

Sara Maleubre Molinero

Cosmology – Large Scale Structure –
Baryonic Feedback – Simulations – Dark Energy

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Theoretical and computational cosmologist studying the non-linear regime of large-scale structure. Develops high-precision N-body and hydrodynamical simulations, non-Gaussian statistics, and emulator-based models to link baryonic processes with cosmological observables, working toward precision modelling for next-generation surveys.

Research Experience. Education

- Oct 2023-Present **Beecroft Research Fellow (Independent Postdoc)**, University of Oxford, United Kingdom.
- Apr-Sep 2023 **Research Scientist (Postdoc)**, Max-Planck-Institut für extraterrestrische Physik, Germany.
- Oct-Mar 2023 **DAAD Fellowship**, Max-Planck-Institut für extraterrestrische Physik, Germany.
○ COSMOLOGICAL INFERENCE FROM DENSITY-SPLITS CLUSTERING STATISTICS IN REDSHIFT-SPACE, Local sponsor: Dr. Ariel Sanchez
- 2019-2023 **PhD Candidate EDPIF**, Sorbonne Université - LPNHE, France.
○ COSMOLOGICAL STRUCTURE FORMATION WITH N-BODY SIMULATIONS : THE PATH TO PERCENT ACCURACY WITH SCALE-FREE MODELS, Supervised by: Prof. Michael Joyce
- 2017–2019 **MSc Astronomy and Cosmology**, Universiteit Leiden, The Netherlands.
○ STUDY OF VIABLE HORNDESKI MODELS WITHIN THE PLANCK PHENOMENOLOGICAL PARAMETRIZATION OF DARK ENERGY, Supervised by: Dr. Alessandra Silvestri, *Lorentz Institute* (2018-2019)
○ THE DENSITY-ENVIRONMENT OF RADIO-SELECTED GALAXIES, Supervised by: Dr. Jarle Brinchmann, *Leiden Sterrewacht* (2017-2018)
- 2013–2017 **BSc Physics**, Universidad Autónoma de Madrid, Spain.
○ **Theoretical Bachelor Thesis:** LOCAL EFFECT OF AGN ON THE HOST GALAXY, Supervised by: Dr. Yago Ascasibar (2016-2017)
○ **Experimental Bachelor Thesis:** SPECTROSCOPIC ANALYSIS OF KIC 8462852, Supervised by: Prof. Carlos Eiroa (2016-2017)
○ **Erasmus Traineeship:** HIGH REDSHIFT GALAXIES AND THE REIONIZATION OF THE UNIVERSE, Supervised by: Dr. Fergus Cullen, *The Institute for Astronomy, University of Edinburgh* (Summer 2016)
○ **Erasmus Studentship** - *Université Joseph Fourier*, France (2015-2016)

Collaborations and Consortiums

- Feb 2022-Present **Euclid Full-member.**
- Oct 2025-Present **LSST-DESC:UK, Dark Energy Engagement Group.**

Technical skills

- HPC DiRAC-COSMA, CC-IN2P3, MPCDF, local clusters at various institutions
- Simulation Codes Abacus, GADGET, RAMSES
- Analysis Tools Python (Numpy, Numba, PyTorch ...), SQL, C/C++, CUDA, Julia

Scholarships and Awards

- Oct 2023-Sep 2026 **Beecroft Fellowship**, *Beecroft Charitable Trust*, – competitive three year fellowship covering the areas of interest of the BIPAC institute, University of Oxford.
- Oct 2022-Mar 2023 **DAAD Short-term Grant**, *Deutscher Akademischer Austauschdienst*, – competitive grant from the German government for an independent project.
- 2019–2022 **Jean-Pierre Aguilar Scholarship**, *Fondation CFM pour la Recherche*, – competitive PhD grant, 3-6 best profiles from French Doctoral Schools in exact sciences.
- 2018–2019 **Oort Scholarship**, *Leiden University*, – competitive grant based on exceptional academic merits.

Teaching-Mentoring/Organization-Institutional Responsibilities

- Passed 03/11/2024 **Associate Fellowship of Higher Education (AFHEA)**, – international professional recognition for supporting teaching and learning in higher education, (Reference PR303653).
- Oct 2024-Present **PhD Co-supervision**, (Alexander Roskill, University of Oxford) "HIGHER CORRELATIONS IN LARGE SCALE STRUCTURE".
- Oct 2024-Present **Research Fellow**, (External PhD advisor (9 students) + Governing Body Observant), St. Cross' College, University of Oxford.
- Jun 2024-Present **University Ambassador (outreach)**, Department of Physics, University of Oxford.
- Oct 2023-Present **Stipendiary Lecturer**, (teaching, examining, undergraduate selection, academic administration, welfare...), St. Peter's College, University of Oxford.
- 2020-2022 **Teaching Assistant**, Sorbonne Université.
- 2020-2022 **Academic Mentorship**, Undergraduate finalist, Sorbonne Université.
- 2018-2019 **Sterrenwacht Buddy Program**, Mentorship of 3 international students, Leiden University.
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- 2025-Present **Co-Organizer BIPAC Journal Club**, University of Oxford.
- 2024-Present **Starter/Organizer Astro-Computing Seminar**, University of Oxford.
- 2023-Present **Postdoc representative - Astronomy Computing Committee**, University of Oxford.
- 2022-2023 **Co-organizer -Cosmology- Journal Club**, MPA/MPE.
- 2022-2023 **Co-organizer of the Cambridge-Munich monthly seminars**, MPE.
- 2022 **Starter/Organizer Early Career Journal Club**, LPNHE.

Selected Scientific and General Public Talks

- Oct 2025 28th International conference COSMO'25, (Pittsburgh - USA)
- Jan 2025 London Cosmology and Relativity Seminar, **Invited Talk**, Queen Mary University of London, (UK)
- Oct 2024 27th International conference COSMO'24, (Kyoto - Japan)
- Mar 2024 18th IberiCos 2024, **Invited Plenary Talk**, (Salamanca - Spain)
- Sep 2023 Lensing and Galaxies seminar **Invited talk**, Universitäts-Sternwarte München, (Germany)
- Jul 2023 European Astronomical Society Conference, (Krakow - Poland)
- May 2023 CosmoLSS workshop at DIPC, **Invited talk**, (Spain)
- October 2022 OPINAS seminar, **Invited talk**, MPE, (Germany)
- April 2022 CTC Cosmology Seminars (**Invited talk**), University of Maryland, (USA)
- January 2022 56th Rencontres de Moriond, (La Thuile - Italy)
- October 2021 Physical Cosmology Team Journal Club, **Invited Talk**, Ludwig-Maximilians-Universität, (Germany)
- March 2021 IA **Invited Talk**, Institute d'Astrophysique de Paris, (France)
- +3 posters, +10 scientific talks (3 invited seminars)
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- Jul 24/25 Oxford Summer School, **Invited**, Workshop "A Mission to Mars", (UK)
- Mar 24/25 Aspire Liverpool Residential Tutor, (UK)
- Mar 2025 EMPower Oxford, **Invited**, Workshop "Astronomy and Light", (UK)
- Jun 24 - Mar/May 25 Marie Curious - Beecroft Inspire Program, (UK)
- Feb 2025 Woman and Non-Binary people in STEM, in collaboration with Mansfield, St. Anne's and St. Catherine colleges, (UK)
- Feb 2025 International Day of Women and Girls in Science, **Invited**, Workshop "Numerical Simulations", Instituto Cañada Blanch - SRUK/CERU, (UK)
- +15 outreach activities and talks (7 invited)

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Published refereed publications

S. Maleubre, M. Zennaro, D. Alonso, I. McCarthy, M. Schaller, J. Schaye *The impact of galaxy bias on cross-correlation tomography.* submitted to MNRAS arXiv:2508.05319

Contributions: Led the project; formal analysis; methodology; investigation, validation & interpretation of results; writing — original draft, editing, final.

S. Maleubre, D. Eisenstein, L. H. Garrison, M. Joyce *Convergence of halo statistics: code comparison between Rockstar and CompaSO using scale-free simulations.* 2024, MNRAS, 527, 5603

Contributions: Led the project, project conceptualization; formal analysis; methodology; investigation, validation & interpretation of results; writing — original draft, editing, final.

S. Maleubre, D. Eisenstein, L. H. Garrison, M. Joyce *Constraining accuracy of the pairwise velocities in N-body simulations using scale-free models.* 2023, MNRAS, 525, 1039

Contributions: Led the project, project conceptualization; formal analysis; methodology; investigation, validation & interpretation of results; writing — original draft, editing, final.

S. Maleubre, D. Eisenstein, L. H. Garrison, M. Joyce *Accuracy of power spectrum in dissipationless cosmological simulations.* 2022, MNRAS, 512, 1829

Contributions: Led the project; formal analysis; methodology; investigation, validation & interpretation of results; writing — original draft, editing, final.

M. Leroy, L. Garrison, D. Eisenstein, M. Joyce, **S. Maleubre** *Testing dark matter halo properties using self-similarity.* 2021, MNRAS, 501, 5064

Contributions: Methodology; investigation, validation & interpretation of results; writing - review and editing.

Publications in preparation

S. Maleubre, A. G. Sanchez, A. N. Ruiz *Evolution Mapping III: describing statistics of the non-linear matter clustering in redshift-space* in prep.

Contributions: Led the project, project conceptualization; formal analysis; methodology; investigation, validation & interpretation of results; writing — original draft

S. Maleubre, M. Zennaro, D. Alonso, I. McCarthy, M. Schaller, J. Schaye *Impact of feedback and cosmology on Cosmic Infrared Background tomography* in prep.

Contributions: Led the project, project conceptualization; formal analysis; methodology; investigation, validation & interpretation of results; writing — original draft

A. Roskill, **S. Maleubre**, D. Alonso, P. G. Ferreira *Skew-spectra: a generalization to spin-s* in prep.

Contributions: General supervision; methodology; investigation, validation & interpretation of results; writing - review and editing.

Thesis. Books of proceedings

S. Maleubre, *Formation des structures cosmologiques avec des simulations à N-corps : tester la précision avec des modèles sans échelle.* 2023, HAL Id : tel-04137933, NNT : 2023SORUS090

S. Maleubre, *Accuracy of power spectrum measurements in Scale-Free simulations.* 2022, Proceedings of the 56th RENCONTRES DE MORIOND, pp. 281 - 284, Cosmology

S. Maleubre, *Power Spectrum Accuracy in N-body simulations using Scale Free cosmologies.* 2021, JRJC 2021 Book of Proceedings, 77-80.