

# Federico Bianchini

fbianc@stanford.edu  
<https://fbianchini.github.io/>

## RESEARCH INTERESTS

---

Cosmology: phenomenology and data analysis; Cosmic microwave background; Large-scale structure; Gravitational Lensing; Sunyaev-Zel'dovich effect; Cross-correlations and connections with astrophysics; Cosmological test of fundamental physics; Statistical and computational methods for cosmology

## CURRENT POSITION

---

12/2020-present **KIPAC Postdoctoral Fellow** Advisor: Zeeshan Ahmed  
Kavli Institute of Cosmology and Astroparticle and Stanford University, USA

## PREVIOUS POSITION

---

10/2016-10/2020 **Postdoctoral Fellow** Advisor: Christian L. Reichardt  
School of Physics, University of Melbourne, Australia

## EDUCATION

---

11/2012-9/2016 **Ph.D. in Astrophysics** Supervisor: Carlo Baccigalupi  
Astrophysics Sector, SISSA/ISAS International School for Advanced Studies, Italy

10/2010-7/2012 **Master Degree in Astrophysics** Supervisor: Alessandro Melchiorri  
Department of Physics, University of Rome "La Sapienza", Italy

10/2007-9/2012 **Bachelor Degree in Physics & Astrophysics** Supervisor: Alessandro Melchiorri  
Department of Physics, University of Rome "La Sapienza", Italy

## FELLOWSHIPS AND AWARDS

---

2020 **KIPAC Fellowship at Stanford University**

2020 **INFN Fellini Fellowship** (declined)

2018 **Betty Laby ECR Travel Bursary**

2015 **Erasmus Job Placement Fellowship**

2014 **International Astronomical Union Symposium 306 Travel Grant**

2012 **PhD Scholarship in Astrophysics curriculum, SISSA**

## MENTORED STUDENTS

---

### The University of Melbourne (co-supervised with Dr Christian Reichardt)

2020 – present	Eduardo Schiappucci (PhD candidate)
2018 – 2019	Mitchell Dylan De Zylva (MSc candidate)
2018 – 2018	Bryce Murphy (MSc candidate)
2016 – 2020	Anh Pham Thi Phuong (PhD candidate)

## INSTITUTIONAL RESPONSIBILITIES

---

2019 – 2020	Organizer of the Astrophysics seminar, University of Melbourne, School of Physics, Australia
-------------	--

## PROFESSIONAL ACTIVITIES

---

- Member of the **SPT** collaboration 2016 – present
- Member of the **POLARBEAR** collaboration 2016 – present
- Member of the **Simons Observatory** collaboration 2016 – present
- Member of the **EUCLID** collaboration 2015 – present
- Member of the Astronomical Society of Australia (ASA) 2016 – present
- Member of the Italian National Institute for Nuclear Physics (INFN) 2012 – 2016
- Member of the Italian National Institute for Astrophysics (INAF) 2012 – 2016
- Referee for Nature Astronomy (2018 - present), Astronomy&Astrophysics (2020-present), Monthly Notices of Royal Astronomical Society (2015 - present), Journal of Cosmology and Astroparticle Physics (2020-present), Physical Review Letters (2020-present)

## TECHNICAL SKILLS

---

- Computer languages: Python, C, Fortran (basics), IDL, scripting languages
- Scientific software: HEALPix, CAMB, CosmoMC, CLASS, emcee, PolSpice, scikit-learn, pandas
- Supercomputing: MPI, OpenMP; clusters used: NERSC (USA), Midway (USA), Spartan (Australia)

## OUTREACH AND SERVICE

---

- Talks for year 10 students @ University of Melbourne 2018 - present
- Pint of Science @ Melbourne 2018 - present

## REFERENCES

---

- Prof. Carlo Baccigalupi, SISSA/ISAS, email: [bacci@sissa.it](mailto:bacci@sissa.it)
- Prof. Christian Reichardt, University of Melbourne, email: [christian.reichardt@unimelb.edu.au](mailto:christian.reichardt@unimelb.edu.au)
- Prof. John Carlstrom, University of Chicago, email: [jc@astro.uchicago.edu](mailto:jc@astro.uchicago.edu)
- Prof. Alessandra Silvestri, Leiden University, email: [silvestri@lorentz.leidenuniv.nl](mailto:silvestri@lorentz.leidenuniv.nl)

## PRESENTATIONS AT SCIENTIFIC CONFERENCES

---

Inv. = invited talk; \* = Talk; Pos = Poster; Sem = seminar

- Sem. May 2020, GCCL Zoom Seminar – ‘*Cosmological constraints from the SPTpol CMB lensing power spectrum*’
- Sem. Aug 2019, UC Los Angeles, USA – ‘*Distortions in the Cosmic Microwave Background*’
- Sem. Aug 2019, CCA, Flatiron Institute, USA – ‘*Distortions in the Cosmic Microwave Background*’
- \* July 2019, ASA2019, Brisbane, Australia – ‘*A new CMB lensing measurement from 500 square degrees of SPTpol data*’
- Sem. April 2019, University of Sussex, UK – ‘*Distortions in the Cosmic Microwave Background*’
- Sem. April 2019, SISSA/ISAS, Italy – ‘*Distortions in the Cosmic Microwave Background*’
- Sem. April 2019, Padua Observatory, Italy – ‘*Distortions in the Cosmic Microwave Background*’
- Inv. July 2018, LSS2LSS, Paris Orsay, France – ‘*Measuring peculiar velocities (and more) with the Cosmic Microwave Background*’
- \* July 2017, ASA2017, Canberra, Australia – ‘*A new CMB lensing measurement from 500 square degrees of SPTpol data*’
- Sem. Apr 2017, University of Melbourne, Melbourne, Australia – ‘*Cross-correlations in the high-redshift sky: the Planck and Herschel case*’
- Sem. Nov 2016, Swinburne University of Technology, Melbourne, Australia – ‘*Cross-correlations in the high-redshift sky: the Planck and Herschel case*’
- Sem. Jan 2016, UC Irvine, US, - ‘*Investigating the Universe with Cosmic Microwave Background-Large Scale structure interactions*’
- \* Jan 2016, Statistical sampling and non-sampling methods in cosmology, Berkeley, US – ‘*Towards a tomographic analysis of Planck CMB lensing-Herschel cross-correlation*’
- \* Dec 2015, CMBXC Meeting Italia, Bologna, Italy – ‘*Methods and algorithms for CMB-LSS cross-correlations*’

- \* Sep 2015, Science with LSS and CMB cross-correlations, Merate, Italy – ‘Towards a tomographic analysis of Planck CMB lensing-Herschel cross-correlation’
- \* Jul 2015, 14<sup>th</sup> Marcel Grossmann Meeting, Rome, Italy – ‘Cross-correlations in the high-redshift sky: the Planck and Herschel case’
- Sem. Imperial Centre for Inference and Cosmology, Imperial College London, UK – ‘Cross-correlations in the high-redshift sky: the Planck and Herschel case’
- \* Euclid Consortium Meeting 2015, EPFL, Lausanne, Switzerland – ‘Cross-correlations in the high-redshift sky: the Planck and Herschel case’
- Inv. Jun 2015, ASTRO@TS 2015, Trieste, Italy - – ‘Cross-correlations in the high-redshift sky: the Planck and Herschel case’
- Sem. Instituut-Lorentz for theoretical physics, Leiden, Netherlands – ‘Cross-correlations in the high-redshift sky: the Planck and Herschel case’
- Pos. Dec 2014, PLANCK2014, Ferrara, Italy – ‘Cross-correlating Planck CMB Lensing with high-z sub-mm H-ATLAS galaxies’
- \* Jun 2014, Cross-correlation in the high-redshift sky, London, UK - ‘Cross-correlations in the high-redshift sky: the Planck and Herschel case’
- \* May 2014, Statistical Challenges in 21<sup>st</sup> century cosmology, Lisbon, Portugal – ‘Cross-correlations between cosmological and astrophysical data sets’

## LIST OF PUBLICATIONS

---

36 papers, 32 published, 4 submitted, 6 white papers/conference proceedings, 600+ citations of published papers, according to [Inspire](#)

### i) Publications as Lead Author or with Substantial Contribution

- 12.** “Searching for Anisotropic Cosmic Birefringence with Polarization Data from SPTpol”  
**F. Bianchini**, W.L.K. Wu, ... et al. [72 authors]  
 The Astrophysical Journal, in press (2020)
- 11.** “Constraints on Cosmological Parameters from the 500 deg<sup>2</sup> SPTpol Lensing Power Spectrum”  
**F. Bianchini**, W.L.K. Wu, ... et al. [71 authors]  
 The Astrophysical Journal 888 (2020) 2
- 10.** “Cross-correlation of POLARBEAR CMB Polarization Lensing with High-z Sub-mm Herschel-ATLAS galaxies”  
 M. Aguilar Faúndez, ..., **F. Bianchini**, ... et al. [48 authors – I am the corresponding author]  
 The Astrophysical Journal 886 (2019) 1

9. “*Broadband spectral energy distributions of SDSS-selected quasars and of their host galaxies: intense activity at the onset of AGN feedback*”  
**F. Bianchini**, G. Fabbian, A. Lapi, J. Gonzalez-Nuevo, R. Gilli, C. Baccigalupi  
 The Astrophysical Journal 871 (2019) 136
8. “*Pancakes and fingers in the sky*”  
**F. Bianchini**  
 Nature Astronomy 2 (2018) 942-943
7. “*Imprints of gravitational lensing in the Planck cosmic microwave background data at the location of WISE×SCOS galaxies*”  
 S. Raghunathan, **F. Bianchini**, C. L. Reichardt  
 Physical Review D 98 (2018) 4, 043506
6. “*Constraining gravity at large scales with the 2MASS Photometric Redshift catalogue and Planck lensing*”  
**F. Bianchini** & C. L. Reichardt  
 The Astrophysical Journal 862 (2018) 81
5. “*Where is Population II?*”  
 J. Mould, **F. Bianchini**, D. Forbes, C. L. Reichardt  
 Publications of the Astronomical Society of Australia 35 (2018) e016
4. “*Needlet estimation of cross-correlation between CMB lensing maps and LSS experiments*”  
**F. Bianchini**, A. Renzi, D. Marinucci  
 Journal of Cosmology and Astroparticle Physics 1611 (2016) 11, 050
3. “*Toward a tomographic analysis of the cross-correlation between Planck CMB lensing and H-ATLAS galaxies*”  
**F. Bianchini**, A. Lapi, M. Calabrese, P. Bielewicz, J. Gonzalez-Nuevo, C. Baccigalupi, L. Danese, G. de Zotti, N. Bourne, A. Cooray, L. Dunne, S. Eales, E. Valiante  
 The Astrophysical Journal 825 (2016) 1, 24
2. “*The kinetic Sunyaev-Zel’dovich effect in modified gravity*”  
**F. Bianchini** & A. Silvestri  
 Physical Review D 93 (2016) 06, 064026
1. “*Cross-correlation between the CMB lensing potential measured by Planck and high-z sub-mm galaxies detected by the Herschel-ATLAS survey*”  
**F. Bianchini**, P. Bielewicz, A. Lapi, J. Gonzalez-Nuevo, C. Baccigalupi, G. de Zotti, L. Danese, N. Bourne, A. Cooray, L. Dunne, R. Ivison, S. Maddox, M. Negrello, E. Valiante, M.W.L. Smith, D. Scott, S. Eales, S. Dye  
 The Astrophysical Journal 802 (2015) 1, 64

**ii) Collaborative papers with some contribution**

24. “A measurement of the CMB E-mode angular power spectrum at subdegree scales from 670 square degrees of POLARBEAR data”  
S. Adachi, ..., **F. Bianchini**, ... et al. [56 authors]  
Submitted to The Astrophysical Journal, Astro-ph: 2005.06168 (2020)
23. “Deployment of Polarbear-2A”  
D. Kaneko, ..., **F. Bianchini**, ... et al. [80 authors]  
Journal of Low Temperature Physics 199 (2020) no.3-4, 1137-1147
22. “An Improved Measurement of the Secondary Cosmic Microwave Background Anisotropies from the SPT-SZ + SPTpol Surveys”  
C. L. Reichardt, ..., **F. Bianchini**, ... et al. [77 authors]  
Submitted to The Astrophysical Journal, Astro-ph:2002.06197 (2020)
21. “Measurement of the Cosmic Microwave Background Polarization Lensing Power Spectrum from Two Years of POLARBEAR Data”  
M. Aguilar Faúndez, ..., **F. Bianchini**, ... et al. [51 authors]  
The Astrophysical Journal 893 (2020) 1, 85
20. “Measurements of B-mode Polarization of the Cosmic Microwave Background from 500 Square Degrees of SPTpol Data”  
J.T. Sayre, ..., **F. Bianchini**, ... et al. [65 authors]  
Submitted to The Astrophysical Journal, Astro-ph:1910.05748 (2019)
19. “The SPTpol Extended Cluster Survey”  
L.E. Bleem, ..., **F. Bianchini**, ... et al. [138 authors]  
The Astrophysical Journal Supplement Series, 247 (2020) 1, 25
18. “A Measurement of the Degree Scale CMB B-mode Angular Power Spectrum with POLARBEAR”  
S. Adachi, ..., **F. Bianchini**, ... et al. [72 authors]  
Submitted to The Astrophysical Journal, Astro-ph:1910.02608 (2019)
17. “Internal delensing of cosmic microwave background polarization B-modes with the POLARBEAR experiment”  
S. Adachi, ..., **F. Bianchini**, ... et al. [53 authors]  
Physical Review Letter 124 (2020) 13, 131301
16. “Galaxy Clusters Selected via the Sunyaev-Zel'dovich Effect in the SPTpol 100-Square-Degree Survey”  
N. Huang, ..., **F. Bianchini**, ... et al. [76 authors]  
The Astronomical Journal, 159 (2020) 3, 110
15. “Fractional Polarisation of Extragalactic Sources in the 500-square-degree SPTpol Survey”  
N. Gupta, ..., **F. Bianchini**, ... et al. [80 authors]  
Monthly Notices of Royal Astronomical Society, 490 (2019) no.4, 5712-5721

14. “*A Detection of CMB-Cluster Lensing using Polarization Data from SPTpol*”  
S. Raghunathan, ..., **F. Bianchini**, ... et al. [129 authors]  
Physical Review Letter 123 (2019) 18, 181301
13. “*A Measurement of the Cosmic Microwave Background Lensing Potential and Power Spectrum from 500 deg<sup>2</sup> of SPTpol Temperature and Polarization Data*”  
W.L.K. Wu, ..., **F. Bianchini**, ... et al. [71 authors]  
The Astrophysical Journal 884 (2019) 1, 70
12. “*Constraining Radio Mode Feedback in Galaxy Clusters with the Cluster Radio AGN Properties to  $z \sim 1$* ”  
N. Gupta, ..., **F. Bianchini**, ... et al. [62 authors]  
Monthly Notices of Royal Astronomical Society, 494 (2020) no.2, 1705-1723
11. “*The POLARBEAR Fourier Transform Spectrometer Calibrator and Spectroscopic Characterization of the POLARBEAR Instrument*”  
F. Matsuda, ..., **F. Bianchini**, ... et al. [28 authors]  
Rev.Sci.Instrum. 90 (2019) no.11, 115115
10. “*Evidence for the Cross-correlation between Cosmic Microwave Background Polarization Lensing from POLARBEAR and Cosmic Shear from Subaru Hyper Suprime-Cam*”  
T. Namikawa, ..., **F. Bianchini**, ... et al. [73 authors]  
The Astrophysical Journal 882 (2019) 1, 62
9. “*QSOs acting as gravitational lenses: halo mass and projected mass density profile at  $z \sim 0.7$* ”  
L. Bonavera, J. González-Nuevo, S. L. Suárez Gómez, A. Lapi, **F. Bianchini**, M. Negrello, E. Díez Alonso, J. D. Santos, F. J. de Cos Juez  
Journal of Cosmology and Astroparticle Physics 1708 (2017) 9, 21
8. “*The Simons Observatory: Science goals and forecasts*”  
J. Aguirre, ..., **F. Bianchini**, ... et al. [249 authors]  
Journal of Cosmology and Astroparticle Physics 1902 (2019) 056
7. “*Mass Calibration of Optically Selected DES clusters using a Measurement of CMB-Cluster Lensing with SPTpol Data*”  
S. Raghunathan, ..., **F. Bianchini**, ... et al. [131 authors]  
The Astrophysical Journal 872 (2019) 2, 170
6. “*Dark Energy Survey Year 1 Results: tomographic cross-correlations between DES galaxies and CMB lensing from SPT+Planck*”  
Y. Omori, ..., **F. Bianchini**, ... et al. [137 authors]  
Physical Review D 100 (2019) 4, 043501

5. “*Dark Energy Survey Year 1 Results: Joint Analysis of Galaxy Clustering, Galaxy Lensing, and CMB Lensing Two-point Functions*”  
T. Abbott, ..., **F. Bianchini**, ... et al. [164 authors]  
Physical Review D 100 (2019) 2, 023541
4. “*Measurements of tropospheric ice clouds with a ground-based CMB polarization experiment, POLARBEAR*”  
S. Takakura, ..., **F. Bianchini**, ... et al. [48 authors]  
The Astrophysical Journal 870 (2019) 102
3. “*The POLARBEAR-2 and Simons Array Focal Plane Fabrication Status*”  
B. Westbrook, ..., **F. Bianchini**, ... et al. [93 authors]  
Journal of Low Temperature Physics, 193 (2018) 5-6, 758-770
2. “*Measuring galaxy cluster masses with CMB lensing using a Maximum Likelihood estimator: Statistical and systematic error budgets for future experiments*”  
S. Raghunathan, S. Patil, E. J. Baxter, **F. Bianchini**, L. E. Bleem, T. M. Crawford, G. P. Holder, A. Manzotti, C. L. Reichardt  
Journal of Cosmology and Astroparticle Physics 1708 (2017) 08, 30
1. “*A Measurement of the Cosmic Microwave Background BB-Mode Polarization Power Spectrum at Sub-Degree Scales from 2 years of POLARBEAR Data*”  
P.A.R. Ade, M. Aguilar, Y. Akiba, ..., **F. Bianchini**, ... et al. [81 authors]  
The Astrophysical Journal 842 (2017) 2, 121

### iii) Conference proceedings / White papers

6. “*Results of gravitational lensing and primordial gravitational waves from the POLARBEAR experiment*”  
Y. Chinone, ..., **F. Bianchini**, ... et al. [93 authors]  
J.Phys.Conf.Ser. 1468 (2020) no.1, 012007
5. “*The Simons Observatory: Astro2020 Decadal Project Whitepaper*”  
M.H. Abitbol, ..., **F. Bianchini**, ... et al. [281 authors]  
Bull. Am. Astron. Soc. 51 (2019) 147, Astro-ph:1907.08284
4. “*Dark Energy and Modified Gravity*”  
A. Slošar, ..., **F. Bianchini**, ... et al. [203 authors]  
Astro-ph:1903.12016 (2019)
3. “*Electrical characterization and tuning of the integrated POLARBEAR-2a focal plane and readout*”  
C. Barron, ..., **F. Bianchini**, ... et al. [103 authors]  
Proc.SPIE Int.Soc.Opt.Eng. 10708 (2018) 1070808



2. “*Cross-correlation between cosmological and astrophysical datasets: the Planck and Herschel case*”

**F. Bianchini**, A. Lapi  
SCCC21/IAU306 (2014)

1. “*H-ATLAS High-z Sources: An Optimal Sample for Cross-Correlation Analysis*”

J. Gonzalez-Nuevo, A. Lapi, **F. Bianchini**,  
49th Rencontres de Moriond: Cosmology, La Thuile, Italy, 22 - 29 Mar 2014, pp.121-126,  
(2014)