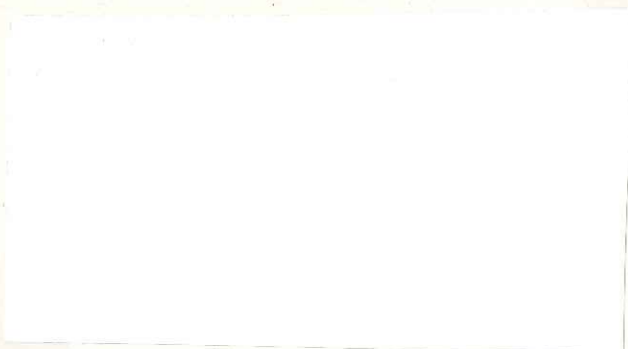


# CURRICULUM VITAE



## Current University Education and Training

Dates (from - to) Nov 2016 - Oct 2019  
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

## Grants

2018 Young research project grant program 2018/19  
2017 KICP grant for "CMB Detectors and Instrumentation" summer school (Chicago)  
2017 Young research project grant program 2017/18  
2015 ASI/ISSNAFF Scholarship

## Thesis Information

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*.

My research activity started in 2015 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 Prof. 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-SWIPE experiment for the Master's thesis under the supervision of Prof. P. de Bernardis. This was the main topic of my Master's thesis which was titled *A cryogenic polarimeter using a half-wave-plate rotating on superconducting magnetic*

*Luca Calzavara*

bearings. On that occasion, my supervisor was Prof. P. de Bernardis, while Prof. F. Piantentini was my referee. I graduated with 110/110 *cum laude*.

I kept on working on this project during the PhD program in *Astronomy, Astrophysics and Space Science*. My thesis is mainly focused on the development of SWIPE instrument, from the polarization modulator to detectors characterization.

Furthermore in our research group in Rome we have developed and collaborated in lots of experiments so I have had the opportunity to give my contribution in the development of the polarization modulators of LiteBIRD and QUBIC, in the optical alignment and measurement during the launch and testing campaign of OLIMPO balloon-borne telescope and in the development of the modulation system of the COSMO cryogenic spectrometer.

## Teaching and other experiences

- 2017 -2018 Course assistant:
  - 2018 40 hours as assistant of Computational Physics Laboratory (Dr. M. C. Angelini)
  - 40 hours as assistant of Astrophysics Laboratory (Prof. E. S. Battistelli).
- 2017 40 hours as assistant of Astrophysics Laboratory (Prof. E. S. Battistelli).
- 2017 - 2018 Supervisor of laboratory experience (Master's Degree)  
"Superconducting magnetic bearing for CMB measurements"
- 2015 - 2016 Tutor at laboratories in University of Rome La Sapienza:
  - 2016 80 hours as tutor of Astrophysics Laboratory (Prof. P. de Bernardis and Prof. 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 Prof. 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

## Computer Skills

- Programming languages: C, C++, Fortran, IDL (*Interactive Data Language*), Mathematica, Python.
- Commercial software: IRAF, LABVIEW, OriginLab
- Simulation software: COMSOL, MATLAB, SOLIDWORKS, Zemax.
- Single-board Computer: ARDUINO, RASPBERRY.

## Invited Talks & Conference Presentations

- F. Columbro on behalf of LSPE collaboration. "The primordial B-modes search in the CMB polarization with LSPE/SWIPE". *8th International Workshop on Astronomy and Relativistic Astrophysics (IWARA2018)*, Ollantaytambo, September 10, 2018.
- F. Columbro on behalf of QUBIC collaboration. "The QUBIC Experiment". *15th Marcel Grossmann Meeting (MG15)*, Rome, July 2, 2018.
- F. Columbro on behalf of LSPE collaboration. "SWIPE-LSPE: Cosmic Microwave Background Polarimetry in the Polar Night". *XXXV SCAR Biennial Meetings (POLAR2018)*, Davos, June 19, 2018.
- F. Columbro. "HWP modulator in Rome". *The 2nd B Mode from Space in Berkeley*, Berkeley, December 5, 2017.





## Publications

- F. Colombo, E. S. Battistelli, A. Coppolecchia, G. D'Alessandro, P. de Bernardis, L. Lamagna, S. Masi, L. Pagano, A. Paiella, F. Piacentini and G. Presta. *The short wavelength instrument for the polarization explorer balloon-borne experiment: Polarization modulation issues*, Proceedings of IWARA2018 (2019), doi:10.1002/asna.201913566.
- A. Mennella, et al. (QUBIC Collaboration). *QUBIC: Exploring the Primordial Universe with the Q and U Bolometric Interferometer*, Proceedings of ICNFP (2018), doi:10.3390/universe5020042.
- A. Paiella, A. Coppolecchia, L. Lamagna, P. A. R. Ade, E. S. Battistelli, M. G. Castellano, I. Colantoni, F. Colombo, G. D'Alessandro, P. de Bernardis, S. Gordon, S. Masi, P. Mauskopf, G. Pettinari, F. Piacentini, G. Pisano, G. Presta and C. Tucker. *Kinetic Inductance Detectors for the OLIMPO experiment: design and pre-flight characterization*, Journal of Cosmology and Astroparticle Physics (2019), doi:10.1088/1475-7516/2019/01/039.
- F. Colombo, P. de Bernardis and S. Masi. *A clamp and release system for superconducting magnetic bearings*, accepted for publication in Review of Scientific Instruments (2018), doi:10.1063/1.5035332.
- P. de Bernardis, et al. (CORE Collaboration). *Exploring Cosmic Origins with CORE: The Instrument*, Journal of Cosmology and Astroparticle Physics (JCAP), April, (2018), doi:10.1088/issn.1475-7516.
- A. Paiella, E. S. Battistelli, F. Colombo, M. G. Castellano, I. Colantoni, S. Gordon, P. Mauskopf, A. Coppolecchia, G. D'Alessandro, P. de Bernardis, L. Lamagna, S. Masi, F. Piacentini. *Design and Electrical Performance of the Kinetic Inductance Detectors of the OLIMPO Experiment*, ISEC 2017 (2018), doi:10.1109/ISEC.2017.8314223.
- P. de Bernardis, et al. (QUBIC Collaboration). *QUBIC: Measuring CMB polarization from Argentina*, Boletín de la Asociación Argentina de Astronomía La Plata Argentina (2018).
- A. J. May, et al. (QUBIC Collaboration). *Thermal architecture for the QUBIC cryogenic receiver*, Proceedings of SPIE (2018), doi:10.1117/12.2312085.
- Y. Sekimoto, et al. (LiteBIRD Collaboration). *Concept design of the LiteBIRD satellite for CMB B-mode polarization*, Proceedings of SPIE (2018), doi:10.1117/12.2313432.
- D. Burke, et al. (QUBIC Collaboration). *Optical modelling and analysis of the Q and U bolometric interferometer for cosmology*, Proceedings of SPIE (2018), doi:10.1117/12.2287158.
- C. O'Sullivan, et al. (QUBIC Collaboration). *Simulations and performance of the QUBIC optical beam combiner*, Proceedings of SPIE (2018), doi:10.1117/12.2313256.
- C. O'Sullivan, et al. (QUBIC Collaboration). *QUBIC: The Q and U bolometric interferometer for cosmology*, Proceedings of SPIE (2018), doi:10.1117/12.2313332.
- M. Salatino, et al. (QUBIC Collaboration). *Performance of NbSi transition-edge sensors readout with a 128 MUX factor for the QUBIC experiment*, Proceedings of SPIE (2018), doi:10.1117/12.2312080.
- B. R. Johnson, F. Colombo, 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.
- A. Mennella, et al. (QUBIC Collaboration). *Qubic - The Q and U bolometric interferometer for cosmology - a novel way to look at the polarized cosmic microwave background*, Proceeding of Science (2017), doi:10.22323/1.314.0044.

Barbara Colombo