Aniello Mennella

Curriculum Vitae

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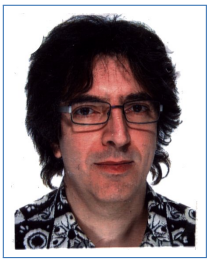

Profile

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Graduated in physics in 1989, I am Associate Professor at the Physics Department of the University of Milan.

Since 1999 I study experimental cosmology with particular reference to the development of high sensitivity receivers for measuring the Cosmic Microwave Background. I participate to three international experiments: the ESA space mission Planck, the ASI-INFN experiment LSPE and the ground experiment QUBIC, funded in Italy by INFN. In Planck I am Calibration Scientist for the Low Frequency instrument, in LSPE I am Program Manager and Deputy PI for the STRIP (STRatospheric Italian Polarimeter) instrument and in QUBIC I am the System Scientist, a member of the Steering Committee and of the Executive board, and I manage the development of the instrument antenna array.

At the Physics Department I teach Radio Astronomy and Space Instrumentation Laboratory, while at the Faculty of Agriculture I teach Applied Physics. From 1990 to 1999 I have worked at ENI (www.eni.it) in petroleum industrial research projects aimed at improving hydrocarbon exploration and production.

Since 2002 I am active in science popularization in schools and for the general public with seminars, lessons, multimedia products and by organizing public events. In this field I am particularly interested in the integration of various forms of communication (theatre, music, video). I believe that science popularization is a key factor in our work of scientists and researchers.

My activity is documented in more than 200 publications on international journals, about 40 contributions to international conferences and more than 70 technical reports. My h-index (Web-of-science) is 62.

Education

Nov. 1989 **Università degli Studi di Milano, Milan, Italy**, *Laurea in Physics*, *110/110 cum laude*.

1983 **Liceo Scientifico S.Lorenzo**, *Novara*, *High school diploma in Math and Science (60/60)*.

Skills & Abilities

Program management	Experience in the management of complex projects (I am currently Program Manager of LSPE-STRIP) and in the use of management tools like Microsoft Project
Programming	Experience in several programming languages like: Mathematica, Python, Fortran 90, IDL, LabView
Laboratory	Experience in microwave laboratory measurements (beam pattern measurements, S-parameters characterization with Vector Network Analyzers, radiometric receivers calibration)
Communication	Skilled in both oral and written communication, experienced in communicating science at all levels.
Human relationships	Motivated in establishing a positive team working environment, interested in knowing people's attitudes and interests, open to dialogue and self-criticism.

Work Experience

Mar 2015 – now **Associate Professor**, Università degli Studi di Milano - Dept. of Physics, Milano, Italy.
Worked on Planck (satellite project), Large Scale Polarization Explorer (ground-based telescope and balloon-borne instrument), QUBIC (ground-based telescope), several technological-oriented projects. Led the Laboratory of Space Instrumentation from 2012 to 2016

Feb 2005 – Feb 2015 **Researcher**, Università degli Studi di Milano - Dept. of Physics, Milano, Italy.
Worked on Planck, Large Scale Polarization Explorer, QUBIC

Dec 1999 – Jan 2005 **Researcher**, National Institute for Astrophysics - IASF, Milano, Italy.
Worked on Planck

Jan 1995 – Nov 1999 **Senior Researcher**, ENI - Italian Hydrocarbon Company, S. Donato Milanese, Italy.
Worked on enhanced oil and gas recovery, reservoir simulations, hydrocarbon migration mechanisms

Apr 1990 – Dec 1994 **Junior Researcher**, ENI - Italian Hydrocarbon Company, S. Donato Milanese, Italy.
Worked on aerosol physics, wettability, enhanced oil recovery processes

Projects

Planck

Overview.
The ESA cosmology mission Planck is the third generation space mission dedicated to the measurement of the Cosmic Microwave Background anisotropies. Two instruments (the Low Frequency Instrument, LFI, and the High Frequency Instrument, HFI) have observed the microwave sky between 30 and 857 GHz with an unprecedented combination of sensitivity, angular resolution and frequency coverage. Planck was launched in May 2009 and successfully completed its operations in October 2013.

Planck has been developed by an international collaboration involving more than 450 scientists and several European and U.S. research institutes. The Low Frequency Instrument has been developed by an Italian-led consortium.

May 2009 – Dec 2016 **Role**, Planck-LFI calibration scientist.
- Coordinated data analysis activity to assess systematic effect uncertainties
- Developed data analysis pipeline to simulate systematic effects in science data
- Coordinated data analysis activity to assess instrument scientific performance
- Coordinated in-flight calibration analysis activities

Jan 2005 – Apr 2009 **Roles**, 2007-2009, Planck-LFI Calibration Scientist, 2005-2007, member of the Planck-LFI system team.
- Participated and coordinated the LFI testing activities from the unit to satellite levels carried out in Thales Alenia Space Italia Labs (2005-2006), Thales Alenia Space Labs in Cannes (2006-2007), CSL Labs in Liége (2008) and at the Ariane launch site in Kourou (French Guyana, 2009)
- Planned, designed, developed and coordinated the development of "LIFE", a software suite for the analysis of data acquired during the LFI testing phases
- Participated to the test activities on the LFI Qualification Model

Dec 1999 – Dec 2004 **Roles**, Member of the Planck-LFI system team, coordinator of the Thermal Effects working team.
- Collaborated to the development of the Planck-LFI calibration plan
- Collaborated to the definition of the instrument scientific requirements
- Coordinated the ESA working team on "Thermal effects"
- Studied the impact of thermal and radiometric systematic effects on the instrument scientific performance
- Participated in the design of the LFI waveguide system
- Developed an analytical model for the evaluation of the impact of periodic systematic effects on the measured maps
- Developed an analytical model of the radiometer response

Large Scale Polarization Explorer (LSPE)

Overview.
The Large Scale Polarization Explorer is an Italian-led international experiment for the measurement of the CMB polarization in about 25% of the Northern Sky. The experiment consists of a ground-based telescope (STRIP) at 43 and 95 GHz that will be deployed in Tenerife during 2018, and a balloon-borne instrument (SWIPE) at 140, 200 and 220 GHz that will fly around the North Pole in a long duration night flight in 2019-2020.

LSPE is being developed by an international collaboration involving Italy, Spain, UK, USA and Chile.

Nov 2016 – now **Roles**, Program Manager and Deputy PI of the STRIP instrument.
- Management of the LSPE-STRIP resources and activities (regular telecons, documentation, relationships with the funding agencies, management of funds at the University of Milan)

Jan 2011 – Oct 2016 **Role**, Instrument scientist of the STRIP instrument.
- Tested polarimeter units at the NASA-JPL Labs
- Managed the procurement of polarimeter units
- Developed an analytical model of the polarimeter receivers
- Defined the instrument scientific requirements
- Prepared the proposal to the Italian Space Agency (ASI)

Q&U Bolometric Interferometer for Cosmology (QUBIC)

Overview.
QUBIC is an experiment based on the concept of bolometric interferometry and designed to constrain tightly the B-mode polarization anisotropies of the Cosmic Microwave Background (CMB). The first QUBIC module will observe the sky in 2019 from the Alto Chorrillo site in Argentina in two spectral bands centered at 150 and 220 GHz.
QUBIC is being developed by an international collaboration involving France, Italy, UK, USA and Argentina.

Mar 2016 – now **Role**, QUBIC System Scientist (member of the QUBIC Executive Board and Collaboration Board.
- Managed the QUBIC interfaces
- Chaired of the QUBIC mount review board
- Managed the development of the QUBIC 400+400 elements antenna array
- Contributed to the development of the Technological Demonstrator calibration plan

Jan 2013 – Feb 2016 **Role**, Responsible for the development of the antenna array, member of the Collaboration Board since 2015.
- Managed the development and testing of the prototypes for the QUBIC antenna array

Space instrumentation laboratory at the University of Milan (μ-Lab)

Overview.
The laboratory μ-Lab (`http://milab.fisica.unimi.it`) is a research and testing facility addressing frontier technology in the manufacturing and performance verification of microwave passive components. The laboratory stems from the Experimental Cosmology research group of the University of Milano, Physics Department, with more than 15 years of experience in the field of microwave cosmological observations.

The laboratory services address mainly research projects in the field of experimental cosmology but are oriented also to small-medium enterprises.

Jan 2015 – Mar 2016 **Role**, Laboratory head.
- Coordinated procurement of scientific instrumentation
- Coordinated laboratory activities
- Organized a workshop oriented to small-medium enterprises

Jan 2013 – Dec 2015 **Role**, Collaborator.
- Collaborated to the development of the facility

Other projects

Sep 2016 – now **Kinetic Inductance Detectors from Space (KIDS)**.
Project funded by the Italian Space Agency to develop a prototype receiver at 150 GHz based on Kinetic Inductance Detectors to be applied in future space missions for the measurement of the CMB polarization.

Role: responsible of the design and manufacturing of the optical coupling between the radiation and the detectors.

Nov 2017 – now **Rivelatori a induttanza cinetica per osservazioni astronomiche dall'Antartide in banda millimetrica e sub-millimetrica (KIDS at Dome-C)**.
Project funded by CNR-PNRA to develop receivers based on Kinetic Inductance Detectors to be deployed at the Italian-French Dome-C in Antarctica to measure CMB spectral distortions.

Role: responsible of the development of the antenna array.

Nov 2017 – now **Space qualification of new polarimetric detectors**.
Project funded by ASI to develop space-qualified receivers at frequencies up to 300 GHz to be employed in future space missions for the measurement of the CMB polarization.

Role: responsible of the design and development of optical coupling between the radiation and the detectors.

Grants

Jan 2012 – now **LSPE**, *ASI*, 570 k€.

Jan 2013 – now **QUBIC**, CNR-PNRA, INFN, 125 k€.

Sep 2016 – now **KIDS**, ASI, 160 k€.

Nov 2017 – now **KIDS at Dome-C**, CNR-PNRA, 31 k€.

Nov 2017 – now **Space qualification of new polarimetric detectors**, ASI, 135 k€.

Reviewing activities

Scientific Journals

2016 – now **European Physics Letters**, *Member of the Editorial Board*.

2015 – now **IEEE Transaction on Microwave Theory and Applications**, *Reviewer*.

2015 – now **Journal of Low Temperature Physics**, *Reviewer*.

Scientific projects

2015 **Regione Sardegna Call for Base Science projects**, *Reviewer*.

2013 **Regione Sardegna Call for Base Science projects**, *Reviewer*.

2013 **FIRB Call**, *Reviewer*.

2012 **PRIN Call**, *Reviewer*.

2012 **Regione Sardegna Call for Base Science projects**, *Reviewer*.

Committees

International conferences

2013 **International Conference "The universe seen by Planck**, *Member of the Scientific Committee*.

1993–1995 **International Symposium on Reservoir Wettability and its Effect on Oir Recovery (2nd, 3rd and 4th editions)**, *Member of the Scientific Committee*.

Personnel selection

2018 **Selection for a University Researcher(University of Milano Bicocca)**, *Member of the selection Committee*.

2004–now **Selections for several (>20) post-doc positions at the University of Milan**, *Member of the selection Committee*.

Teaching

PhD courses

2012 – 2016 **Science communication**.
The course was aimed at the students of the first year of their PhD in Physics and had the goal to train them towards an effective oral and written communication of science among peers.

MSc courses

2017 – now **Radio Astronomy**.
This is a two-semester course with the objective to provide the key knowledge of instruments and methods used in astronomical observations from radio to sub-millimetric waves, and to overview the main astronomical observations at these frequencies discussing the key astrophysical questions.

2006 – now **Laboratory of space instrumentation**.
The course aims at providing the basic know-how about scientific instruments used in astrophysical space mission, with particular reference to active and passive microwave components used in cosmic microwave background measurements.

BSc courses

2005 – 2017 **Introduction to astrophysics (2nd module)**.
The first half of this 14-hours module deals with the main experimental issues in celestial observation, while the second part provides a brief introduction to cosmology and cosmological observations.

2013 – now **Applied Physics - 2nd module (for the degree in Food Service Management and Human Nutrition)**.
This 24-hours module is addressed to 1st year students and deals with electromagnetic and heat transport mechanisms as well as their applications to the food industry.

Tutoring

2006 – now **6 PhD students**, *(Three still ongoing)*.

2001 – now **20 MSc students**.

2005 – now **23 BSc students**.

Communication and outreach

2002 – now **About 50 popular conferences for schools and general public**.
A non exhaustive list of these conferences from 2005 to 2016 is available at this url: `http://cosmo.fisica.unimi.it/divulgazione/`.

2016 – now **Member of the scientific committee of the Milano Planetarium Urlico Hoepli**.
See: `http://lofficina.eu/comitato-scientifico-lofficina-del-planetario-di-milano/`.

2014, 2015 **Summer camp "La radio del cosmo" - 1st and 2nd editions**, *Scientific organization*.
A week-long Summer camp on the Sardinia Radio Telescope site dedicated to high-school students to study Radio Astronomy and learn about one of the most advanced radio telescopes in the world, See `http://www.sterrenlab.com/camps/la-radio-nel-cosmo-2014/` and `http://www.sterrenlab.com/camps/la-radio-nel-cosmo/`

2013 **Sky-FM**, *Organizer, presenter*.
A series of public seminars on Radio Astronomy presented at the Milano Planetarium Urlico Hoepli. See `http://cosmo.fisica.unimi.it/divulgazione/sky-fm/`

2011 **Radio Big Bang**, *Writer, actor*.
An 8-minutes demo aimed at the production of a docu-film about cosmology and astrophysics, Produced in collaboration with TicoFilm (`www.ticofilm.com`). Video available at `http://vimeo.com/39332518`

2009 **International Film Festival "Vedere la scienza"**, *Member of the jury*.
Vedere la Scienza Festival is an international event open to the public. A whole week of films, documentaries and videos dedicated to science. See `http://www.brera.unimi.it/film/en/index.php?arg1=0000000001`

Awards

2018 **RAS Group Achievement Award**, *(Planck Collaboration)*.

2014 **NERSC Award for High Impact Scientific Achievement**, *(Planck Collaboration)*.

2010 **ESA Award for achievements in Planck**, *(Planck Collaboration)*.

Languages

Italian **Native Speaker**

English **Advanced**

French **Basic**