

Curriculum Vitae

Mario Zannoni

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- DATE AND PLACE OF BIRTH

May 2nd, 1969 Milano, Italy.

- IMPACT OF RESEARCH

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Education

- 1988: Scientific High School Diploma (56/60)
- 1994: Master Degree in Physics cum Laude at the University of Milano.
- 2000: PhD in Astronomy at the University of Milano.

Scholarships:

- 1994-95: Research Grant Interuniversity Consortium for Space Physics.
- 1996-1999: Ministerial PhD Scholarship.
- 12/1998-02/1999: PNRA scholarship at the CONCORDIA base in Antarctica during the XIV Expedition.

Job Positions:

- 01/2000-07/2002: Post-Doc at the University of Milano Bicocca.
- 07/2002-03/2005: Researcher at the IASF-INAF in Milano.
- 03/2005-05/2021: Staff Researcher in astrophysics (FIS05) at the University of Milano Bicocca.
- 06/2021-current: Associate Professor of astrophysics (FIS05) at the University of Milano Bicocca.

Collaborations with other research institutions:

- INAF Associate since 2005
- INFN Associate since 2014.
- NASA-JPL affiliate from 2012 to 2016.
- Visiting Scientist at the University of Paris Diderot in 2013.

Main scientific interests:

- Experimental cosmology (Microwave Background Radiation CMB)
 - o residual polarization (LSPE, QUBIC, LiteBIRD, Simons Observatory)
 - o S-Z effect (Olympus experiment, SAGACE, MILLIMETER)
 - o spectral distortions (TRIS experiment, COSMO)
- Propagation of cosmic rays in the heliosphere and study of the population of electrons and positrons in cosmic rays with the AMS02 experiment.
- Development of astronomical instrumentation:
 - o microwave polarimeters
 - o coherent detectors for millimeter and sub-millimeter astronomy (SIS)
 - o superconducting detectors (MKIDs, TES, STJ)
 - o millimeter and submillimeter optics
 - o robotic telescopes for the follow-up of GRB (PI deputy of the PRIN funded PATHOS project).

Responsibilities:

- **Head of the Cryogenics and Microwave Laboratory** of the Department of Physics of the University of Milano Bicocca. In the lab high sensitivity detectors front-end for millimetric astronomy are designed

and tested both at room and cryogenic temperature. The high-quality instrumentation available covering a huge range in frequency (DC-325 GHz) and temperature (from room down to 4K) has been bought during the last 20 years thanks to internal competitions (Grandi Attrezzature), national agencies funding (MUR, PNRA, ASI, INFN) and private companies (mainly aerospace industries) R&D contracts.

- **Head of the Laboratory of Analog and Digital Electronics for astrophysics** of the Department of Physics of the University of Milan Bicocca. In this lab the electronics to drive and acquire state of the art devices is designed, manufactured in house and tested. Examples of state-of-the-art devices are HEMT-LNAs, mKIDs and TES detectors.
- **LiteBIRD Program Full Member:** responsible for the realization of the SQUID control electronics of all telescopes on board the satellite. LiteBIRD the Lite (Light) satellite for the study of B-mode polarization and Inflation from cosmic background Radiation Detection, is a space mission for primordial cosmology and fundamental physics. LiteBIRD is planned to orbit the Sun-Earth Lagrangian point L2, where it will map the cosmic microwave background (CMB) polarization over the entire sky for three years. The primary scientific objective of LiteBIRD is to search for the signal from cosmic inflation, either making a discovery or ruling out well-motivated inflationary models. Within the Italian contribution to the project, the actual responsibility of the Milano-Bicocca team is the design, test and space qualification of squid control electronic boards used to amplify the superconducting detectors' signals. Within this context the evaluation of systematic effect induced by cosmic rays on the superconductive detectors is one of the core activities together with the calibrations of the instrumental polarization. LiteBIRD is planned to fly at the end of 2020's.
- **AMS-02 collaboration member.** AMS-02 is the state-of-the-art cosmic rays detector operating on the international space station since June 2011. Its high precision, due to its high acceptance and detectors redundancy, allows exploring fine structures in cosmic rays spectra at GV rigidity and low abundance ions at high rigidity (TV). The major contribution was the analysis focused on proton and helium fluxes from May 2011 to May 2017 in the rigidity range from 1 to 60 GV. This measurement was in solar cycle 24, which has the solar maximum in April 2014. The measurements allow identifying fine time structures nearly identical in both time and relative amplitude that provides important pieces of information to review the model of solar modulation of galactic cosmic rays. AMS-02 is taking data since May 16th 2011.
- **Instrument Scientist, Site Manager and Co-Investigator** of the ASI **STRIP-LSPE** experiment. ASI LSPE is a program to map a large fraction of the sky from 40 to 240 GHz in order to look for B-mode CMB polarization signals. STRIP is the HEMT based low frequency instrument (40 and 90 GHz) to be operated from Teide Observatory in Tenerife. Aim of STRIP is to map the synchrotron emission of the sky for an unprecedented accuracy on foreground removal. STRIP will start to observe the sky in the SPRIN 2023.
- **Col and Leader of the Milan Bicocca Unit** of the **QUBIC** experiment. QUBIC is an instrument designed and realized by international collaboration to look for B modes of the CMB with a novel architecture based on bolometric interferometry. The Bicocca unit is in charge of the cryogenic optics and the shutters array to perform the self-calibration of the interferometer. QUBIC will observe the sky starting from the Austral summer 2022.
- **Col and Head of the Milan Bicocca Unit** of the PRIN 2017 call COSMO. COSMO is an experiment to look for CMB spectral distortion by means of a cryogenic Martin-Puplett interferometer. The focal plane detectors are mKID for which the Bicocca team is responsible of the readout electronics. COSMO is foreseen to observe from Concordia Station (Antarctica) starting from Austral summer 2024-2025.
- **Member of the SIMONS Observatory collaboration.** The Simons Observatory is an international collaboration which is building 4 telescopes to look for CMB B-modes from the Atacama desert in Chile.

The Milano-Bicocca team is responsible for providing a polarized calibration source at 100 GHz to be flown onboard a drone to calibrate the polarization angle of the four telescopes. The Simons Observatory will start to observe the sky in 2023.

Editorial Activities:

- Referee for scientific papers
 - o Astronomy and Astrophysics
 - o Journal of Instrumentation
 - o Journal of Low Temperature Physics.

Publications:

Author of more than 150 scientific publications with more than 2000 citations. H-index 25 – SCOPUS. (March 2022)