CURRICULUM VITAE

Education

- March 2006 – *PhD in Physics*, University of Padova, awarded on 27 March 2006 defending the thesis *The novel Ion Electron Emission Microscope at SIRAD*, supervisor Prof. Dario Bisello.

Profile summary and research interests

I am staff researcher since 2012 and associate professor since 2017 at Padova University, where I regularly lecture for the Advanced Electronics Laboratory class for the master course in Physics. My research activities cover many fields within the framework of particle detectors electronics, scientific imaging systems development and radiation hardness of solid-state devices and systems.

I am committed to the development of innovative pixel detectors and systems for particle tracking [1][3][5][6][7] and the realization of tracking apparatus employed in high energy physics experiments, as well as in applied sciences apparatus [2][13][14]. I am currently convener of the Readout Electronics working group for the *ALICE collaboration* Inner Tracking System upgrade [4], which focuses on the realization of a completely monolithic, seven layer, ultra-lightweight pixel tracker. I am also National Responsible for the INFN *SEED project*, which aims at the realization of monolithic, fully depleted and broad energy spectrum sensitive pixel imagers. I am co-owner of a specific *patent covering the special sensor geometry* developed within the project [##].

As past member of the *CMS collaboration*, I actively contributed to realization and testing of the pixel tracker for the CMS experiment [10] at the CERN LHC, as well as the radiation tolerance characterization of the APV25 chip. I am currently researching the use of deep sub-micron technology to build the pixel detectors for the next-generation LHC experiments within the framework of the *R&D53 collaboration*.

My work on imaging systems includes the development of novel techniques for proton Computed Tomography and research in the field of Active Imaging systems, for which I have won an *ERC Consolidator Grant* funding a project for the realization of a ultra-fast innovative medical protons achromatic tracker and calorimeter (iMPACT) [2].

I co-own a *patent on innovative monolithic pixel sensor architectures* [9] developed while studying how to effectively address the challenge of instrumenting a full tracker with monolithic pixel detectors [1]. While being a visiting scientist at the Berkeley Laboratory (2006 – 2010) I developed monolithic pixel detectors for the realization of ultra-low material budget, high resolution tracker aimed to instrument the ILC/CLIC future collider. I also contributed to the realization of a MAPS focal plane detector for the *TEAM sub-angstrom electronic microscope* [13] and its readout system [14], as well as to the development of the *counting imaging technique* [15].

Together with the development of new solid states sensors and imaging systems [11], I have long experience in radiation testing and assessment of integrated micro-electronic circuits [8], a field where I contributed to the realization of the *IEEM nuclear microscope*, the first instrument able to micro-map *Single Event Effects* in microelectronic circuits with unfocused ion beams [12]. Always in the field of radiation hardness, I am currently leading the development of radiation-hard solutions for the implementation of the *ALICE collaboration* Inner Tracking System upgrade [4] Readout Electronics. The electronics must operate in the LHC cavern *radiation-harsh environment*, at only few meters distance from the interaction points, yet it is entirely realized with COTS components [##] thanks to the innovative design used.

I supervise and have supervised both graduate and undergraduate students in Padova, Berkeley and at CERN, as well as in international Physics schools.

I am regularly member of project evaluating panels for EU and non-EU funding programs.

Latest grants

- In March 2017 I have been awarded a *FARE research grant* from the Italian Ministry for Research and education (Grant ID C93C15000010005), to further develop proton Computed Tomography.
- In April 2015 have been awarded an *ERC Consolidator Grant* in Physical Sciences & Engineering (Grant ID649031), for the project iMPACT (innovative Medical Proton Achromatic Calorimeter and Tracker), which aims developing monolithic pixel sensors with advanced architectures to build proton-base CT systems.

Mandates

- Since 2017: panel vice-chair for the *FET OPEN RIA* call.
- Since 2014: *convener* of the ALICE collaboration ITS upgrade Readout Electronic working group, which develops the readout and control system of the fully-monolithic novel ITS tracker currently under development by the ALICE collaboration at the CERN LHC.
- During 2016: project reviewer for the *European H2020 program*.
- March 2016: awarded a CERN *Scientific Associate at CERN*, within the ALICE experiment framework as responsible of the Readout Electronic development and radiation hardness assessment.
- Since 2015: *national responsible* for the INFN SEED (Sensor with Embedded Electronics Development) project, a lightweight project focused on developing a tight collaboration with industry for the development of innovative monolithic pixel sensors.
- from 2015 to 2016: *local responsible* for a Padova University Research Project Grant I won with a project entitled *Deep sub-micron CMOS electronics for next generation HEP experiments*.
- From 2001 to 2014: *member of the CMS experiment* at the CERN LHC. I personally contributed to the radiation testing of the solid state micro-strip tracker readout ICs and to the testing and commissioning of the barrel pixel tracker at PSI.
- From 2006 to 2012: member of the *SOI pixel collaboration*, an international collaboration investigating the Silicon On Insulator technology applied to the realization of scientific-grade solid state detectors, especially but not only aimed at x-ray imaging applications.

Career positions

- Since 2017 I am *assistant professor* at University of Padova, where I lecture for the Advanced Electronic Laboratory master class, for special classes on pixel detectors for the master and PhD programs, and where I am responsible of the clean room & the silicon detectors lab.
- From 2012 to 2017 I have been *staff researcher* and *aggregate professor* at University of Padova.
- Since 2012 I am *associate* to the Istituto Nazionale Fisica Nucleare, Italy, which supported my participation to the CMS collaboration and with which I now participate to the ALICE collaboration.
- From 2006 to 2010 I have been *visiting scientist* at the Lawrence Berkeley National Laboratory, Berkeley, CA, USA, where I developed Monolithic Active pixel Detectors for both High Energy Physics (ILC/CLIC) and Applied Physics (TEAM) experiments.

- During 2007 I have been *visiting scientist* at the Paul Scherrer Institute, Villigen, CH, where I contributed to development and commissioning of the CMS pixel vertex tracker.

Patents

- "Integrated sensor of ionizing radiation and ionizing particles", **BI2767M**, deposited 27 Oct 2017, international patent pending.
- "*Method and system for compressing a data array*", **WO 2013/075728 A1**, published 30 May 2013, co-owned with Dr. Walter Snoyes of CERN.

15 selected publications

[1] *Low power, high resolution MAPS for particle tracking and imaging* – Giubilato P. et al. – 2015 JINST **10** C05004.

[2] *ProXY, a high performance monolithic pixel tracker for proton tomography* – Giubilato P. et al. – Radiotherapy and Oncology **110** (2014), pp. S39.

[3] *Design and characterization of novel monolithic pixel sensors for the ALICE ITS upgrade* – Cavicchioli C. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **765** (2014), 177-182.

[4] *Technical Design Report for the Upgrade of the ALICE Inner Tracking System* – The ALICE Collaboration – J. Phys. G: Nucl. Part. Phys. **41** (2014) 087002.

[5] *Monolithic active pixel sensor development for the upgrade of the ALICE inner tracking system* – Snoeys, W. et al. – 2013 JINST **8** C12041.

[6] *LePix, a high resistivity, fully depleted monolithic pixel detector* – Giubilato P. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **732** (2013), pp. 91-94.

[7] *Monolithic pixels on moderate resistivity substrate and sparsifying readout architecture*, – Giubilato P. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **731** (2013), pp. 146-153.

[8] *CMOS sensors in 90nm fabricated on high resistivity wafers: Design concept and irradiation results* – Rivetti A. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **730** (2013), pp. 119-123.

[9] *Orthopix: a novel compressing architecture for pixel detectors* – Giubilato P. et Snoeys W. – 10.1109/NSSMIC.2012.6551407 (2012), pp. 1735-1741.

[10] *Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC* – The CMS Collaboration – Physics Letters B, Vol. **716** (2012), pp. 30-61.

[11] *Development of SOI pixel process technology* – Y. Arai et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **636** (2011), pp. S31-S36.

[12] *First results in micromapping the sensitivity to SEE of an electronic device in a SOI technology at the LNL IEEM* – Mattiazzo S. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **658** (2011), pp. 125-128.

[13] *Characterization of a CMOS active pixel sensor for use in the TEAM microscope* – Battaglia M. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **622** (2010), pp. 669-677.

[14] *A DAQ system for pixel detectors R&D* – Giubilato P. et al. – Nuclear Instruments and Methods in Physics Research A, Vol. **611**, (2009), pp. 105-110.

[15] *Cluster imaging with a direct detection CMOS pixel sensor in Transmission Electron Microscopy* – Battaglia M., Contarato D., Denes P., Giubilato P. – Nuclear Instruments and Methods in Physics Research A, Vol. **608**, (2009), pp. 363-365.