

## **Curriculum Vitae**

### **Piergiorgio Picozza**

Piergiorgio Picozza is full Professor of Physics at the International Telematic Uninettuno University in Rome and Professor Emeritus at the University of Rome Tor Vergata, where he was full Professor of Nuclear and Subnuclear Physics and Astroparticle Physics until November 2011 and, for many years, Director of the PhD School.

He was researcher at the National Committee for Nuclear Energy and at the National Institute of Nuclear Physics (INFN) from 1965 to 1982, before moving to the University of Rome "Sapienza" and in 1987 to the University of "Roma Tor Vergata".

In the 70s he served as Deputy Director of the INFN National Frascati Laboratories and Director of the Researches at the electrosynchrotron. From 1981 to 1988 he was member of the National Committee for Physical Sciences of the National Research Council (CNR) and representative of CNR in the Board of Directors of INFN. From 1988 to 1994 he served in the INFN Executive Board, also as Vice-President from 1990 to 1994. In the same periods, he represented Italy at the European Committee for Nuclear Physics (NuPECC).

From 2000 to 2004 he was member of the Board of Directors of "Centro Fermi" and from 2001 to November 2007 Director of the INFN Division of Rome Tor Vergata and member of the INFN Board of Directors. Since October 2016 he is in the INFN Board of Directors as representative of the Ministry of Economic Development.

He held also the position of General Director of the Cabibbo-Laboratory and for several years as member of the Board of Directors of Roma Ricerche.

He joined many national and international committees.

Awarded in 2012 with the AGILE collaboration of the Bruno Rossi Prize of the American Astronomical Society for the discovery of a "Powerful Gamma-Ray Flares from the Crab Nebula" and in 2019 of the O'Ceallaigh medal from IUPAP for "outstanding contributions to cosmic ray physics".

Worthy member of the Italian Physics Society. He has been and currently he is Principal Investigator of numerous space missions.

## **Scientific Activity**

For many years the scientific activity of Piergiorgio Picozza was carried out in the fields of Nuclear Physics and Elementary Particles at the accelerators of CERN, INFN Laboratories of Frascati and CEA Laboratories of Saclay. Relevant results were obtained in the study of the nuclear structure, discovery of new elementary particles, verification of invariance laws of particle physics, and in the realization by innovative techniques of gamma and particle beams.

Since 1987 Piergiorgio Picozza has been mainly involved in space researches performed with the techniques used in elementary particle physics at accelerators.

The first observations, dedicated to the search for primordial antimatter, mainly positrons and antiprotons, and the detection of low mass nuclei in cosmic rays, in an unexplored energy range, were conducted on stratospheric balloons during five launch campaigns from 1989 to 1998 in the context of an International Collaboration including NASA GSFC, American, Swedish and German Universities, and six INFN Sections and Laboratories led by Piergiorgio Picozza.

On 1993 Piergiorgio Picozza promoted and led the research programme RIM (Russian Italian Missions), in the frame of a collaboration with the Russian Institutes MEPhI and FIAN Lebedev in Moscow and Ioffe in St. Petersburg, the University of Siegen in Germany and the KTH in Stockholm. The program consisted of scientific missions performed on Russian and Italian satellites and space carriers as well as on the Space Stations MIR and ISS. Two experiments, NINA, launched in July 1998 on board the Russian satellite Resurs n.1-04 and NINA2 in 2000 on board the Italian satellite ASI-MITA, were dealing with the study of the nuclear and isotopic components of cosmic rays at low energies and the study of solar activity.

In the same framework, Piergiorgio Picozza led the realization of the experiment PAMELA, installed on board the Russian satellite Resurs DK1, placed in orbit on June 15th, 2006 by the Russian rocket Soyuz-U and in operation until 2016. At that time, it was the most important space mission ever accomplished in the field of the search for antimatter and dark matter annihilation signals.

A very high scientific relevance has had the results obtained on the antiproton-proton ratio and on the positron-electron ratio which arouse a great interest also outside the scientific community of reference with more than 1500 citations. Hundreds theoretical papers have

been published in a short time to interpret the positron data as dark matter annihilation signals, even if other hypotheses have been considered.

Relevant are also the results obtained on the proton, helium, electron, positron and nuclei energy spectra of the cosmic radiation, essential for a better knowledge of the mechanisms of production, acceleration and propagation of the cosmic rays in the Galaxy. Concerning the study of the Sun, the PAMELA experiment has allowed a continuous monitoring of the solar activity and its influence on the cosmic ray fluxes and the measurement of the particle energy spectrum in solar flares. An antiproton radiation belt has also been discovered.

Piergiorgio Picozza was one of the major promoters of the AGILE space mission for the study of gamma radiation, in orbit since April 2007. The results obtained in the detection of Gamma Ray Bursts and in the discovery of new Pulsars and Powerful Gamma-Ray Flares from the Crab Nebula have opened, together with the Fermi mission, a new way for the knowledge of the most violent processes in the Cosmos.

Currently Piergiorgio Picozza is the Principal Investigator of the JEM EUSO Program conducted in the context of an international collaboration composed of 16 countries and more than 300 researchers. The program is dedicated to the detection of cosmic rays of energy greater than  $10^{19}$  eV. The GZK effect, the astrophysical sources that accelerate cosmic rays to such extreme energies, neutrinos and cosmogenic gamma, top-down scenarios in the field of physics of elementary particles (strings...), Lorentz principle violation, are the main fields of exploration. The program is constituted of several experiments. The first, EUSO-Balloon, successfully flew on a CNES stratospheric balloon in August 2014, the second SPB-01 in April 2017 on board a NASA super-pressure balloon. A third apparatus, EUSO-TA, is in operation at the Telescope Array site in Utah, USA. Another, MINI-EUSO, has been placed inside the International Space Station in front of the transparent UV window in August 2019 and is now in operation. In preparation are SPB-02 to be launched on board a NASA super-pressure balloon in 2022 and K-EUSO to be placed outside the ISS in 2023.

Currently, Piergiorgio Picozza is also the Principal Investigator of the Limadou-CSES program, a collaboration between the Italian and the Chinese Space Agencies in the framework of the CSES missions dedicated to the study of the Litosphere-Ionosphere-Magnetosphere coupling, solar activity and Space Weather. The first CSES satellite was launched on February 2<sup>nd</sup> 2018. Nine instruments installed on board the satellite are investigating the structure and the dynamic of the topside ionosphere, the coupling

mechanisms with the lower and higher plasma layers, the temporal variation of the geomagnetic field in quiet and disturbed conditions, the solar-terrestrial interactions and phenomena of solar physics. A second CSES satellite is now in preparation and foreseen to be launched in the second half of 2022.

The scientific activity of Piergiorgio Picozza regarded also the field of the life science in space. He led the missions of the RIM program, Si-Eye 1 and Si-Eye 2 performed on board the Russian Space Station MIR in the periods 1995-1998 and 1998-2000, respectively, and Si-Eye 3 on board the ISS in 2002 and collaborated in ALTEA, placed in 2006 on board the ISS. These experiments were dedicated to the study of the risks due to ionizing particles for the astronauts and to the continuous ionizing radiation monitoring inside the Space Stations. They provided a deal of data essential for planning interplanetary flights.

Piergiorgio Picozza is author of more 500 papers published in the major international journals. He has given many invited talks at the most important Conferences and many seminars in the primary Universities and Research Centres.

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