; **Physical Review Letters** **62**, 191 (1989). ISSN 0031-9007
- 3. Atom Specific Surface Magnetometry**
F. Sirotti, G. Panaccione, and G. Rossi; **Physical Review B****52**, Rapid Communications, 17063, (1995) ISSN 0163-1829
- 4. Experimental proof of circular magnetic dichroism in the transmission electron Microscope,**
P. Schattschneider, S. Rubino, C. Hébert, J. Ruzs, J. Kune, P. Novák, E. Carlino, M. Fabrizioli, G. Panaccione, G. Rossi; **Nature** **441**, 486 (2006) ISSN 0028-0836
- 5. Three-dimensional photoemission tomography of the Fermi surface of the Be(0001) surface: charge transfer from bulk to surface electron states**
I. Vobornik, J. Fujii, M. Hochstrasser, D. Krizmancic, M. Mulazzi, C.E. Viol, G. Panaccione, S. Fabris, S. Baroni, and G. Rossi; **Physical Review Letters** **99**, 166403 (2007) ISSN 0031-9007

Teaching and Thesis Guidance:

Undergraduate and Graduate Courses (starting in 1984) including Fundamentals of Physics (Mechanics, Thermodynamics, Electromagnetism, Optics, Waves), Magnetic Properties of Matter, Advanced Laboratory of Physics of Matter, Surface Physics).

Advisor of over 35 Laurea Theses and 7 PhD Theses.

Service to the Science Community:

- Director of “Laboratorio Nazionale TASC-INFM” in Trieste in 2000-2009
- Member of Executive Committee (Giunta Esecutiva) of INFN (Istituto Nazionale Fisica della Materia) in 2001-2005 with responsibility on Large Scale Facilities and Personnel Policy;
- Scientific coordinator of APE Group (currently of IOM-CNR) since 1997;
- Proposer of the Istituto Officina dei Materiali of CNR (2004-2009);
- Coordinator of NFFA, Nano Foundries and Fine Analysis, FP7-Design Study (2008-2011) and NFFA-Integrated Action 2012 Proposal;
- Responsible of Special Maintenance Programme for Synchrotron Radiation Instrumentation of CNR, since 2008

Responsibilities and Boards:

- Member of ***Consiglio Direttivo (Directors Board) of INFM*** 2000-2005
- Member of ***Executive Committee (Giunta Esecutiva) of INFM*** in 2001-2005 with responsibility on Large Scale Facilities and Personnel Policy;
- Italian Delegate to ***ESFRI*** since 2009 (***Executive Board*** member since 2011)
- Italian Delegate to ***ERIC Management Board Committee*** since 2009 ;
- Member of “Consiglio di Amministrazione” (Board) of ***AREA-SCIENCE Park*** in 2002-2006
- Member of “Consiglio di Amministrazione” (Board) of ***Sincrotrone Trieste S.c.p.A.*** in 2005-2010
- Member of “Comitato Strategico” of ***Sincrotrone Trieste S.c.p.A.*** since 2006
- Member of “Consiglio di Amministrazione” (Board) of ***SISSA*** since 2008 representing MIUR (Italian Ministry of Education, University and Research)
- Member of “Coordinamento degli ***Enti di Ricerca operanti nel FVG***” and related Scientific Council, since 2009.
- Member of the ***MIUR Workgroup for the Italian Roadmap of Research Infrastructures of Pan-European Relevance*** (2008-2010).

International committees:

- Member of ***Scientific Advisory Committee of ESRF*** Grenoble in 2001-2011
- Member of ***FP7-Capacities Research Infrastructure Programme Committee*** delegation of Italy since 2007 ;
- Italian Member of the ***Group of Senior Officers (GSO, Carnegie Group) of G8+5*** on Global Research Infrastructures, since 2011.
- Member of the ***Special Committee for the Future of ESRF*** (2012)

Experience as evaluator:

- Referee for Physical Review Letters, Physical Review B, Surface Science, ...
- Evaluator of PRIN projects
- Evaluator of FIRB-Giovani projects
- Member of Scientific Programme Committee (Surfaces), ***LURE*** 1986-1992
- Member of Proposal Review Panel Surfaces and Interfaces, ***ESRF*** in 2001-2003
- Member of Proposal Review Panel Hard Condensed Matter, ***ESRF*** in 2004-2010
- International expert of Ministry of Education, Youth and Sports of ***Czech Republic*** for evaluation of Research Infrastructures, Prague 2010

Experience of technology transfer:

- Member in 2002-2006 of “Commissione Ricadute Industriali” of AREA Science Park. TT projects of relevance for the Region FVG.
- Member of the Industrial Advisory Committee of Sincrotrone Trieste in 2004-2008

Work Biography

I was involved in surface spectroscopy and in exploiting and developing the synchrotron radiation methods since the beginning of my work. At Stanford University (SU) I joined the group of W.E.Spicer and I.Lindau contributing to the evolution of the study of the electronic properties of metal/semiconductor interfaces by means of energy dependent core level and density of states spectroscopy. The characterization of the Cooper minima of photoionization cross sections in solids allowed to establish a direct experimental method to isolate partial density of states from complex systems like interfaces and silicide surfaces. At SU I coordinated a few PhD students and visiting scientists in the research work on ultrathin films of rare earths and their interfaces on semiconductors, again by exploiting resonant photoemission and modulations of the photoionization cross sections to disentangle the local vs. extended character of interface electron states. I established collaboration with both groups (Exxon and Bell Labs.) who were leading the development of the SEXAFS (surface extended x-ray absorption fine structure) technique at SSRL (Stanford Synchrotron Radiation Lab.). I was invited to France by the CEA (Commissariat à l'Energie Atomique) to contribute in setting up the first SEXAFS station at a high-energy European synchrotron radiation laboratory, on the DCI storage ring at Orsay. I created my own group at the LURE-CNRS (Laboratoire pour l'Utilisation du Rayonnement Electromagnetique, Orsay) with funds from the CNRS and the EC SCIENCE programme. We built a beamline for soft-X ray spectroscopy at the new SuperACO storage ring in 1987 and started a programme based on both structural and electronic studies of epitaxial metal silicides and other interfaces on GaAs. The bonding configuration at the CoSi₂/Si(111)7x7 interface was established and growth models were proposed. The local structure of amorphous pure transition metals was also studied, developing ad-hoc cryostats and sources for kinetic hindered crystallization. In 1988 I joined the Laboratorium für Festkörperphysik of the ETH-Zürich and learned from H.C. Siegmann the methods of Mott scattering for the study of surface and 2D magnetism. I could strengthen my group and carry on a programme on surface and thin film magnetism that exploited Mott polarimetry with synchrotron radiation for atom-specific Spin Polarization measurements (by coupling X-ray absorption spectroscopy and SP measurement) both as a means to study multiple interfaces, and as a method to pioneer the time-resolved magnetometry with a storage ring X-ray source. The 2-bunch operation mode of the SuperACO storage ring delivered 0.5 ns long pulses of soft X-rays every 500 ns. We obtained the first time reversal dynamics data on surfaces by this method. At LURE we also developed the Linear Magnetic Dichroism in Photoemission (Angular Distribution) and managed a strong competition with larger groups in Europe and US on both experimental measurements and phenomenological explanation. We established an approach to surface magnetometry and derived the absolute measure of the surface atom magnetic moment in intrinsic surfaces like Fe, Cr and Co. After joining the Italian University, at Modena, in 1994, I organized a proposal for a laboratory capable to prepare and grow surfaces and ultrathin films in controlled / epitaxial conditions, to characterize them and to exploit two advanced sources of undulator radiation from the storage ring Elettra at Trieste for the fine analysis. The proposal of the APE (Advanced Photoelectric Effect Experiments) beamline was international, involving the ETH-Z (Group of D. Pescia) the University of Zürich (Group of J. Osterwalder), the CNRS-Orsay (optical project by F. Polack) and the Catholic University of Brescia (group of M. Sancrotti), and collected funds from a public call by the INFN and in-kind contributions from ETH-Z and Uni-Zurich. With a similar budget as other projects at Elettra APE realized an advanced surface science/nanoscience laboratory with two independent beamlines of different energy and variable polarization parameters with the end stations being part of a complex laboratory with complementary synthesis, characterization, atomic resolution scanning probe microscopy, magneto-optics, Spin Polarization measurements. APE has realized an advanced station for the 3D tomography of the Fermi surface of solid surfaces and nanostructured ultrathin films. The Fermi surface of Be has been measured and the spill over of charge from bulk to surface states derived quantitatively. The APE beamline is oversubscribed by international users since its opening in 2001 and produces results that are published in top journals. APE has also trained over thirty students (thesis, PhDs) of Italian and European universities, many of whom are now leading or sharing leadership in facilities and research teams worldwide. We demonstrated the existence of a proximity effect at the interface between diluted

ferromagnetic semiconductors (GaMnAs) and a standard ferromagnet (epitaxial Fe film) that induces FM ordering of the proximate portion of semiconductor at high temperature, i.e. well above RT. We have carried out, also in the frame of two subsequent PRIN projects with local coordination at Uni. Modena, a research programme on organic interfaces on metallic substrates and imaged the bonding and antibonding charge density distribution of pentacene on various substrates and the various phases of growth and the magnetic coupling of Fe and Co phthalocyanine on metallic and magnetic substrates. A patent has been filed for this system that is prototypical to possible spintronics materials operating at room temperature. In 2000 I was named Director of the TASC National Laboratory of INFM in Trieste. During my direction period (ended in 2009) TASC has realized 6 beamlines at the Elettra storage ring, two instruments at the ESRF, an all-new Centre for TEM microscopy. A staff of 54, including a coordinated technical group of 12, was hired with international participation making TASC the most dynamical among open laboratories in Italy, performing its own research projects in materials growth, nanofabrication, surface science, biomedical nanotechnologies, spectroscopy and crystallography, and supporting users from the INFM/CNR and university science community. Associate university professors from Rome, Milano, Modena, Trieste, Brescia, SISSA, Perugia have joined with their PhD students averaging a total workforce at TASC of over 100. As a direct benefit of integrating TEM and synchrotron based methods we could demonstrate the possibility of magnetic dichroism in the TEM, opening a novel approach to high resolution microscopy of magnetic nano-materials and interfaces that has stimulated world-wide developments. In 2004, in view of the merging of INFM into CNR, I designed the IOM (Istituto Officina dei Materiali) institute that was eventually founded in 2009. IOM includes TASC, the DEMOCRITOS and SLAC centres for theoretical simulation and modelisation (SISSA and Uni. Cagliari), the OGG Grenoble staff operating at ILL and ESRF, and the Uni. Perugia group. It carries out own science programmes within the CNR projects nanoscience, complexity, magnetism and superconductivity, and it provides unique resources for the growth of high purity materials, the nanolithography/nanofabrication, the synchrotron radiation and neutron spectroscopies of atoms, solids and surfaces. In 2008 I have coordinated a European Design Study under FP7 for a novel infrastructure integrating nano-foundry laboratories with the fine-analysis large scale infrastructures: NFFA. The Design Study was carried out by a partnership involving the STFC (UK), CSIC (E), OEAW (A), PSI (CH) and delivered its conclusions in 2011. Currently The NFFA project is undergoing a demonstrator phase to prepare the implementation under H2020 having involved in an integration analysis over 50 European nanoscience institutes, consortia and industrial laboratories. As a member of the Programme Committee FP7 Capacities research Infrastructure and as Italian delegate to ESRFI I have been involved since 2007 in evaluation and support to European Research Infrastructure Projects and, in collaboration with MIUR, in the definition of the national strategy for national research infrastructures and for the Italian participation to the most relevant pan-European RIs. I have been, and currently am, contributing to several international committees concerned with the science management or the strategic planning of research infrastructures of European and international relevance.