Bastien Carreres

PhD in Astrophysics and Cosmology

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Research Interests

Keywords: observational cosmology, dark energy, large-scale structures, Type Ia Supernovae

I work on cosmology with Type Ia Supernovae (SNe Ia). I am interested in the use of SNe Ia to infer cosmological parameters to study the expansion of the Universe and the nature of dark energy. Particularly, I am using low-redshift SNe Ia to measure peculiar velocities and constrain the growth of cosmic structure.

Education

PhD - Astrophysics and Cosmology 2023

Aix-Marseille Université

Thesis title: Measurement of the growth rate of structures with Type Ia Supernovae of the ZTF photometric survey.

Master's degree - Subatomic Physics and Cosmology 2020

Université Grenoble-Alpes

Graduated with honors

Bachelor's degree - Fundamental Physics 2018

Université de Montpellier

Graduated with high honors

Research Experiences

Post-doctoral Associate Nov. 2023 – Present

Duke University, Durham, NC, USA

Supervisor: Pr. Dan Scolnic

Subject: Cosmology with low-z SNe Ia, peculiar velocities, survey simulation, data analysis.

PhD candidate Oct. 2020 – Sept. 2023

Centre de Physique des Particules de Marseille, Marseille, France

Supervisors: Drs. Dominique Fouchez, Benjamin Racine et Julian Bautista

Subject: SNe Ia cosmology, growth rate of structure measurement, peculiar velocities, survey simulation.

Teaching Experiences

PhD candidate with teaching duties Sept. 2020 – June 2023

Université Aix Marseille

64h / year

Calculus tutoring Oct. 2017 – Dec. 2017

Université de Montpellier

Tutoring for first-year college students.

Math tutoring Sept. 2016 – June 2018
Independent
Tutoring for middle-school and high-school students.

Responsibilities

Member of the SOC of the 2025 DESC Peculiar Velocities workshop Apr. 2025 – Sept. 2025
CPPM, Marseille, France

Member of the SOC of the 2025 DESC summer meeting Apr. 2025 – Sept. 2025
University of Illinois, Urbana-Champaign, IL, USA

Member of the DESC Collaboration Council Dec. 2024 – Present
Elected for a 2 year term.

Reviewer for MNRAS Feb. 2025 – Present
Review of 1 publication.

Co-organiser of the CPPM cosmology group' journal club Sept. 2021 – June 2023

Co-organiser & Volunteer of the CPPM cosmology "Fête de la Science" stands Oct. 2021 – 2023

Student supervision

PhD student Mentoring Nov. 2023 – Present
Duke University
Maria Acevedo – Subject: Cosmology with DEBASS survey.

Graduate student project supervision Sept. 2024 – June 2025
Duke University
Subject: Estimation of the velocity power spectrum in a N-body simulation.

Collaborations

- Full member of the Dark Energy Science Collaboration (DESC) of the Legacy Survey of Space and Time (LSST).
- External collaborator of the cosmology group of the Zwicky Transient Facility (ZTF) survey.

Grants and awards

- LSSTC Enabling Science Program Award 2021 - $5000
- National PhD fellowship - 3 years contract (ED352 - Aix-Marseille Université)

Technical skills

Programming languages:

- Python (Expert)

- LaTeX (Intermediate)
- C/C++ (Novice)
- CSS/HTML (Novice)

Contributions to public codes:

- `SNSim` (Creator and main developer)
- `flip` (Creator of a previous version, Co-developer)
- `OpSimSummaryV2` (Principal maintainer, developer)
- `SNCosmo` (Contributor)
- `SNANA` (Contributor)