Curriculum vitae of Lodovico Ratti

Lodovico Ratti is Associate Professor of Electronics at the University of Pavia. His main fields of expertise include

- the design of mixed-signal front-end circuits and of monolithic pixels for radiation detectors in planar and vertical integration (3D) CMOS technology,
- the characterization of advanced microelectronic processes (in particular CMOS technologies) from the standpoint of radiation tolerance and electronic noise,
- the development of instrumentation for electronic device and circuit characterization.

Lodovico Ratti is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and a Technology Research Fellow with INFN. He is the team leader of the Electronic Instrumentation Group and is responsible for the Electronic Instrumentation Laboratory, Department of Electrical, Computer and Biomedical Engineering, University of Pavia. He is author or co-author of more than 130 papers published in peer-reviewed journals and more than 180 works presented at international conferences and workshops. The academic career, the research experience and the main scientific appointments are summarized in the following.

Research experience

- 2014 – present: development of dual-layer CMOS SPAD detectors with integrated electronics for thin, low power particle trackers (APiX R&D experiment with INFN);
- 2014 – 2016: development of building blocks and of the enabling technologies for fast X-ray imagers at the next generation FELs (PixFEL R&D experiment with INFN);
- 2014 – present: design of the very front-end channel for the phase II upgrade of the CMS inner pixel tracker (CHIPIX 65 and CMS experiments with INFN);
- 2009 – 2013: design of the front-end electronics for the microstrip tracking detector and of monolithic sensors (in planar and 3D technologies) for the innermost layer of the SuperB particle tracker (with INFN);
- 2006 – 2009: development of CMOS monolithic pixel sensors for the ILC vertex detector (P-ILC R&D experiment with INFN);
- 2004 – present: development of fast, low material budget hybrid and monolithic pixel detectors for particle tracking based on high density technologies, such as planar CMOS 130 and 65 nm and vertical integration CMOS processes, including radiation tolerance study (VIPIX and SLIM5 projects funded by INFN, PRIN calls funded by MIUR, AIDA FP7 project funded by the EU); in the framework of this activity, Lodovico Ratti has contributed to the development of the first DNW monolithic sensor, implementing innovative solutions for the integration of advanced analog and digital functions at the pixel level, including data sparsification, in view of particle tracking applications;
- 2002 – 2005: design and characterization of the front-end chip for the microstrip tracking detector of the BTeV experiment (with INFN);
- 2001 – 2004: design of the front-end circuit of the ionization chamber detector for the LHC beam monitor (BEAMON R&D experiment with INFN);
- 1999 – 2004: development of microstrip detectors in high resistivity substrate with integrated electronics (PRIN calls funded by MIUR);
- 1999 – 2001: design of a readout circuit with bilinear compression feature for the fluorescence detector of the Auger experiment (with INFN);
- 1996 – present: noise and radiation hardness characterization of microelectronic technologies, including bulk and SOI CMOS and BiCMOS and JFET processes and development of ad hoc instrumentation (within several project funded by INFN and PRIN and FIRB programs funded by MIUR);
- 1995 – 2001: design and characterization of the front-end chip for the microstrip tracking detector of the BaBar experiment (with INFN).

Scientific appointments and coordination of funded research programs

PRIN MIUR projects

- 2011 – 2013: head of the Pavia research unit in the PRIN 2009 project “High space-time resolution pixel detection systems”.
- 2008 – 2010: head of the Pavia research unit in the PRIN 2007 project “Pixel systems for thin charged particle trackers based on high density microelectronics technologies”.

INFN projects

- 2014 – 2016: national scientific coordinator of the PixFEL CSN5 project “Enabling technologies, building blocks and architectures for advanced X-ray pixel cameras at FELs”.
- 2014 – present: head of the Pavia research unit in the APiX2 CSN5 project “Development of an avalanche pixel sensor for tracking applications”.
- 2009 – 2012: head of the Pavia research unit in the VIPIX CSN5 project ”Pixel systems for thin charged particle trackers based on vertical integration technologies”.
- 2006 – 2009: head of the Pavia research unit in the SLIM5 CSN5 project “Silicon detectors with low interaction with material”.

EU projects

- 2011 – 2014: head of the Pavia research unit in the AIDA FP7 INFRASTRUCTURE 2010 EU project “Advanced European Infrastructures for Detectors at Accelerators”.

Seminars at international schools

- "Ionizing radiation effects on electronic circuits: from micro to nano, from mega to giga", VII National School on "Detectors and Electronics for High Energy Physics, Astrophysics, Space Applications and Medical Physics" – INFN Laboratori Nazionali di Legnaro, Legnaro, April 3-7 2017.
- “Advances on Pixel-Embedded Signal Processing Technology”, 4th International Summer School on Intelligent Front-End Signal Processing for Frontier Exploitation in Research and Industry (INFIERI), San Paolo, Brazil, January 23 – February 3 2017.
- "Processing the signal from pixel detectors in high energy physics and photon science", Topics on Microelectronics 2016, Pavia, Italy, September 29 2016.
- “Processing the signals from pixel detectors in X-ray imaging at FELs”, 3rd International Summer School on Intelligent Front-End Signal Processing for Frontier Exploitation in Research and Industry (INFIERI), Hamburg, Germany, September 14-25 2015.
- "Ionizing Radiation and Single Event Effects in Electronic Devices and Circuits", VI National School on "Detectors and Electronics for High Energy Physics, Astrophysics, Space Applications and Medical Physics" – INFN Laboratori Nazionali di Legnaro, Legnaro, March 25 2015.
- “Radiation effects in electronic devices and circuits”, Master in Nuclear and Ionizing Radiation Technologies, Pavia, Italy, December 2013.
- “Front-end electronics for hybrid and monolithic particle detectors: new ideas and technologies”, IDPASC School on Frontier Detectors for High Energy and Astroparticle Physics, Siena, Italy, October 4-6 2013.
- “Intelligent front-end for pixel based instruments: front-end and novel ideas”, 1st International Summer School on Intelligent Front-End Signal Processing for Frontier Exploitation in Research and Industry (INFIERI), Oxford, UK, July 10-16 2013.
- "Ionizing Radiation Effects in Electronic Devices and Circuits", V National School on "Detectors and Electronics for High Energy Physics, Astrophysics, Space

Applications and Medical Physics" - INFN Laboratori Nazionali di Legnaro, Legnaro, April 17 2013.
- "Radiation effects in electronic devices and circuits", International Doctoral School in Information and Communication Technology, Trento, Italy, February 11-12 2013.
- "Mixed signal integrated circuits for semiconductor radiation detectors", International Doctoral School in Information and Communication Technology, Trento, Italy, February 11-12 2013.
- "Radiation effects in electronic devices and circuits", Master in Nuclear and Ionizing Radiation Technologies, Istituto Universitario di Studi Superiori (IUSS), Pavia, December 2012.
- "Total Dose Effects in Electronic Devices and Circuits", IV National School on "Detectors and Electronics for High Energy Physics, Astrophysics, Space Applications and Medical Physics" - INFN Laboratori Nazionali di Legnaro, Legnaro, April 13 2011.
- "Radiation effects in electronic devices and circuits", Master in Nuclear and Ionizing Radiation Technologies, Istituto Universitario di Studi Superiori (IUSS), Pavia, February 2010.

PhD and master student supervision

As of 2017, Lodovico Ratti has been or is supervisor or co-supervisor of 9 PhD students and about 20 master students.

Awards

Lodovico Ratti was a co-recipient of the Outstanding Paper Award for the paper "Channel Hot Carrier Stress on Irradiated 130-nm NMOSFETs: Impact of Bias Conditions During X-ray Exposure", presented at the 9th European Conference on Radiation and Its Effects on Components and Systems (RADECS 2007), Deauville, France, September 10-14 2007.

Other activities and commitments

Lodovico Ratti

- serves as a reviewer for a number of international scientific journals, including IEEE Transactions on Nuclear Science, Nuclear Instruments and Methods in Physics Research, Section A, IEEE Transactions on Instrumentation and Measurements, IET Circuits, Devices and Systems, IEEE Sensors Journal, IEEE Journal of Solid State Circuits, Solid State Electronics, The International Journal for Computation and Mathematics in Electrical and Electronic Engineering (COMPEL), The Scientific World Journal, Analog Integrated Circuits and Signal Processing and Nuclear Science and Techniques;
- is in the official reviewer list for the following international annual conferences: IEEE Nuclear Science Symposium (NSS), European Conference on Radiation Effects on Components and Systems (RADECS) and Nuclear and Space Radiation Effects Conference (NSREC);
- is a member of the program committee for the PRIME (PhD Research in Microelectronics and Electronics) 2017 conference;
- is the topic convener for the "Synchrotron, FEL and Beamline instrumentation" session of the 2017 IEEE Nuclear Science Symposium to be held in Atlanta, USA, in October 2017;
- is a member of the Awards Committee of the 2017 RADECS Conference, to be held in Geneva, Switzerland, in October 2017;
- is secretary of the IEEE NPS (Nuclear and Plasma Sciences) Italy Chapter;
- has been a member of the organizing committee and of the scientific committee for the International VIPS (Vertically Integrated Pixel Detectors) 2010 Workshop, Pavia, Italy, April 22-24 2010;

- has been a member of the organizing committee for the 2011 Front-End Electronics Meeting (FEE2011), Bergamo, Italy, May 24-27 2011.

Bibliometric indicators, as extracted from the ISI web of science (as of beginning of 2017):

Entries:	202
Citations:	2523
h-index:	16

Bibliometric indicators, as extracted from Scopus (as of beginning of 2017):

Entries:	212
Citations:	2672
h-index:	17

The full publication list is available at
http://www.scopus.com/authid/detail.uri?authorId=7003330388&origin=AuthorEval