

CURRICULUM VITAE

Personal Information

Surname / First name Columbro Fabio
Date of birth June 22th, 1992

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Current University Education and Training


Dates (from) Nov 2016
Name and type of organization Department of Physics,
University of Rome La Sapienza
Title of qualification sought for PhD in Astronomy, Astrophysics & Space Science

Previous University Education and Training

Dates (from - to) Oct 2014 – Oct 2016
Name and type of organization Department of Physics,
University of Rome La Sapienza
Title of qualification sought for Master's Degree (110/110 *cum laude*) in
Astronomy and Astrophysics

Dates (from - to) Jul 2015 - Oct 2015
Name and type of organization Department of Physics,
Columbia University in the City of New York
Title of qualification awarded ASI/ISSNAFF Scholarship

Dates (from - to) Oct 2011 – Sep 2014
Name and type of organization Department of Physics, University of Rome La Sapienza
University of Rome La Sapienza
Title of qualification awarded Bachelor's Degree (110/110 *cum laude*) in
Physics and Astrophysics



Other Experience

- 2018 Co-tutor of laboratory experiences (Master's Degree)
"Superconducting magnetic bearing for CMB measurements"
- 2017 40 hours as assistant of Astrophysics Laboratory.
(Prof. E. Battistelli).
- 2015 – 2016 Tutor at laboratories in University of Rome La Sapienza:
- 2016 80 hours as tutor of Astrophysics Laboratory
(Prof. P. de Bernardis and C. Rossi).
30 hours as tutor of Signals and Systems Laboratory I
(Prof. A. Nigro and Prof. M. Vignati).
40 hours as tutor of Signals and Systems Laboratory II
(Prof. A. Nigro).
- 2015 60 hours as tutor of Astrophysics Laboratory
(Prof. P. de Bernardis and C. Rossi).
90 hours as tutor of Signals and Systems Laboratory I
(Prof. A. Nigro and Prof. M. Vignati).
- 2015 – 2016 Excellence Program (Master's degree):
– Simulation of accretion in Low-Mass X-ray Binaries – Prof. L. Stella
- 2012 – 2014 Excellence Program (Bachelor's degree):
— Properties of Zeta function and Riemann hypothesis – Dr. F. Cesi
— Fourier transform interferometry and DFTS of the OLIMPO
experiment – Prof. P. de Bernardis
— Primordial gravitational waves – Dr. L. Lamagna
- 2011 National stage of Mathematical Olympiad
- 2002 – 2010 Master's degree in oboe, from the "Luisa D'Annunzio" conservatory
in Pescara

Research Experience

Supported by ASI/ISSNAF scholarship I had worked for 10 weeks in the experimental cosmology group at Columbia University under the supervision of Prof. B. Johnson and Dr. M. Limon. My project focused on implementing and testing a new kind of encoder technology which measured the orientation of a cryogenic motor based on a superconducting magnetic bearing recently developed for CMB polarization studies. After these tests that allowed to understand advantages and disadvantages of this technology, I started the design of a new superconducting magnetic bearing for LSPE experiment for the Master's thesis under the supervision of Prof. P. de Bernardis and carrying on this project as the main topic during the PhD program in *Astronomy, Astrophysics and Space*

Science.

Furthermore during the PhD program I'm working on the electronics and on the code of the QUBIC half-wave-plate. This is a classic step rotation system with a room temperature motor connected with the cryogenic stage through a fiberglass shaft which is coupled with a pulley which transmits the rotation to the HWP through a kevlar belt. Finally the third activity I'm carrying on is the test of multi-mode horns and TES detectors firstly at room temperature in an anechoic chamber and in a cryogenic testbed.

I'm also involved in the OLIMPO experiment. During the course of *Astrophysics Laboratory* I took part in the calibration and characterization of KIDs (Kinetic Inductance Detectors) detectors to define the effective quality of resonators as light detector. Within the Excellence Program (see below) during my Bachelor's degree I was involved in aligning the mirrors inside DFTS (Differential Fourier Transform Spectrometer), in extracting the spectra from the interferograms and digitally filtering them to obtain noiseless data and in studying the instrument's resolution and optical response. The whole analysis was conducted by using of IDL.

Additional Information

I have been working at the Laboratories of the Department of Physics as assistant and tutor in the courses of Astrophysics Laboratory, Signals and Systems Laboratory I and II (detailed in Other Experience) since 2015.

I'm collaborating with Dr. L. Stella (INAF) and Prof. G. Ponti (Max Planck Institute) in numerical simulation about a thermal wind in the accretion disk of Low-mass X-ray binaries.

My Master's thesis was titled *A cryogenic polarimeter using a half-wave-plate rotating on superconducting magnetic bearings*. On that occasion, my supervisor was Prof. P. de Bernardis, while Prof. F. Piancentini was my referee. I graduated with 110/110 *cum laude*.

My Bachelor's thesis was titled *The polarization of cosmic microwave background*. On that occasion, my supervisor was Dr. L. Lamagna, while Prof. M. De Petris was my referee. I graduated with 110/110 *cum laude*.

Computing Experience

I can use the following computing languages: C, C++, Fortran, IDL (*Interactive Data Language*), Mathematica, Python.

I analyse data by using both commercial software (e.g. OriginLab or IRAF for image reduction) and self-made programs, mostly written in IDL and Python.

Finally I can use the following simulation software: SOLIDWORKS, COMSOL, Zemax, MATLAB. I can handle quite good with ARDUINO and RASPBERRY.

Publications

- B. R. Johnson, **F. Columbro**, D. Araujo, M. Limon, B. Smiley, G. Jones, B. Reichborn-Kjennerud, A. Miller, and S. Gupta. *A large-diameter hollow-shaft cryogenic motor based on a superconducting magnetic bearing for millimeter-wave polarimetry*, Review of Scientific Instruments, 88, 105102 (2017), doi:10.1063/1.4990884.
- QUBIC Collaboration. *QUBIC - The Q&U Bolometric Interferometer for Cosmology - A novel way to look at the polarized Cosmic Microwave Background*, Accepted for publication in EPS conference proceedings, arXiv:1801.03730v1
- P. de Bernardis, et al. (CORE collaboration). *Exploring Cosmic Origins with CORE: The Instrument* (2017). To be submitted, arXiv:1705.02170.
- I. Colantoni; E. Stefano Battistelli; **F. Columbro**; M. G. Castellano; A. Coppolecchia; G. D'Alessandro; P. De Bernardis; C. Franceschet; M. Gervasi; L. Lamagna; S. Mandelli; J. Martelli; S. Masi; A. Mennella; A. Paiella; F. Piacentini; G. Presta; E. Tommasi; A. Volpe; M. Zannoni. *Kinetic Inductance Detector for Space*, Journal of Low Temperature Physics (2017).

University Courses and Scores

COURSE	SCORE
Bachelor's degree program	
Calculus Laboratory	30/30
Calculus	30/30 <i>cum laude</i>
Mechanics	30/30 <i>cum laude</i>
Geometry	27/30
Chemistry	28/30
Mechanics Laboratory	30/30 <i>cum laude</i>
Vectorial Calculus	30/30 <i>cum laude</i>
Astronomy	30/30
Thermodynamics and Laboratory	30/30 <i>cum laude</i>
Celestial Mechanics	30/30
Electromagnetism and Circuits Laboratory	30/30
Mathematical Methods of Physics	30/30
Electromagnetism	23/30
Complements of Mathematical Methods of Physics	30/30
Quantum Mechanics	27/30
Numerical Methods of Astronomy	30/30
Statistical Mechanics	30/30
Astrophysics	30/30 <i>cum laude</i>
English Language I	Qualified
English Language II	Qualified
Nuclear and Sub-nuclear Physics	27/30
Astrophysics Laboratory	30/30
Structure of Matter	28/30
Master's degree program	
Astrophysical Plasmas and Processes	30/30
General Relativity	28/30
Theoretical Astrophysics	30/30
Stellar Astrophysics	28/30
Observational Cosmology	30/30
Physical Cosmology	30/30 <i>cum laude</i>
Astronomical Optics	30/30 <i>cum laude</i>
Astrophysics Laboratory	30/30
Methods of Space Astrophysics	30/30 <i>cum laude</i>
Advanced Calculus Laboratory	30/30 <i>cum laude</i>
Advanced Physics	28/30
Internship	Qualified
High Energy Astrophysics	30/30 <i>cum laude</i>

