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 | Aix-Marseille Université
Marseille, France
2023
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 | Université Grenoble-Alpes
Grenoble, France
2020
Graduated with honors

Bachelor's degree – Fundamental Physics | Université de Montpellier
Montpellier, France
2018
Graduated with high honors

Research Experiences

Post-doctoral Associate | Duke University
Durham, NC, USA
Nov. 2023 – Present
Supervisor: Pr. Dan Scolnic.
Subjects: Cosmology with low-z SNe Ia, peculiar velocities, survey simulation, data analysis.

PhD candidate | Centre de Physique des Particules de Marseille
Marseille, France
Oct. 2020 – Sept. 2023
Supervisors: Drs. Dominique Fouchez, Benjamin Racine et Julian Bautista.
Subjects: SNe Ia cosmology, growth rate of structure measurement, peculiar velocities, survey simulation.

Teaching & Mentoring Experiences

Teaching

PhD candidate with teaching duties | Aix-Marseille Université
Marseille, France
Sept. 2020 – June 2023
64h / year. Bachelor's lectures in basic physics: Electricity, Optics, Thermodynamics

Calculus tutoring | Université de Montpellier
Montpellier, France
Oct. 2017 – Dec. 2017
Tutoring for first-year college students.

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

Student Mentoring

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

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

Responsibilities & Services

Member of the SOC of the DESC Peculiar Velocities workshop Apr. 2025 – Sept. 2025
Workshop took place at the Centre de Physique des Particules de Marseille, France

Member of the SOC of the 2025 DESC summer meeting Apr. 2025 – Sept. 2025
Meeting tootk place at the 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

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.

Awards

- LSSTC Enabling Science Program Award 2021 ($5 000)

- French 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 (Co-developer)
- OpSimSummaryV2 (Principal maintainer)

- SNCosmo (Contributor)
- SNANA (Contributor)