Adrien La Posta

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Education

2020 - 2023 PhD (Cosmology with the Cosmic Microwave Background) at **Université Paris-Saclay**
2018 - 2020 Master's degree in Subatomic Physics and Cosmology at **Université Grenoble Alpes**

Teaching

Python classes	Python classes for first year Fundamental Physics Master students.
General physics classes	Optics and classical mechanics classes and practical classes for first year Biology Bachelor students.
Optics practical classes	Practical classes on the Michelson interferometer for third year Physics Bachelor students.
Student supervision	I supervised an undergraduate student during a 3rd year internship (Ronan Meunier)

Work Experience

Postdoctoral Research Assistant - University of Oxford Oct. 2023 - Present

As a postdoctoral researcher at Oxford University, I am involved in the data analysis of the large scale polarization anisotropies measured by the **Simons Observatory** Small Aperture Telescopes (SATs). My main objective is to setup and strengthen the analysis pipeline used to compute polarization power spectra, from which **SO** will bring strong constraints on the existence of primordial gravitational waves. In addition to that, my second objective is to take advantage of the wide range of cosmological probes already available, to constrain theoretical modelling through the measurement of cross-correlations.

PhD in Cosmology - IJCLab, Orsay, France Oct. 2020 - Sep. 2023

My PhD work - supervised by Thibaut Louis at IJCLab is focused on the analysis of the Cosmic Microwave Background anisotropies. I am involved in two collaborations : the **Atacama Cosmology Telescope** and **Simons Observatory**. I have contributed to the development of the analysis pipeline of the latest available data from ACT to assess the robustness of the power spectra and covariances that will be passed into the likelihood code.

Public codes

Pipeline development for AdvACT and SO

Contributions to the public power spectra analysis pipeline `PSpipe`. I am also developing tools for power spectra analysis in `pspipe_utils`

Talks

Dec 2022	-	Talk on Early Dark Energy given for a transverse group meeting at IJCLab (CosPT - Cosmology and High Energy Physics)
May 2022	-	Talk on the Hubble tension given at a seminar for the PHENIICS Doctoral school at Université Paris-Saclay
Mar. 2022	-	Invited speaker on the CosmologyTalks youtube channel with J. Colin Hill & Evan McDonough
Jan. 2022	-	The Hubble tension from a CMB perspective - talk for an Action Dark Energy webinar
Nov. 2021	-	Assessing consistency between CMB temperature and polarization measurements - talk at Institut d'Astrophysique de Paris (IAP), CMB France meeting
Jun. 2021	-	Cosmology with the T-E correlation coefficient - talk at a CMB France meeting

Publications

Below is a list of my publications (3 as a first author) along with a short description.

- In this paper, we propose a re-analysis of Planck NPIPE data using the correlation coefficient of T and E modes instead of the standard power spectra and derives cosmological parameter constraints from it.

  Adrien La Posta, Thibaut Louis, Xavier Garrido, Matthieu Tristram, et al. (July 2021). "Cosmology with the Planck $T - E$ correlation coefficient". In: *Phys. Rev. D* 104 (2), p. 023527. DOI: 10.1103/PhysRevD.104.023527. URL: https://link.aps.org/doi/10.1103/PhysRevD.104.023527

- In this paper, we constrain the Early Dark Energy model, proposed as a solution to the Hubble tension using ACT DR4 data.

  J. Colin Hill et al. (June 2022). "Atacama Cosmology Telescope: Constraints on prerecombination early dark energy". In: *Phys. Rev. D* 105 (12), p. 123536. DOI: 10.1103/PhysRevD.105.123536. URL: https://link.aps.org/doi/10.1103/PhysRevD.105.123536

- In this article, we provide the first constraint on the Early Dark Energy model from SPT-3G data as well as combined constraints with other CMB datasets.

  Adrien La Posta, Thibaut Louis, Xavier Garrido, and J. Colin Hill (Apr. 2022). "Constraints on prerecombination early dark energy from SPT-3G public data". In: *Phys. Rev. D* 105 (8), p. 083519. DOI: 10.1103/PhysRevD.105.083519. URL: https://link.aps.org/doi/10.1103/PhysRevD.105.083519

- In this paper, we study the consistency between the measured temperature and polarization signals for Planck, ACT and SPT. The goal is to identify possible deviations from what is expected from the standard model.

  Adrien La Posta, Umberto Natale, et al. (Jan. 2023). "Assessing the consistency between CMB temperature and polarization measurements with application to Planck, ACT, and SPT data". In: *Phys. Rev. D* 107 (2), p. 023510. DOI: 10.1103/PhysRevD.107.023510. URL: https://link.aps.org/doi/10.1103/PhysRevD.107.023510

- This article explores the construction of a noise simulation software for ground-based observations of the cosmic microwave background to capture the anisotropic properties of the noise.

  Zachary Atkins et al. (2023). *The Atacama Cosmology Telescope: Map-Based Noise Simulations for DR6*. arXiv: 2303.04180 [astro-ph.CO]

- The following two articles are focused on the ACT DR6 CMB lensing reconstruction and cosmological analysis made on 9400 square degrees, showing an excellent agreement with the standard model of cosmology (ΛCDM).

Mathew S. Madhavacheril et al. (2023). *The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters*. arXiv: 2304.05203 [astro-ph.CO]
Frank J. Qu et al. (2023). *The Atacama Cosmology Telescope: A Measurement of the DR6 CMB Lensing Power Spectrum and its Implications for Structure Growth*. arXiv: 2304.05202 [astro-ph.CO]

- This articles describe the elaboration of component separated maps from the ACT DR4 and DR6 datasets, in particular a Compton-y map which traces the electron pressure integrated along the line of sight.

  William R. Coulton et al. (2023). *The Atacama Cosmology Telescope: High-resolution component-separated maps across one-third of the sky*. arXiv: 2307.01258 [astro-ph.CO]

- The following article is a review about state-of-the-art observational constraints on the Early Dark Energy scenario featuring additional constraints from Planck data.

  Evan McDonough et al. (2023). *Observational constraints on early dark energy*. arXiv: 2310.19899 [astro-ph.CO]