

Dr. Giovanni Ambrosi, curriculum vitae

Research contracts and fellowships

June 2019 – today	Dirigente di Ricerca (Research Director) INFN Perugia.
2009 – May 2019	Primo Ricercatore (First Researcher) INFN Perugia.
2001 – 2008	Ricercatore (Researcher) INFN Perugia.
2000 – 2001	Assegno di Ricerca (post Doc research grant) INFN Perugia.
1996 – 2000	Maitre Assistant (post Doc) Geneva University.
1995	Borsa di Perfezionamento all'estero (Research grant for studies abroad) Perugia University, spent at the Geneva University.
1991 – 1994	Dottorato di Ricerca in Fisica (PhD in Physics) Perugia University.
1984 – 1990	Laurea in Fisica (Master degree in Physics) Perugia University.

Main responsibilities and coordination activities

1993 – 1994	Co-responsible for the SMD (Silicon Microstrip Detector) commissioning in the L3 experiment
1996 – 1998	Coordinator for the integration and operation of the AMS-01 silicon tracker.
1999 – 2012	Coordinator of the AMS-02 SubDetector Electronics group.
2002 – 2012	Coordinator of the AMS-02 Silicon Tracker Collaboration.
2003 – 2009	INFN Perugia representative in the INFN IT committee.
2006 – 2008	Perugia local responsible for the Crystal experiment, for the studies on charged particle channeling effect in bent crystals with single particle tracking.
2007 – 2010	Perugia local responsible for the DASIPM2 and 4D-MPET experiment, for the use of SiPM in PET detectors.
2009 – 2015	Member of the INFN National Committee on R & D on detector, electronics and relate technologies - referee of more than 20 projects
2009 – 2016	Responsible for the INFN-FBK agreement on the common development of semiconductor detectors - referee of more then 20 development project
2013 – 2018	Italian national responsible for the DAMPE experiment, for the design, construction and operation of a cosmic rayr detector in space, on board the Chinese DAMPE satellite. Technical coordinator of the Silicon-Tungsten Tracker detector for DAMPE
2020 – today	Technical Coordinator and Italian coordinator of the PAN project, founded by EU FETOPEN program, for the design and construction of particle detector for space optimized for the energy range 100 MeV – 10 GeV.

- 2019 – today Italian national responsible for the DAMPE and HERD experiment. Vice PI for the HERD experiment, in charge of the coordination of the European contribution to the design and construction of the HERD payload to be installed on board the Chinese Space Station for the measurement of cosmic rays up to the PeV scale.
- 2015 – today Member of the INFN-ASI (Italian Space Agency) joint board.

Short description of the activities

My research activity actually started in 1993 with the work for my PhD thesis, devoted to the construction and installation of the silicon microstrip vertex detector for the L3 experiment at the LEP, and with the data analysis on the Z parameter measurement. Starting in 1995 my activities were mainly carried out in the AMS (Alpha Magnetic Spectrometer) and, in recent years, in the DAMPE (Dark Matter Particle Explorer) experiments for the direct cosmic rays measurements with detector in space. In parallel with the main activities in the framework of big international Collaborations, I have also been involved in the activities related to the development of new detectors and in the use of tracking detectors for different applications.

The first version of the AMS experiment flew aboard the Shuttle Discovery from 2 to 12 June 1998. The final version, improved under different points of view, was installed in May 2011 on the International Space Station for a data acquisition lasting at least ten years. In this context I have been responsible for the Tracker electronics (silicon track detector) both in the first phase, called AMS-01, and in the current one (AMS-02). In AMS-02 I coordinated all the activities of design and construction of the tracking detector as responsible for the Silicon Tracker detector. I also coordinated the working group responsible for the design, production and commissioning of the entire electronics system (data acquisition and electronics ancillary) of the AMS02 subdetectors. Since the AMS-02 installation on the ISS in May 2011 I am responsible for the operations of the Silicon Tracker.

From September 2004 until 2006 I was the Perugia coordinator of the SIGESPES project for the development of silicon detectors up to a few millimeters thick for X-ray detection and gammas. The group of Perugia took care of the development and characterization of the thick junction detectors and the development of the base module, with detector and front - end electronics, for the demonstrator of a PET apparatus. In the period from 2006 to 2008 I was coordinating the work of the Perugia group, using the skills acquired for the use of silicon tracking detectors, in the Crystal collaboration, for the study of the interactions between charged particles and curved crystals (channeling phenomena). The developed detector allows the measurement of the single particle trajectories to study bending in the trajectory itself due to the channeling phenomena. Since 2007 I coordinate the research and development of SiPM (Silicon PhotoMultiplier) at the INFN Section of Perugia (DASIPM and 4D-MPET experiments for medical application, CTA Collaboration for atmospheric shower detector) in a collaborative effort with the

FBK/IRST center in Trento, in order to develop an Italian production line of Silicon PhotoMultiplier.

Starting from 2013, using a substantial CAS funding (Chinese Academy of Science), I work as national coordinator of the DAMPE experiment. The aim of the work is to design, construct and put into orbit a detector for cosmic rays and photons to measure the flux and characteristics of charged particles and photons of cosmic origins that can give hint for new physics signal (for example, Dark Matter). The detector has been launched in December 2015, and is properly tacking data since then onboard the Chinese DAMPE satellite.

I am participating in the HERD working group since the beginning of the activities in October 2012 with the First International Workshop on HERD Experiment onboard China's Space Station and I am member of the Joint Working Team.

Along the years, with the grow of experience in the use of semiconductor detectors, I have implemented a laboratory at INFN Perugia, called Semiconductors Lab, where to carry out the necessary tests and measures for the development of semiconductor detectors. The group, beside the activities on silicon microstrip detector for space and medical physics, is now working on the use of SiPM in medical applications (PET), for Cherenkov telescopes and collaborating with the Geneva University for the development of scintillating fiber tracker, with the use of dedicated front-end electronics.

In all the activities I have followed the work of students, in particular being the thesis' advisor of 20 bachelor's degree students (in Information technology and in Physics), 5 Master degree student in Physics.

In the years since 2000, I have been a member or chair of the organising committee or serving in the scientific committee of nine conferences and workshops.

Scopus bibliometric indicators as January 20th 2021

- Articles in the DB: 391, including conference proceedings
- Citations: 13896
- h-index: 53

List of selected publications

- M. Aguilar *et al.* [AMS-02 Collaboration],
"Towards Understanding the Origin of Cosmic-Ray Positrons"
Phys. Rev. Lett. **122**, 041102 (2019).
- X. Wu *et al.*
"Penertrating particle ANalyzer (PAN)"
Advances in Space Research 63 2672 (2019)
- G. Ambrosi *et al.* [DAMPE Collaboration],
"Direct detection of a break in the teraelectronvolt cosmic-ray spectrum of electrons and positrons"
Nature **552** 63 (2017)."
- J. Chang *et al.* [DAMPE Collaboration],
"The DArk Matter Particle Explorer mission"
Astroparticle Physics **95** 6 (2017).
- M. Aguilar *et al.* [AMS-02 Collaboration],
"Observation of the Identical Rigidity Dependence of He, C, and O Cosmic Rays at High Rigidities by the Alpha Magnetic Spectrometer on the International Space Station"
Phys. Rev. Lett. **119**, 251101 (2017).
- M. Aguilar *et al.* [AMS-02 Collaboration],
"Precision Measurement of the Proton Flux in Primary Cosmic Rays from Rigidity 1 GV to 1.8 TV with the Alpha Magnetic Spectrometer on the International Space Station"
Phys. Rev. Lett. **114**, 171103 (2015).
- M. Aguilar *et al.* [AMS-02 Collaboration],
"First Result from the Alpha Magnetic Spectrometer on the International Space Station: Precision Measurement of the Positron Fraction in Primary Cosmic Rays of 0.5–350 GeV"
Phys. Rev. Lett. **110**, 141102 (2013).
- J. Alcaraz *et al.*,
"The Alpha Magnetic Spectrometer Silicon Tracker: Performance Results With Protons And Helium Nuclei,"
Nucl. Instrum. Meth. A 593 (2008) 376.
- W. Scandale *et al.*,
"High-Efficiency Volume Reflection Of An Ultrarelativistic Proton Beam With A Bent Silicon Crystal,"
Phys. Rev. Lett. 98 (2007) 154801.

- G. Collazuol *et al.*,
” Single photon timing resolution and detection efficiency of the IRST silicon photo-multipliers”,
Nucl. Instrum. Meth. A 581 (2007) 461.
- M. Aguilar *et al.* [AMS Collaboration],
“The Alpha Magnetic Spectrometer (AMS) on the international Space Station: part I – results from the test flight on the space shuttle ”,
Physics Report 366 (2002) 331.
- M. Acciarri *et al.*,
“The L3 Silicon Microvertex Detector”
Nucl. Instrum. Meth. A 351 (1994) 300.

Curriculum

Nome **MOVILEANU MARIA**
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STUDI

1/04/1994 – 09/12/1999

Corso di Dottorato in Fisica, Università di Bucarest, Facoltà di Fisica

Titolo della tesi: “La ricerca dell’antimateria nei raggi cosmici con Alpha Magnetic Spectrometer”

1/10/1988- 23/06/1993

Corso di Laurea in Fisica , Università di Bucarest, Facoltà di Fisica

Titolo della tesi: "La produzione dei protoni di alta energia nella reazione $^{16}\text{O}-^{27}\text{Al}$ ad un energia incidente di 19.3MeV/nucl."

15/09/1984 – 15/09/1988

Liceo Scientifico “Al. I. Cuza” di Matematica e Fisica, Focsani, Romania

ESPERIENZA LAVORATIVA E DI RICERCA

1/08/2017 - Istituto Nazionale di Fisica Nucleare, Sezione di Perugia, IT

Tecnologo III Livello

Responsabile scientifico della Camera Bianca della Sezione INFN di Perugia. Attività di ricerca tecnologica nei progetti: CTA, FOOT, PAN-EU, CMS; 3d-SiAm

1/05/2014-30/04/2017

Istituto Nazionale di Fisica Nucleare, Sezione di Perugia, IT

Tecnologo III Livello - contratto a Tempo Determinato

1/05/2006- 30/04/2014

Universita di Perugia, Dipartimento di Fisica

Assegno di ricerca: “Tecniche avanzate di assemblaggio integrato di rivelatori di particelle a stato solido”

January 2004 – April 2006

(19/01/-31/03/2004, 21/04/-30/09/2004, 01/02/-20/04/2005, 18/05/-18/10/2005, 10/11/2005-10/01/2006)

Istituto Nazionale di Fisica Nucleare, Sezione di Perugia, IT

Associato alla ricerca con FAI

1 /04/2003 -31/12/2003

G&A Engineering-Oricola, Aquila, Italy

Borsa di studio per ricercatore

20/11/2002-31/12/2002

Istituto Nazionale di Fisica Nucleare, Sezione di Perugia, IT on leave from IMT-Bucharest
Associato alla ricerca con FAI

23/10/ 2000- 23/10/ 2002

Istituto Nazionale di Fisica Nucleare, Sezione di Perugia, IT “on leave” da IMT-Bucarest
Borsa di studio post-dottorato per cittadini stranieri

13/04 – 13/08/1994; Nov- Dec 1994; 01/10/ 1995-7/07/1997

Istituto Nazionale di Fisica Nucleare, Sezione di Perugia, IT “on leave” from IMT-Bucharest
Borsa di studio

01/09/1993– 13/02/2003

National Institute for research and Development of Microtechnologies (IMT)– Bucharest.
Ricercatore III Livello

Sett. 1992 e Aprile –Giugno 1993

Laboratorio di Problemi Nucleari, Joint Institute of Nuclear Research (JINR) - Dubna, Russia,
Borsa di studio per studenti - Sperimento con ioni pesanti

RESPONSABILITA

24 Gennaio 2018 – oggi

Responsabile scientifica della Camera Bianca della Sez. INFN di Perugia

01 Gennaio 2020 – oggi

Coordinatrice del WorkPackage3:Tracker per la costruzione del
tracciatore al silicio a microstrip nel Progetto Europeo PAN

Aprile 2016-Maggio 2017

Responsabile Locale del esperimento LIMADOU (costruzione del
Tracciatore al Silicio)



Curriculum Vitae Servoli Leonello (updated to 26-apr-2021).

Leonello Servoli (08-nov-1961) graduated summa cum laude in Physics at the University of Perugia (Italy) November 15th, 1985. Since 1991 he is a Researcher with Istituto Nazionale di Fisica Nucleare (Perugia Research Unit), currently Senior Researcher.

Main responsibilities and scientific memberships:

→ Member of the SLD (5 years), L3 (11 years) and CMS (21 years) high energy physics experiments at SLAC and CERN.

→ Member of the National Computing and Network INFN Committee (8 years) and local coordinator of the scientific INFN computing.

→ Member and Deputy of the National V Scientific INFN Committee

(7 years).

→ Referee of about 30 INFN experiments, on behalf of the National INFN Committee 3 and 5.

→ National coordinator of the “High Availability” INFN computing project (2 years);

→ National coordinator of the RAPID INFN experiment (4 years);

→ National coordinator of the 3D-SOD INFN experiment (3 years).

→ National coordinator of the 3DOSE INFN experiment (in progress).

→ Local coordinator of the INFN GRID computing initiative (7 years);

→ Local coordinator of the DACEL2 INFN experiment (2 years);

→ Local coordinator of the FOOT INFN experiment (4 years, in progress);

→ Member of the FP7 AIDA project (4 years);

→ Local coordinator of the RD42 experiment (6 years, in progress);

→ Member of the Italian Association of Medical Physics (AIFM, 5 years, in progress);

→ Member of the Società Italiana per la Ricerca sulle Radiazioni – SIRR (4 years, in progress);

He is the author, co-author or corresponding author of more than 450 scientific papers and conference proceedings published on international scientific journals (Scopus, Web of Science), of which more than 120 on detector development. **H-index are the following: Scopus = 56, Web of Science Citation Report = 58, Google Scholar = 81, and about 55200 citations.**

He has been in the organizing committee of several national and international conferences.

He has been teaching from 1991 at Perugia University several courses both at graduate, master and PhD levels. He has been the supervisor of more than 90 thesis works of graduate, master and PhD level for Physics, Computing and Electronic Engineering curricula.

Main fields of interest:

[A] Gaseous ionizing radiation detectors R&D:

he has worked on gaseous detectors (proportional chambers, limited streamer tubes) from 1984 to 1990 (SLD experiment at SLAC). He studied the gas mixtures to be used in the limited streamer tubes, to optimize the signal formation, reduce the dead time and the afterpulse effect, to improve the drift velocity and to obtain a non-flammable mixture. He also participated in the construction, installation and operation of the Warm Iron Calorimeter of the SLD experiment at SLAC.

[B] Solid state ionizing radiation detectors R&D : silicon microstrips:

he has worked on development and characterization of semiconductor detectors for tracking charged particles in High Energy experiments (L3 and CMS) from 1991 to present days. He has been involved in the following items:

1) Study of the sensor element for the basic sensor unit of the L3 microvertex system: single and double sided silicon microstrip sensors (1991-1994).

2) Installation and commissioning of the L3 silicon microvertex detector (1993-1995).

3) Study of the sensor element of the CMS Silicon Strip Detector single and double sided silicon microstrip sensors (1995-2000); focus on detector performance and on radiation damage resistance.

4) Construction, Installation and commissioning of CMS Silicon Strip Detector (2000-2005).

5) Development, Characterization and Installation of thin microstrips detectors for the MicroStrip Detector (MSD) of the FOOT experiment (2016-today)

[C] Solid state ionizing radiation detectors R&D : Active Pixel Sensors:

he has been actively working on pixel detectors for tracking charged particles in High Energy experiments (RAPS, SHARPS, VIPIX, CMS) from 2001 to present days. He has been involved in the following items:

- 1) test of hybrid pixel detectors for the CMS experiment, studying their response, calibration, detection efficiency;
- 2) development of Active Pixel Sensors, to prove that they are capable of detecting ionizing radiation with good S/N performances (S/N at least 20).
- 3) development and test of stacked pixel devices, to measure the direction of incoming charged particles, instead than a single point, with a precision of few degrees.
- 4) study of CMOS Imagers as ionizing radiation sensors, to prove that standard imagers optimized for visible light collection are also capable of ionizing radiation detection with high S/N (about 30 and more) and almost 100% detection efficiency.
- 5) Precision measurement of ionizing radiation interaction with solid state detectors, mainly silicon ones, using innovative experimental techniques, like charged particles impinging at grazing angle.

[D] Solid state ionizing radiation detectors R&D : Diamond Sensors both 3D, Silicon-On-Diamond and Hydrogenated Amorphous Silicon:

he has been actively developing new type of devices to detect ionizing radiation based on diamond substrate, both scCVD and pcCVD (experiments DIPIX and 3D-SOD) and a-Si:H. These are the main branches:

- 1) creation of conductive paths inside the diamond bulk, or on its surface, using a focused pulsed fs laser to graphitize the diamond bulk and surface (3D diamond);
- 2) bonding a layer of silicon with embedded CMOS electronics, typically thinned (tens of micrometers) Monolithic Active Pixel Sensors, to a diamond substrate, both scCVD than pcCVD (Silicon-On-Diamond approach). Also this technique requires a pulsed laser to give enough energy to the silicon surface to be transmitted to the diamond surface producing a rearrangement of the crystals structure creating an amorphous interface mechanically resistant and hence obtaining a single device with finely pixellated readout.
- 3) development of a-Si:H sensors, both planar than 3D, for single ionizing radiation detection and flux measurements.

[E] Development of devices for medical applications.

he is working to apply ionizing radiation sensors for use in the medical field. This research is structured in different approaches:

- 1) development of a wireless real-time dosimeter for medical operators in Interventional Radiology procedures; he is the National Coordinator of an INFN project (RAPID), aiming to produce a dosimeter capable of real-time recording of dose-rate, wireless data transmission, and linearity in the entire range of dose-rate due to X-ray photons diffused by the patient's body;
- 2) measurement of the dose absorbed during medical procedures and identification of criteria to reduce the dose absorbed by the operators;
- 3) development of new methodologies to measure the beam profile of radiotherapeutic beams using CMOS imagers (patent obtained);
- 4) design and test of new type of diamond detectors for dosimetry of small field photon beams;
- 5) design and test of a-Si:H diodes for fluximetry of beams at accelerators
- 6) use of SiPM as direct detection devices for ionizing radiation beams.
- 7) use of CMOS Imaging Sensors as detectors for a probe for radio-guided surgery.

[F] Scientific Computing.

he has been actively working on the definition, development and testing of computing models and computing facilities, devoted to the scientific computing in several areas (MONARC, GRID, MACGO) from 1999 to 2011. He has been local responsible of several projects and has been involved mostly in the following items:

- 1) definition of the computing model for the LHC experiments;
- 2) study of performance of an open source batch system and development of optimization tools;
- 3) use of open source virtual operating systems to implement a flexible batch system on demand;
- 4) development of a framework to implement scientific computing programs on Graphic Processing Units.
- 5) development of a dedicated system for Level-1 triggering using the tracker information for CMS experiment at LHC.