Curriculum Vitæ
Spring 2021

Josquin Errard

Université de Paris, CNRS, Astroparticule et Cosmologie, 75006 Paris, France

Phone: +33 (0)1 57 27 60 90
Cell: +33 (0)7 81 01 18 47
Email: josquin@apc.in2p3.fr
Website: `josquinerrard.wordpress.com`
Date of Birth: November 30, 1986
Nationality: French

Research and Education

2016-today Research Associate (*Chargé de Recherche Classe Normale*) at CNRS [1]. Working at *laboratoire Astroparticule & Cosmology* [2] (APC, Paris, France).

2015-2016 Postdoctoral fellow at the *Institut Lagrange de Paris* (ILP, Paris, France) [3].

2012-2015 Postdoctoral fellow at Lawrence Berkeley National Lab (LBNL, Berkeley, US). Member of the Computational Cosmology Center (C^3) [4].

2009-2012 PhD [5] at *laboratoire Astroparticule & Cosmologie* (APC), at the *Université Paris Diderot*.

2008-2009 Master program named Nuclei, Particles, Astroparticles and Cosmology (NPAC) [6] in Paris. Obtained with distinctions (rank: 1st/35).

2006-2009 Student at the *École Normale Supérieure* (ENS) of Paris [7]. Graduation and master program obtained with distinctions.

Collaborations

2009-2019 – **POLARBEAR** – Coordination of the map-making working group during the first season of observations which led to the first direct measurement of CMB lensing B-modes. Work on calibration, atmospheric and galactic contaminations. Contribution to the design, implementation and exploitation of the current data analysis pipeline. Co-leader of the foreground cleaning working group for the 2019 collaboration paper (arXiv:1910.02608). Internal reviewer and member of the collaboration board.

2010-today – **Simons Array** – Participation to the design of the instrument, optimizing its scientific outputs with respect to our best knowledge regarding galactic foregrounds and delensing possibilities. Co-leading the foregrounds and systematics working groups. Internal reviewer and member of the collaboration board.

2012-today – **LiteBIRD** [8] – Development and exploitation of the forecasting framework which has been and is heavily used to optimize and forecast the design of the satellite, in particular in the presence of galactic foregrounds. Strongly involved in the foregrounds Joint Study Group, and co-coordinator of the performance team.

2016-today – **Simons Observatory** [9] – Co-leader of the B-modes Analysis Working Group and in charge of the development, testing and exploitation of a map-based parametric pipeline. Elected member of the Theory and Analysis Committee.

2016-today – **CMB-S4** [10] – Member of the low-ell BB working group.

2015-today – **LSST** and **DESC** – Member of the weak lensing working group.

2017-2021 Collaborator on two ANR (French Research Agency) projects: **BxB** [11] and **B3DCMB** [12].

Scientific and administrative responsibilities

Regular reviewer for PRD, PRL, ApJ, A&A, MNRAS and JCAP.

2021-today French PI of the Primordial Universe section and member of the scientific laboratory council of the new International Laboratory for Astrophysics, Neutrinos and Cosmology Experiments (ILANCE) based at the University of Tokyo, Japan.

2020-today Co-coordinator of the performance team within the LiteBIRD collaboration.

2019-today Elected board member of the APC laboratory council.

2018-today Elected member of the Simons Observatory Theories and Analysis Committee (TAC) which oversees the scientific development and progress across the entire collaboration.

2017-today Member of the POLARBEAR - Simons Array collaboration board.

2016-today Co-organizer of the APC colloquia.

2019-2021 Member of the LIA (International Joint Laboratory) IN2P3-IPMU scientific board.

Fall 2016 - today Co-leader of the science group "Measuring r" (now BB pipeline lead) for the Simons Observatory collaboration.

2009-2012 Elected at the laboratory council, as a representative of the graduate students.

Teaching and advising

2016-today Co-advisor of four PhD students: D. Beck (defended in the Fall 2019, now postdoc at Stanford),

C. Vergès (defended in the Fall 2020, now postdoc at Harvard University as a postdoc), H. El Bouhargani (accepted postdoc offer at Berkeley) and B. Jost; I am likely to co-advise two new PhD students starting in the Fall 2021.

2018-today Co-advisor of two postdoctoral researchers (C. Leloup, 2019-2021 in the context of the BxB project, and A. Jamal, 2018-2020 in the context of the ANR B3DCMB project).

2018-today Teacher and coordinator of the series of lectures called "cosmos history", for the *Université ouverte*, at the *Université de Paris* [13].

2012-today Advisor of 9 master students' interships.

2018-today Yearly participation to the *Rencontres dt de physique de linfiniment grand linfiniment petit* with the lecture named *Observer linfiniment grand*.

2018-today Yearly participation to the series of lectures Teaching the Universe organized by G. Smoot, and aiming at teaching cosmology to middle- and high-school teachers.

Nov 2015 Lecture on "Observational probes of dark energy" for the graduate school *École Internationale de Physique Subatomique* (EIPS), held in Lyon, France.

2009-2012 Teaching assistant at *Université Paris Diderot* (192 hours of physics lectures for undergraduate students).

Awards and Distinctions

2021 Awarded the *Émergence en Recherche 2020* grant for the project DRONE, supported by the IdEx of the Universit de Paris, and aiming at calibrating the Simons Observatory Small Aperture Telescopes using an artificial polarized microwave source aboard a flying drone.

2021 Awarded the Alliance Hubert Curien cooperation grant, to collaborate on the Simons Observatory and Lit-BIRD analysis with the University of Oxford.

2017-2019 Awarded the grant from the France Japan Particle Physics Laboratory (TYL-FJPPL) for the collaboration between France and Japan, focusing on Simons Array and LiteBIRD.

Spring 2016 Selected by the CNRS sections 01 and 17 jurys for Research Associate job interviews. Selected and successful candidate at the competition for the astroparticle and cosmology position (IN2P3 [14]).

Dec 2014 Postdoctoral fellowship from the *Institut Lagrange de Paris* (ILP).

2014-2015 Collaborator on a France-Berkeley Fund grant (PIs: R. Stompor and J. Borrill, FBF #2014-0008).

Feb 2014 Qualified to apply for the competitions for lecturer positions at French Universities (*Qualification Maître de Conférences*).

Sep 2012 Doctoral degree from the *Université Paris Diderot* obtained with distinctions (*très honorable, avec félicitations du jury*).

Jul 2009 PhD fellowship from the French Ministry of Education and Research, awarded by the doctoral school Particles, Nuclei and Cosmology (PNC) and by the *Université Paris Diderot*.

Jun 2009 Diploma of the *École Normale Supérieure* (ENS) of Paris (speciality: Physics).

Outreach

Fall 2019 Collaborating with APC artists-in-residence, graduated from the ESAD Art School.

2017 - 2018 Writing and designing a book for children about observational cosmology, in collaboration with Ève Barlier, master student at the *École Estienne* (Paris).

Summer 2018 and **2019** Half-day conference on general cosmology for the *Rencontres de physique de l'infiniment grand à l'infiniment petit*.

Jun 2016 Intervention in the French middle school *collège Jean Zay*, Escautpont.

Feb 2015 Participation to a science popularization documentary about the latest results in observational cosmology. With Jean-Luc Robert and Pierre Binétruy.

Dec 2013 Participation to an architectural competition for an International Museum Of Astronomy, to be installed in San Pedro de Atacama, Chile.

Jan 2012 Virtual lecture for high school students about observational cosmology (*Passeport pour les Deux Infinis* project, led by Jean-Luc Robert)

Nov 2011 + 2018 Lectures for high school teachers as part of the project "Teaching the Universe", led by Prof. G. Smoot.

Oct 2011 General public demonstration about superconductivity (e.g. construction and exhibition of a supra-conductive skate board) for the *Fête de la Science* at *Université Paris Diderot*.

Jul 2011 Presentations and talks with the *association Paris Montagne*, in Paris.

Nov 2010 Presentations and talks with the association *Fête le Savoir*, in Paris.

Aug 2009 Week-long general public event about particles and cosmic rays in Fleurance, France.

Skills

- French maternal, fluent English and basic Spanish.
- Use of Python, Matlab, IDL, C, C++, MPI, LateX, Mathematica, LateX, SolidWorks, etc.

Selected publications
(chronological order)

- 41 talks (16 invited)
- 51 refereed articles (5 first author)
- 32 conference proceedings.
- h-index: 32, i10-index: 60 (Google Scholar)

- **Framework for performance forecasting and optimization of CMB B-mode observations in the presence of astrophysical foregrounds**
  Errard, J., Stivoli, F. and Stompor, R.
  Physical Review D, vol. 84, Issue 6, id. 063005 (2011).

- **Astrophysical foregrounds and primordial tensor-to-scalar ratio constraints from cosmic microwave background B-mode polarization observations**
  Errard, J. and Stompor, R.
  Physical Review D, vol. 85, Issue 8, id. 0830065 (2012).

- **Can CMB Lensing Help Cosmic Shear Surveys?**
  Das, S., **Errard, J.** and Spergel, D.
  eprint arXiv:1311.2338 (2013).

- **Evidence for Gravitational Lensing of the Cosmic Microwave Background Polarization from Cross-Correlation with the Cosmic Infrared Background**
  Ade, P.A.R. et al.
  Physical Review Letters, Volume 112, Issue 13, id.131302 (2014).

- **A Guide to Designing Future Ground-based Cosmic Microwave Background Experiments**
  Wu, W. L. K., **Errard, J.** et al.
  The Astrophysical Journal, Volume 788, Issue 2, article id. 138, 19 pp. (2014).

- **Measurement of the Cosmic Microwave Background Polarization Lensing Power Spectrum with the POLARBEAR Experiment**
  Ade, P.A.R. et al.
  Physical Review Letters, Volume 113, Issue 2, id.021301 (2014).

- **A Measurement of the Cosmic Microwave Background B-mode Polarization Power Spectrum at Sub-degree Scales with POLARBEAR**
  Ade, P.A.R. et al.
  The Astrophysical Journal, Volume 794, Issue 2, article id. 171, 21 pp. (2014).

- **Neutrino physics from the cosmic microwave background and large scale structure**
  Abazajian, K. N. et al.
  Astroparticle Physics, Volume 63, p. 66-80 (2015)

- **Modeling Atmospheric Emission for CMB Ground-based Observations**
  Errard, J. et al.
  The Astrophysical Journal, Volume 809, Issue 1, article id. 63, 19 pp. (2015).

- **POLARBEAR constraints on cosmic birefringence and primordial magnetic fields**
  Ade, P.A.R. et al.

- Physical Review D, Volume 92, Issue 12, id.123509 (2015).

- **Robust forecasts on fundamental physics from the foreground-obscured, gravitationally-lensed CMB polarization**
  Errard, J., Feeney, S. et al.
  Journal of Cosmology and Astroparticle Physics, Issue 03, article id. 052 (2016).

- **CMB-S4 Science Book, First Edition**
  Abazajian, K. N. et al.
  eprint arXiv:1610.02743 (2016).

- **A Measurement of the Cosmic Microwave Background B-mode Polarization Power Spectrum at Subdegree Scales from Two Years of polarbear Data**
  Ade, P.A.R. et al.
  The Astrophysical Journal, Volume 848, Issue 2, article id. 121, 15 pp. (2017).

- **Optimization study for the experimental configuration of CMB-S4**
  Barron, D. et al.
  Journal of Cosmology and Astroparticle Physics, Issue 02, article id. 009 (2018).

- **The Effects of Bandpass Variations on Foreground Removal Forecasts for Future CMB Experiments**
  Ward, J. T., Alonso, D., **Errard, J.** et al.
  The Astrophysical Journal, Volume 861, Issue 2, article id. 82, 9 pp. (2018).

- **Lensing reconstruction in post-Born cosmic microwave background weak lensing**
  Beck, D., Fabbian, G. and **Errard, J.**
  Physical Review D, Volume 98, Issue 4, id.043512 (2019).

- **The Simons Observatory: science goals and forecasts**
  The Simons Observatory collaboration
  Journal of Cosmology and Astroparticle Physics, Issue 02, article id. 056 (2019).

- **Characterizing bias on large scale CMB B-modes after Galactic foregrounds cleaning**
  Errard, J. and Stompor, R.
  Physical Review D, Volume 99, Issue 4, id.043529 (2019).

- **Removal of Galactic foregrounds for the Simons Observatory primordial gravitational wave search**
  Thorne, B. et al. (2019)
  arXiv:1905.08888 (May 2019).

- **Evidence for the Cross-correlation between Cosmic Microwave Background Polarization Lensing from Polarbear and Cosmic Shear**

from Subaru Hyper Suprime-Cam
Namikawa, T. et al.
The Astrophysical Journal, Volume 882, Issue 1, article id. 62, 12 pp. (2019).

■ **Cross-correlation of CMB Polarization Lensing with High-z Submillimeter Herschel-ATLAS Galaxies**
The POLARBEAR collaboration
The Astrophysical Journal, Volume 886, Issue 1, article id. 38, 11 pp. (2019).

■ **Measurement of the Cosmic Microwave Background Polarization Lensing Power Spectrum from Two Years of POLARBEAR Data**
The POLARBEAR collaboration
The Astrophysical Journal, Volume 893, Issue 1, id.85, 9 pp. (2020).

■ **Internal delensing of cosmic microwave background polarization B-modes with the POLARBEAR experiment**
The POLARBEAR collaboration
Physical Review Letters, Volume 124, Issue 13, article id.131301 (2020).

■ **A measurement of the CMB E-mode angular power spectrum at subdegree scales from 670 square degrees of POLARBEAR data**
The POLARBEAR collaboration
eprint arXiv:2005.06168 (2020).

■ **Impact of Polarized Galactic Foreground Emission on CMB Lensing Reconstruction and Delensing of B-Modes**

Beck D., **Errard, J.** and Stompor, R.
Journal of Cosmology and Astroparticle Physics, Issue 06, article id. 030 (2020).

■ **A Measurement of the Degree Scale CMB B-mode Angular Power Spectrum with POLARBEAR**
The POLARBEAR collaboration
The Astrophysical Journal, Volume 897, Issue 1, id.55, 23 pp. (2020).

■ **CMB-S4: Forecasting Constraints on Primordial Gravitational Waves**
The CMB-S4 collaboration
arXiv:2008.12619 (2020).

■ **LiteBIRD satellite: JAXA's new strategic L-class mission for all-sky surveys of cosmic microwave background polarization** M. Hazumi et al.
Proceedings of the SPIE, Volume 11443, id. 114432F 20 pp. (2020).

■ **The Simons Observatory: Bandpass and polarization-angle calibration requirements for B-mode searches** M. H. Abitbol et al.
eprint arXiv:2011.02449 (2020).
■ **Framework for analysis of next generation, polarised CMB data sets in the presence of galactic foregrounds and systematic effects**
Vergs, C., **Errard, J.** and Stompor, R.
Phys. Rev. D 103, 063507 (2021).

[1] http://www.cnrs.fr
[2] www.apc.univ-paris7.fr
[3] http://ilp.upmc.fr/
[4] https://crd.lbl.gov/departments/computational-science/c3/
[5] https://tel.archives-ouvertes.fr/tel-00761117
[6] ww.npac.lal.in2p3.fr/
[7] http://www.ens.fr/
[8] http://litebird.jp/eng/
[9] https://simonsobservatory.org/
[10] https://cmb-s4.org/
[11] http://www.bxb.space
[12] http://b3dcmb.in2p3.fr
[13] https://formation-continue.univ-paris-diderot.fr/pole-ouvert-denseignement-tous/luniversite-ouverte-quest-ce-que-cest
[14] https://in2p3.cnrs.fr/