

My scientific interest was devoted since the beginning of the career to the understanding of the Standard Model of particle physics, from neutrino weak interactions (CHARM experiment) to the study of the Z and W properties at LEP (L3 experiment) and the discovery of the Higgs boson at LHC (CMS experiment). In this last breakthrough for particle physics, I had a leading role in the design, construction and exploitation of the CMS electromagnetic calorimeter, the key detector for the observation of the decay $H \rightarrow \gamma\gamma$. The Nobel Prize in Physics 2013 was awarded jointly to F. Englert and P. Higgs for the theoretical discovery of the electroweak symmetry breaking mechanism confirmed experimentally in 2012 by ATLAS and CMS at LHC. After the Higgs boson discovery, the key issue is to understand if even tiny deviations from the Standard Model are present and I am focusing now on the particle nature of the dark matter (CMS and SABRE). **Summary of publications** (from WoS): 1314 published papers. Total citations: 63074. Without self-citations: 52365. **h index 108.**

Education

- July 1982 Degree in Physics (Laurea) at the Università di Roma "La Sapienza".
- January 1987 PhD in Particle Physics at the Università di Roma "La Sapienza"

Professional Appointments

- 1982 - 1983 Paid associate at CERN
- 1987 - 1988 Post Doctoral INFN fellowship
- 1988 - 1990 Permanent staff Reasercher (Ricercatore) of INFN Sezione di Roma
- 1990 - 2002 Senior staff Reasercher (Primo ricercatore) of INFN Sezione di Roma
- 2002 - present Director of Research (Dirigente di Ricerca) of INFN Sezione di Roma

Main Responsibilities in Scientific Coordination

- 1996-2012 leader of the CMS Rome group contributing to the CMS Electromagnetic Calorimeter (ECAL) Project. Responsible for the construction and test in Rome and delivery to CMS of half of the barrel part of ECAL (about 30000 PWO crystals).
- 1997-2002 member of the Technical Board of ECAL.
- 2002-2007 coordinator of INFN activities (Roma, Milano, Torino, Trieste) within the CMS ECAL Project.
- 2001-2004 Deputy Chair of the CMS ECAL Institution Board.
- 2004-2008 Deputy Project Manager CMS ECAL Project.
- 2004-2011 Member of the CMS Management Board.
- 2007-2011 INFN representative in CMS (Rappresentante nazionale italiano).
- 2007-2011 Member of the CMS Finance Board.
- 1996-2012 Member of the CMS Collaboration Board.
- 2011-2019 Director of INFN *Sezione di Roma* (Rome Department).
- From 2020 Partner Investigator of the ARC Centre of Excellence for Dark Matter Particle Physics for the *Sezione di Roma*.

International Scientific Committees

- 2007 member of the Review Comm. for Calorimetry and Jet Energy Measurement at ILC.
- 2008-2014 member of the European Committee for Future Accelerators (ECFA).
- 2009-2012 member elected of the Scientific Policy Committee of CERN (SPC), 1st term.
- 2012-2014 member elected of the Scientific Policy Committee of CERN (SPC), 2nd term.
- 2011-2014 member of the ECFA EU Comm. to review the R&D effort for future detector projects.
- 2011-2012 member of the Preparatory Group for European Strategy in Particle Physics.
- 2017-*present* member of the Future Circular Colliders International Advisory Committee.
- 2018-*present* member of the Muon Collider working group for the EU Strategy in Particle Physics.

Commissions of trust

- 2004-2011 member of CERN Research Fellow & Associate selection committee.
- 2010-*present* Member of the Editorial Board of *Nature Scientific Reports*
- 2011 Member of the selection committee of Premio Fermi of Società Italiana di Fisica.
- 2011-2012 Member of the panel (Gruppo Esperti della Valutazione, GEV02) set up by ANVUR (Agency for the evaluation of Italian Research) to evaluate the physics research in Italy for the period 2004-2010.
- 2012 Member of the selection committee (Area 02) for the program PRIN 2010-1011
- 2013 Referee for Scuola Normale Superiore di Pisa of particle physics projects.
- 2013-*present* Member of the selection committee of Premio Tomassoni of Dipartimento di Fisica Sapienza Università di Roma.
- 2014 Referee for Swiss National Science Foundation of particle physics projects.
- 2014-*present* member of the selection committee of International Doctorate Network in Particle Physics, Astrophysics and Cosmology IDPASC-Portugal.
- 2014 member of the Search Committee for the selection of the Director General of CERN.
- 2017, 2019 member of the ERC Starting Grant panel PE2.
- 2019 member of the Scientific Advisory Committee of the Instituto de Fisica de Cantabria.

Honours and Awards

- 1980 Winner of “Enrico Persico” Grant, Accademia dei Lincei
- 2008 Awarded Premio Minerva per la Ricerca scientifica.
- 2012 Awarded the honour of “*Grande Ufficiale dell’ordine al merito della Repubblica*” by the Italian President Giorgio Napolitano (May 2012).

Selected invited lectures, conferences and schools

- *Measurement of the $b \rightarrow \tau \nu X$ branching ratio.* Electroweak Interactions and Unified Theories, XXIXth Rencontre de Moriond Meribel les Allues, France, Mar. 12-19, 1994.
- *Progress on PWO for the CMS electromagnetic calorimeter.* 8th International Conference on Calorimetry in High Energy Physics (CALOR 99), Lisbon, Portugal, June 13-19, 1999.
- *The electromagnetic calorimeter of the CMS experiment.* IEEE Nuclear Science Symposium, San Diego, CA, November 04-10, 2001.
- *The electromagnetic calorimeter of the CMS experiment,* 11th International Vienna Conference on Instrumentation, Vienna, Austria February 19-24, 2007.
- *Status of the CMS exp.,* 96° Conf. of the Italian Physical Society, Bologna, Italy, 2010
- *Calorimetry,* Lectures given to EDIT 2011, Excellence in Detectors and Instrumentation Technologies, CERN, Geneva, Switzerland – 31 January-10 February 2011.
- *Summary of the Energy Frontier Physics,* Talk given to the European Strategy Drafting Session, 20-26 January 2013, Erice, Italy.
- *Discussion on the electromagnetic calorimeters of ATLAS and CMS,* XIIIth Vienna Conference on Instrumentation, 11 – 15 February 2013, Vienna, Austria
- *Summary talk on the results presented to CALOR2014,* 16th Conference on Calorimetry in High Energy Physics (CALOR 2014), Giessen, Germany 2014.
- *Lessons & trends in calorimetry,* Keynote for TIPP '14 International Conference on Technology and Instrumentation in Particle Physics, Amsterdam, The Netherlands 2014.
- *Calorimetry,* Lectures given to the XIV ICFA School on Instrumentation in Particle Physics, La Habana, Cuba – 27 November - 8 December 2017.

Membership of Advisory Committee, Organization of conferences, Direction of Schools

- Chair of the CERN Summer Students Lecture Programme Committee 1998-2002
- International Advisory Committee of Calorimeter Conference in High Energy Physics. (CALOR series since 2006)
- International Advisory Board of Physics at LHC, Perugia 2011.
- Scientific Committee of the Open Symposium on the European Strategy for Particle Physics, 10-12 September, Cracow 2012.

- Secretary of the organizing committee of the 101^o Conference of the Italian Physical Society (SIF), Roma 2015
- 2011-2019 Member of the Board of the PhD in Physics of *Sapienza Università di Roma*.
- *SPS WA18 (CHARM) experiment*
Experimental study of nucleon structure functions: determination of parton densities and of the parameter Λ_{QCD} at leading log.
- *Parton model and QCD*
Parametrization of parton densities known in literature as DFLM (PhD Thesis). Paper largely used at the time and that nicely predicted the W and Z production at SppS.
- *L3 experiment at LEP*
Calibration of the high precision BGO calorimeter composed by about 10000 crystals to a precision better than 0.5%. Study of the Z line shape and precise determination of the parameters of the Standard Model. Search of the Higgs Boson Standard and MSSM.
- *CMS experiment at LHC*
Leading roles the design, R&D, construction and test of the high precision electromagnetic crystal calorimeter (ECAL, about 75000 Lead Tungstate crystals, PWO). Original proposal of La³⁺ ions doping which allowed the substantial improvement of the radiation hardness of PWO crystals. Responsibility of the construction and test of half of the barrel part of CMS-ECAL (about 30000 PWO crystals) in the INFN/ENEA Rome Regional Centre specifically designed for this goal. *In situ* the design performance was obtained. The Higgs boson discovery, announced in 2012, demonstrates the effectiveness of the instrument, which gave a major contribution to the significance of the result (4.1 σ). Young members of the Rome group, always guided and encouraged by the PI, are ECAL best experts and took a leadership role in the H $\rightarrow\gamma\gamma$ analysis. The goal is now to detect any possible deviation from the Standard Model. The quest for new effects that can explain the nature of the astrophysical evidence of the so-called dark matter is a crucial scientific goal.
- *Dark matter searches*
During my term (2011-2019) as Director of the INFN Department of Roma (100 staff members and more that 300 associates to the scientific activities on INFN) my main focus was on the promotion of Dark Matter searches activities. I pushed the development of studies on new experimental techniques and the promotion of international collaborations. In 2011 Roma had one DM experiment and now counts four consolidated experiments and few cutting-edge R&D activities. Direct participation to the SABRE experiment; proponent of the Australian branch of the experiment to verify the origin of the DAMA signal. As Partner Investigator, I will coordinate the scientific effort of the Rome Department within the international proposal "ARC Centre of Excellence for Dark Matter Particle Physics" coordinated by the Univ. of Melbourne and funded by the Australian government, for the period 2020-26.

Mentoring and outreach

I spend a great attention to the education and the career of young people, to the dissemination of scientific culture and, in the last few years, to the role of women in science (STEM). I established innovative CERN programs to explain particle physics to young students and High School teachers. I gave a number of courses and lectures for PhD students and Post Doc in Italy and in international schools. I also frequently give outreach talks and address the gender balance problem in science as in Vilnius Science Festival (2017) and UWE (University Women of Europe) Conference Women in STEM professions (Rome 2018).