

Dr. Giuseppe Puglisi

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CONTACT INFORMATION

Postdoc at Stanford
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RESEARCH INTERESTS

Observational cosmology. Data-analysis for Cosmic Microwave Background (CMB) polarization experiments (map-making, observation systematics, foreground cleaning), estimation of cosmological parameters and forecasting.

Modelling Galactic and Extragalactic Emission at the microwave and sub-millimetric frequencies. Modelling the polarized emission coming from synchrotron, thermal dust, molecular line processes contaminating the CMB signal at large angular scales. Forecast of polarized emission from radio galaxies.

Developer of public packages

- COSmic Microwave linear Operator for MAP-making (COSMOMAP)
- Monte-Carlo MOlecular Line Emission 3D (MCMOLE3D)
- Point Source ForeCast (PS4C)

ACADEMIC APPOINTMENTS

Postdoc at Stanford University

- Period: January 2017- December 2019
- Referee: Prof. Chao-Lin Kuo
- Focus: Data Analysis for sub-orbital and ground based CMB polarization experiment

RESEARCH EXPERIENCES

PhD in Astrophysics

<http://www.sissa.it/ap>

- Period: November, 2013 - October, 2017
- Title: *B-mode Polarization Experiments for the Cosmic Microwave Background: Map-making and Foreground Modeling*
- Advisors: Prof. Carlo Baccigalupi (SISSA), Dr. Giulio Fabbian (IAP-Paris)
- Opponents: Prof. Paolo Natoli, Dr. Ingunn Wehus

Master's Degree in High Performance Computing - Research Project

Period: May 2015 - December, 16th 2016

Institutions: SISSA, ICTP

Title: *Accelerating CMB Maps production with Deflation Preconditioners*

Advisors: Dr. Luca Heltai, Prof. Carlo Baccigalupi, Dr. Giulio Fabbian (SISSA)

Master's Degree in Physics - Thesis

Period: July 2012 - April 2013

Institutions: Dipartimento di Fisica, Università degli Studi di Milano, Istituto di Astrofisica Spaziale e Fisica Cosmica - Bologna

Title: *Component Separation for CMB Polarization Experiments*

Advisors: Prof. Davide Maino, Prof. Marco Bersanelli, Dr. Sara Ricciardi

Area of study: Polarization of Cosmic Microwave Background, polarized foreground (synchrotron, thermal dust) emission, ICA and CCA Component Separation Methods

Defense: 16th April 2013

Bachelor's Degree in Physics - Thesis

Period: July 2010 - November 2010

Institutions: Università degli Studi di Catania, Dipartimento di Fisica e di Astronomia

Title: *Cosmological Implications from weak Supernovae Ia*
Advisors: Prof. Lucio Paternó, Dr. Cosimo Inserra
Area of Study: Observational cosmology, Cepheid calibration
Defense: 18th November 2010

SCHOLARSHIPS AND Dean “Key to Europe Erasmus Traineeship Training Students”

AWARDS

(June 2016-September 2016) AstroParticule et Cosmology (APC), Paris
Research field: Data-analysis for ground based CMB experiments
Focus: Noise estimation and mapmaking for Polarbear experiment
Supervisor: Dr. Radek Stompor

Undergrad scholarship

Period: July 2013-November 2013
Institutions: International School for Advanced Studies (SISSA), Trieste
Research field: Forecast of polarized Galactic emission and parametric component separation for sub-orbital CMB experiments.
Supervisor: Prof. Carlo Baccigalupi

REFEREED JOURNAL
PUBLICATIONS

- [1] The POLARBEAR Collaboration, (2017). A Measurement of the Cosmic Microwave Background BB-Mode Polarization Power Spectrum at Sub-Degree Scales from 2 years of POLARBEAR Data, arXiv:1705.02907
- [2] Puglisi, G., Fabbian, G., Baccigalupi, C., (2017). A 3D model for carbon monoxide molecular line emission as a potential cosmic microwave background polarization contaminant, *Mon.Not.Roy.Astron.Soc.* 469 (2017) no.3, 2982-2996 STX1029 doi: 10.1093/mnras/stx1029
- [3] Takakura, S., Aguilar, M., Akiba, Y., Arnold, K., Baccigalupi, C., et al., (2017). Performance of a continuously rotating half-wave plate on the POLARBEAR telescope, *JCAP* 1705 (2017) no.05, 008 doi: 10.1088/1475-7516/2017/05/008
- [4] Poletti, D., Fabbian, G., Jeune, M. Le, Peloton, J., Arnold, K., Baccigalupi, C., et al., (2016). Making maps of Cosmic Microwave Background polarization for B-mode studies: the POLARBEAR example. *Astron.Astrophys.* 600 (2017) A60. doi: 10.1051/0004-6361/201629467
- [5] Suzuki, A., Ade, P., Akiba, Y., Aleman, C., Arnold, K., Baccigalupi, C., et al., (2016). The Polarbear-2 and the Simons Array Experiments. *Journal of Low Temperature Physics.* doi: 10.1007/s10909-015-1425-4
- [6] Inoue, Y., Ade, P., Akiba, Y., Aleman, C., Arnold, K., Baccigalupi, C., et al., (2016). POLARBEAR-2: an instrument for CMB polarization measurements. *Proc.SPIE Int.Soc.Opt.Eng.* 9914. DOI: 10.1117/12.2231961
- [7] Stebor, N., Ade, P., Akiba, Y., Aleman, C., Arnold, K., Baccigalupi, C., et al., (2016). The Simons Array CMB polarization experiment. In W. S. Holland and J. Zmuidzinas (Eds.), *Proc.SPIE Int.Soc.Opt.Eng.* (Vol. 9914, p. 99141H). <http://doi.org/10.1117/12.2233103>
- [8] The EBEX Collaboration (2016). Temperature calibration of the E and B experiment, arXiv:1601.07923
- [9] The POLARBEAR Collaboration (2015). POLARBEAR constraints on cosmic birefringence and primordial magnetic fields. *Physical Review D*, 92(12), 123509. doi:10.1103/PhysRevD.92.123509.
- [10] Errard, J. and the Polarbear Collaboration (2015). Modelling atmospheric emission for CMB ground-based observations. *The Astrophysical Journal*, 809(1), 63. doi:10.1088/0004-637X/809/1/63

SUBMITTED
PUBLICATIONS

[11] Puglisi, G., Poletti, D., Fabbian, G., Baccigalupi, C., Heltai, L. and Stompor, R., (2018). *Iterative map-making with two-level preconditioning for polarized Cosmic Microwave Background data sets*, eprint arXiv:1801.08937

[12] G. Puglisi, V. Galluzzi, M. Massardi, F. Perrotta, A. Lapi, L. Danese, C. Baccigalupi, (2017). *Forecasting the Contribution of Polarized Extragalactic Radio Sources in CMB observations*, eprint arXiv:1712.09639

CONFERENCE
PUBLICATIONS AND
PROCEEDINGS

[13] Inoue, Y., Ade, P., Akiba, Y., Aleman, C., Arnold, K., Baccigalupi, C., . . . , Zahn, O. (2016). POLARBEAR-2: an instrument for CMB polarization measurements. Proc.SPIE Int.Soc.Opt.Eng. 9914. DOI: 10.1117/12.2231961

[14] Stebor, N., Ade, P., Akiba, Y., Aleman, C., Arnold, K., Baccigalupi, C., . . . , Zahn, O. (2016). The Simons Array CMB polarization experiment. In W. S. Holland and J. Zmuidzinas (Eds.), Proc.SPIE Int.Soc.Opt.Eng. (Vol. 9914, p. 99141H). <http://doi.org/10.1117/12.2233103>

MENTORING

Co-advisor of Master Thesis

- Li Yang and Li Siyu (Beijing University), in collaboration with prof. Jun-Qing Xia (Beijing University-IHEP) and prof. Carlo Baccigalupi (SISSA)
Period: September-October 2015
Focus: Atmospheric forecasts for the Ali Station (Tibet) proposal to observe CMB polarization B-modes.
- Alberto Annoni (Univ. Milan), in collaboration with prof. Carlo Baccigalupi, Dr. Giulio Fabbian (SISSA), prof. Aniello Mennella and Dr. Nicoletta Krachmalnicoff (Univ. Milan)
Period: July 2015 - April 2016
Focus: Cross-Correlation of Thermal Dust and Synchrotron polarization maps.

PROFESSIONAL
MEMBERSHIPS

- Member of Polarbear and Simons Array Collaboration, since December 2014
- Member of Simons Observatory Collaboration, since October 2016
- Member of National Institute for Nuclear Physics (INFN), since January 2014

EDUCATION

Master in High Performance Computing SISSA - ICTP

<http://www.mhpc.it>

Period: September 2014- May 2015

Thesis Defense: December, 16th 2016

MSC in Physics, curriculum of Astrophysics, ("Laurea Magistrale"), 110/110

Università degli Studi di Milano

Final GPA: **28.85/30** with 2 special mentions

18th October 2010 - 16th April 2013

Bachelor in Physics, curriculum of General Physics, 110/110 cum laude

Università degli studi di Catania

Final GPA: **28.8/30** with 4 special mentions

10th October 2007 - 18th November 2010

Musical Studies Degree for Clarinet, Final Score: 8/10

2003 - 2010 Istituto Musicale "V. Bellini" di Catania

CONFERENCES AND
PHD SCHOOLS

- *New challenges in Cosmic Microwave Background studies*
30 March 2016, Italian CMB-day workshop, Italian Space Agency (ASI) Rome
- *Workshop on High Performance Computing*,
24-26 February 2016, SISSA - Trieste

- *First ICTP Advanced School on Cosmology*, 18-29 May 2015, ICTP - Trieste
- *PhD School of Astrophysics Francesco Lucchin*, 15-20 September 2013, Gaeta - Italy
- *New Light in Cosmology from the CMB School & Workshop* 22th July - 2nd August 2013, ICTP - Trieste

CONFERENCE AND INVITED TALKS [15] CMB B-mode Polarization Experiments and Galactic Foreground Modelling. Invited talk at *University of Bologna , Astrophysics Dept., Istituto di Fisica Cosmica (IASF) and Istituto di Radio Astronomia (IRA)*, October, 5th 2017

[16] A 3D model for CO molecular line emission as a potential CMB polarization contaminant. In: *AstroTS Conference*, September 25-27 2017, SISSA Trieste

LANGUAGES Italian **Native**
English **Fluent**
French **Good**

COMPUTER SKILLS AND COMPETENCES

- **Programming Languages:** C, C++, Fortran, Python, parallel computing (OpenMP, OpenMPI, etc...), Mathematica, IDL, Bash scripting
- Developer of COSMOMAP2 and MCMOLE3D packages soon to be released to the scientific community. The former provides a toolkit to produce maps for ground based CMB polarization experiments. The latter code simulates the distribution of molecular clouds in the Milky Way.
- **Operating systems:** LINUX, Macintosh, Windows
- **Productivity applications:** Installation of Scientific libraries, \TeX , Gnuplot, GIT

EDUCATIONAL OUTREACH

- 2013-2016 I have actively participated in a plethora of outreach activities organized in SISSA: **SISSA for Schools** (monthly meetings with students in primary schools), **SISSA High-School** Open-Days, **Trieste-Next**, **Science Picnic** (organized by ICTP and SISSA), **SISSA in Festa** (outreach event open to all the people in Trieste)
- December, 16th 2015: I participated at a Radio transmission at RadioCapodistria (Koper, Slovenia): "*The echo of Big Bang*"
- November, 9th-13th 2015: JCOM Masterclasses training course, "Communicating your own research to many audiences".
- April, 19th 2015, "Quando la passione per la verita' conta piu della competizione" Chairman of a public meeting with prof. Carlo Baccigalupi, Dr. Giulio Fabbian (SISSA) and prof. Giovanni Comelli (Univ. of Trieste) organized by the *TriesteIncontra* association.
- 2011-2012: Introductory Astronomy lectures to high school classes *Liceo Scientifico Galileo Galilei* and *Istituto Sant'Orsola* Catania
- 2010-now: Member of the *Euresis Association* for the promotion of scientific endeavour. I contributed to the preparation of scientific outreach exhibition ("*Is the atom really invisible? Questions and certainties in science*") presented at the *Rimini Meeting 2011*, a one-week cultural event visited by more 800.000 people every year.
- 2010-2013: Tutoring session for undergraduate students (Mathematics and Physics) in *Camplus Residences*

COMMUNITY
SERVICES AND
VOLUNTEER JOBS

- 2014-2016: Student representative of the SISSA PhD courses in the council for Research Fundings of Friuli-Venezia-Giulia region
- 2014-2016: Elected member of the SISSA student council as representative of the Astrophysics Sector
- Since 2004 Volunteer at *Colletta Alimentare* an yearly appointment organized by the Banco Alimentare Foundation which provide to redistribute food to needy families in Italy
- 2008-2010: Elected member, as student representative in the Physics Coordination Committee of the University of Catania (“Consiglio di Coordinamento Didattico”)
- 2007-2012: Volunteer at the centers for disabled support *ODA (Catania)* and *Inst. Sacra Famiglia Cesano Boscone (Milan)*.