

Keywords: study of gas dynamics in and around galaxy clusters and their impact on the hydrostatic mass bias using cosmological simulations

RESEARCH EXPERIENCES

- **PhD**

Institut d'Astrophysique Spatiale (IAS)

 - Title: "Mass calibration from constrained simulations: towards bias-free scaling relations for galaxy clusters."
 - Supervisors: Nabila Aghanim & Jenny Sorce
 - Expected defence date : September 2025

Oct 2022 - present

Orsay, France
- **2nd year Master Degree research internship**

Institut d'Astrophysique Spatiale (IAS)

 - Project: Study of a constrained zoom-in simulation of the Virgo cluster
 - Supervisors: Nabila Aghanim & Jenny Sorce

Mar 2022 - Jun 2022

Orsay, France
- **1st year Master Degree research internship**

Institut d'Astrophysique Spatiale (IAS)

 - Project: Study of galaxy clusters pressure profiles in the IllustrisTNG simulation
 - Supervisors: Nabila Aghanim & Hideki Tanimura

May 2021 - Jul 2021

Orsay, France
- **Bachelor research internship**

Laboratoire de Physique SUBAtomique et TECHnologies associées (SUBATECH)

 - Project: Calibration of the XENON1T detector using ^{83m}Kr and light yield determination
 - Supervisors: Sara Diglio and Julien Masbou

Jan 2020

Nantes, France

EDUCATION

- **Magister degree in Fundamental Physics, specialisation in Astrophysics (M2)**

Université Paris-Saclay

2022

Orsay, France
- **Bachelor degrees in Physics and Mathematics**

Université de Nantes

2020

Nantes, France

PUBLICATIONS

Refereed

1. *Turbulence from cosmic filaments to galaxy clusters*
Lebeau, Zaroubi, Aghanim, Sorce & Langer, to be submitted to A&A
2. *Can the splashback radius be an observable boundary of galaxy clusters?*
Lebeau, Ettori, Aghanim & Sorce, A&A 689, A19 (2024)
3. *Simulating the LOcal Web (SLOW) – II: Properties of local galaxy clusters*
Hernández-Martínez, Dolag, Seidel, Sorce, Aghanim, Pilipenko, Gottlöber,
Lebeau & Valentini, A&A 687, A253 (2024)
4. *Mass bias in clusters of galaxies: Projection effects on the case study of Virgo replica*
Lebeau, Sorce, Aghanim, Hernández-Martínez & Dolag, A&A 682, A157 (2024)

Proceedings

1. *Projection effects on pressure profiles: a case study of the Virgo replica*
Lebeau, Sorce & Aghanim, mm Universe Proceedings, EPJ Web of conferences, 2024

TALKS

Invited talks and seminars

1. **Physics processes of the cosmic gas in galaxy clusters environment**
Day of the astrophysics axis of the Univ. Paris-Saclay Graduate School
Oct 2024
Orsay, France
2. **Physics processes biasing galaxy clusters mass estimation:
case study of the Virgo cluster simulated replica**
INAF-OAS Seminar
Sep 2024
Bologna, Italy

Contributed talks

1. **Physics processes biasing galaxy clusters mass estimation:
case study of the Virgo cluster simulated replica**
Ultimate cluster cosmology workshop
Oct 2024
Orsay, France
2. **Turbulence in the ICM of the Virgo cluster simulated replica**
EAS annual meeting
Jul 2024
Padova, Italy
3. **Can the splashback radius be an observable boundary of galaxy clusters ?**
GdR Cophy Episode 2
May 2024
Lyon, France
4. **Can the splashback radius be an observable boundary of galaxy clusters ?**
Tuorla-Tartu meeting
May 2024
Turku, Finland
5. **Gas dynamics in the ICM of galaxy clusters: case study of a Virgo replica**
Elbereth Conference
Mar 2024
Paris, France
6. **Mass bias in clusters of galaxies: case study of Virgo CLONE replica**
RAMSES SNO kick-off meeting
Dec 2023
Lyon, France
7. **Biases in the estimation of the hydrostatic mass of the Virgo simulated CLONE**
mm Universe conference
Jun 2023
Grenoble, France
8. **Biases in the estimation of the hydrostatic mass of the Virgo simulated CLONE**
CLUES meeting
Jun 2023
Munich, Germany
9. **Towards bias-free mass calibration of galaxy clusters using constrained
cosmological simulations**
Elbereth Conference
Mar 2023
Paris, France

POSTERS

1. **Turbulence in galaxy clusters and cosmic filaments**
IAS young researchers and ingeeners day
Jun 2024
Orsay, France
2. **Towards bias-free mass calibration of galaxy clusters using constrained
cosmological simulations**
Colloque Alain Bouyssy
Dec 2023
Orsay, France
3. **Towards bias-free mass calibration of galaxy clusters using constrained
cosmological simulations**
Journée de l'axe Astro de la Graduate School de Physique de l'Université Paris-Saclay
Oct 2023
Orsay, France
4. **Towards bias-free mass calibration of galaxy clusters using constrained
cosmological simulations**
IAS young researchers and ingeeners day
Jun 2023
Orsay, France
5. **Towards bias-free mass calibration of galaxy clusters using constrained
cosmological simulations**
"Future Cosmology" summer school
Apr 2023
Cargèse, France

SUPERVISION AND TEACHING

- **Co-Supervision of Jade Paste (1st year Master Degree trainee)** May-Jun 2024
2 months research internship
- **Astronomy practical works (15h/year)** 2022-present
1st year Master Degree
- **Electromagnetism courses (21h/year)** 2023-2024
2nd year Bachelor Degree
- **Co-supervision of astronomy projects (one week)** 2023
1 week project with four students of 3rd year Bachelor Degree

MAIN SKILLS

Programming Languages: Analysis of cosmological simulations with Fortran (own RAMSES-related data preparation and map creation codes) and Python (use of scientific (numpy, scipy, astropy,...), visualisation (matplotlib, pyvista,...) and optimisation (numba, jax,...) libraries)

Languages: English (fluent), French (mother tongue)

CONTRIBUTIONS TO THE COMMUNITY

International

- **Referee for "The Open Journal of Astrophysics"** 2024

Local

- **Member of the LOC for the Ultimate Cluster Cosmology workshop @ IAS** 2024
- **Co-organisation of bimonthly Cosmology team seminars** 2024 - present
- **Organisation of the IAS young researchers and engineers day** 2024
- **Elected as doctoral student representative at the laboratory board** 2024 - present
- **Elected as doctoral student representative at the Paris-Saclay University Physics Graduate School board** 2023 - present
- **Management of the Cosmology team's conference webpage** 2022 - 2024

COLLABORATIONS

- **Member of the LOCALIZATION project** 2022-2025
P.I.s: Nabila Aghanim (IAS, Paris-Saclay University) & Klaus Dolag (LMU, Munich)

GRANTS

- **Financial support from doctoral school to participate to "Future Cosmology" summer school (~500€)** Apr 2023
- **3-years PhD half-grant from doctoral school "Astronomie & Astrophysique d'Ile-de-France" (~50k€)** 2022 - 2025

PROPOSALS

- **Co.I of project Proposal for Tier 0/Tier 1 HPC Access at the Gauss Center for supercomputing** 2023
45Mcpu hours obtained on the LRZ supercomputer to run the LOCALIZATION simulation

OUTREACH

- **"The story of my PhD", ALCOR Astronomy association event** Oct 2024
- **Conference "Introduction to cosmology" for secondary school students** Dec 2023
- **Participation to the "Science Festival 2022" at IAS** Oct 2022

PERSONAL INTERESTS

- **Basketball in competition**
- **Guitar in amateur band**

REFERENCES

- **Nabila Aghanim:** nabila.aghanim@universite-paris-saclay.fr
- **Jenny Sorce:** jenny.sorce@univ-lille.fr
- **Stefano Ettori:** stefano.ettori@inaf.it
- **Saleem Zaroubi:** saleem@astro.rug.nl