Armand LECLERC

Curriculum Vitae

CRAL - AstroENS
ENS de Lyon, France
✉ *armand.leclerc@ens-lyon.fr*
My Webpage
Github *ResearchGate*

Education & Training

2022–2025 **PhD, Astrophysics**, *CRAL, ENS de Lyon*, Lyon, France.
Wave topology for asteroseismology, Defended on October 13th, 2025.

2019–2021: **Master of Theoretical Physics**, *Ecole Normale Supérieure (ENS) de Lyon*, Lyon, France.
Advanced courses on various topics of modern theoretical physics. GPA: 8.4/10, Mention "Très Bien".

2018–2019: **Bachelor of Physics**, *Ecole Normale Supérieure (ENS) de Lyon*, Lyon, France.
Experimental and theoretical physics. GPA: 8.3/10, Mention "Très Bien".

Articles

First author or major contributor

2026 **Dixmier-Douady topology in waves of astrophysical fluids**, A.Leclerc, P.Delplace.
In prep.

2026 **A prograde edge sound wave in supersonic rotation**, A.Leclerc, L.Bugnet, M.Rieutord.
In prep.

2026 **On the feasibility of inverting the rotation of the solar core with mixed f/g modes**, A.Leclerc, A. Le Saux, J. Ong.
Submitted

2026 **Radial modes of pressure bumps and dips in astrophysical discs**, A.Leclerc, G.Laibe, E.Lynch, N.Perez.
Accepted for publication in A&A

2025 **A core-sensitive mixed f/g mode of the Sun predicted by wave topology and hydrodynamical simulation**, A.Le Saux, A.Leclerc, G.Laibe, P.Delplace, A.Venaille.
Published in The Astrophysical Journal Letters, 987(1), L12.

2025 **The importance of Berry phase in solar acoustic modes**, A.Leclerc, G.Laibe.
Published in The Astrophysical Journal Letters, 983(1), L17.

2025 **Topology of shallow-water waves on the rotating sphere**, N.Perez, A.Leclerc, G.Laibe, P.Delplace.
Published in the Journal of Fluid Mechanics, 2025;1003:A35.

2024 **Wave topology of stellar inertial waves**, A.Leclerc, G.Laibe, N.Perez.
Published in Physical Review Research, 6(4), 043299.

2024 **PT and anti-PT symmetry for astrophysical waves**, A.Leclerc, G.Laibe, N.Perez.
Published in Astronomy & Astrophysics, 689, A237.

2024 **Exceptional ring of the buoyancy instability in stars**, A.Leclerc, L.Jezequel, N.Perez, A.Bhandare, G.Laibe, P.Delplace.
Published in Physical Review Research, 6(1), L012055.

2022 **Topological Modes in Stellar Oscillations**, A.Leclerc, G.Laibe, P.Delplace, A.Venaille, N.Perez.
Published in The Astrophysical Journal, 940(1), 84.

Other

2023 **From ray tracing to waves of topological origin in continuous media**, A.Venaille, Y.Onuki, N.Perez, A.Leclerc.
Published in SciPost Physics, 14(4), 062.

Online list accessible here (NASA ADS).

Research Experience

Nov 2025 – present ***Topological seismology of magnetized stars***, *ISTA, Austria*.
Postdoctoral position in the group of Dr Lisa Bugnet

PhD

2022 – 2025 ***Topological physics in astrophysical waves and instabilities***.
Developing a new approach of linear waves and instabilities in astrophysical and geophysical contexts, relying on topology. This technique from condensed matter physics allows for a new analytical tackling of waves with long wavelengths, i.e fundamental modes of celestial bodies. When applied to the spectrum of the Sun, it predicts a wave of a new kind which is found in nonlinear simulations, whose properties are such that it will give astronomers access to the solar core.

Advisor : **Prof. Guillaume Laibe**, *CRAL*, ENS de Lyon.

Internships

Feb,2022 – Jul,2022 ***Gravity waves excitation by turbulent plumes in the Sun***.
Analysis of gravity waves in compressible hydrodynamical simulations of the solar interior. Convective plumes generated in the convective zone hit the radiative region and excite trains of gravity waves, whose power spectrum is exhibited and correlated to the plume.

Advisor : Prof. Isabelle Baraffe, *Department of Physics and Astronomy*, University of Exeter.

Sept,2021 – Feb,2022 ***Topological asteroseismology***.
Topological analysis of the waves propagating in stellar media. Re-formulation of the equations of linear waves, computation of Chern numbers and prediction of a wave of a new kind in stellar spectra.

Advisor : Prof. Guillaume Laibe, *CRAL*, ENS de Lyon.

Mar,2021 – Aug,2021 ***Instability detections in anisotropic spheroidal galaxies***.
Analysis of instabilities caused by anisotropy in galaxies. Analytical equilibria with tunable anisotropy parameters are implemented in a spectral code to detect their influence on linear modes.

Advisor : Dr. Simon Rozier, *Post-doc, Observatory of Strasbourg, France*

Oral contributions

4 posters, and 6 presentations, including:

2025 **TASC9/KASC16 Workshop**, Vienna, Contributed talk

2025 **Journées de la Société Française d'Astronomie et Astrophysique**, Toulouse, Contributed talk

2024 **British Applied Mathematics Conference**, Newcastle, Contributed talk

Grants and Awards

2026 **EAS PhD Prize** MERAC Prize for Best Doctoral Thesis in Theoretical Astrophysics.

2025 **Conference Prize** Best PhD presentation at the TASC9/KASC16 Workshop.

2022 **PhD Grant** Contrat Doctoral Spécifique Normalien (CDSN), ENS de Lyon (3 year salary, 79k€).

2018 **ENS de Lyon Entrance Exam**, Admission among the 2.6% candidates selected.

Teaching and Tutoring

2026 : **3-months Master Student Internship**, Stanislas Sendera-Cartailler, 100% tutoring charge.
2025 : **3-months Master Student Internship**, Laura Caravaglios, 75% tutoring charge.
2025 : **2-months Bachelor Student Internship**, Romain Lequertier, 75% tutoring charge.
2022-2025 : **Nonlinear physics - Lectures Master 2**, Prépa agrégation de Physique, ENS de Lyon.
2023-2025 : **Introduction to Astrophysics - Tutorials Master 1**, Physics Department, ENS de Lyon.
2022-2025 : **Quantum Mechanics - Tutorials Bachelor**, Physics Department, ENS de Lyon.

Extra

Nov 2026 : **Organization of a Workshop**, Waves in astrophysical fluids (website).
June 2023 : **Local Organization Committee Member**, Star@Lyon conference (website).