

Louis Legrand

Ph. D.

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Research positions

- July 2024–present **Postdoctoral fellow at the University of Cambridge**, Department of Applied Mathematics and Theoretical Physics, with a Postdoc Mobility fellowship from the Swiss National Science Foundation (N. P500PT 217950)
- Nov 2023–June 2024 **Postdoctoral fellow at the ICTP-South American Institute of Fundamental Research**, São Paulo, with a FAPESP fellowship (N. 2023/08560-7)
- Nov 2020–Oct 2023 **Postdoctoral researcher at the University of Geneva**, Department of Theoretical Physics, within SNSF Eccellenza Professorial Fellowship of Julien Carron (N. 186879)

Education

- 2017–2020 **PhD at the Paris-Saclay University**, Institut d'Astrophysique Spatiale
○ Thesis title: Large surveys: from galaxy evolution to cosmological probes
○ Supervisors: Marian Douspis and Nabila Aghanim
- 2016–2017 **Master degree in Astronomy and Astrophysics**, Université Paul Sabatier
- 2013–2017 **Engineering degree in Aerospace**, École Polytechnique and ISAE-Supaero

Grants and Fellowships

- Jul. 2023 **Postdoc Mobility fellowship** from the Swiss National Science Foundation, grant number P500PT 217950 (128'600 CHF)
- Feb. 2023 **FAPESP Postdoctoral fellowship** at the ICTP-South American Institute of Fundamental Research
- Aug. 2022 **Grant of the Academic Society of Geneva**, for participating in the COSMOS'22 conference and research visit at Federal University of Rio de Janeiro (1370 CHF)
- 2017–2020 Doctoral grant provided by the Centre National d'Etudes Spatiales (45'000 EUR)

Key Publications

- [1] Louis Legrand and Julien Carron. "Robust and efficient CMB lensing power spectrum from polarization surveys". In: *Phys. Rev. D* 108.10 (2023), p. 103516. DOI: 10.1103/PhysRevD.108.103516.
- [2] Louis Legrand and Julien Carron. "Lensing power spectrum of the cosmic microwave background with deep polarization experiments". In: *Phys. Rev. D* 105.12 (2022), p. 123519. DOI: 10.1103/PhysRevD.105.123519.
- [3] Sebastian Belkner, Julien Carron, Louis Legrand, Caterina Umiltà, Clem Pryke, and Colin Bischoff. "CMB-S4: Iterative Internal Delensing and r Constraints". In: *Astrophys. J.* 964.2 (2024), p. 148. DOI: 10.3847/1538-4357/ad2351.
- [4] Omar Darwish, Sebastian Belkner, Louis Legrand, Julien Carron, and Giulio Fabbian. "Non-Gaussian deflections in iterative optimal CMB lensing reconstruction". In: *Phys. Rev. D* 110.10 (2024), p. 103520. DOI: 10.1103/PhysRevD.110.103520.

- [5] Sayan Saha, Louis Legrand, and Julien Carron. "Cluster profiles from beyond-the-QE CMB lensing mass maps". In: *JCAP* 01 (2024), p. 024. DOI: 10.1088/1475-7516/2024/01/024.
- [6] Louis Legrand, H. J. McCracken, I. Davidzon, O. Ilbert, J. Coupon, N. Aghanim, M. Douspis, P. L. Capak, O. Le Fèvre, and B. Milvang-Jensen. "The COSMOS-UltraVISTA stellar-to-halo mass relationship: new insights on galaxy formation efficiency out to $z \sim 5$ ". In: *Mon. Not. Roy. Astron. Soc.* 486.4 (2019), pp. 5468–5481. DOI: 10.1093/mnras/stz1198.

Full list available on INSPIRE: <https://inspirehep.net/authors/1991840>

Supervision

- Nov. 2022 – Angelo Ferrari, postgraduate student, *Development and validation of the analysis pipeline for Euclid and CMB lensing cross-correlations*
- Mar. 2023
- Feb.–June 2022 Samuel Simko, graduate student, *Machine learning reconstruction of the mass of galaxy clusters with lensed CMB observations*

Collaboration Membership

- 2017–present **Euclid collaboration**
 - Co-lead of the CMB lensing cross-correlations Key Project
 - Co-chair of the Early Career Committee
- 2020–present **CMB-S4 collaboration**
- 2024–present **Simons Observatory collaboration**
- 2016–2020 **COSMOS collaboration**

Teaching

- 2022–2023 Teaching assistant *Thermodynamics*, bachelor of physics, University of Geneva, 2 hours/week for 1 semester
- June 2022 International Euclid advanced school, Les Houches, France, *Cross correlations between Euclid and CMB lensing*, lecturer, 1.5 hours total
- 2020–2021 Teaching assistant *Mathematical methods for physicists*, bachelor of physics, University of Geneva, 2 hours/week for 1 semester
- Dec 2019 Teaching assistant *Data analysis*, master of physics, Université Paris Saclay, 15 hours total

Outreach and Public Engagement

- 2021–2022 Outreach science talks at the University of Geneva for school students (from 6 to 18 years old), 2 hours/week for 1 semester
- 2017–2020 Outreach science talks at the *Palais de la Découverte* museum in Paris, 62 hours/year for three years

Service and Leadership

- 2024–present Co-lead of the CMB lensing cross-correlations Key Project of the Euclid collaboration
- 2021–present Chair of the Early Career Committee of the Euclid collaboration
- 2024–present Co-organizer of the cosmology seminars in DAMTP, Cambridge
 - 2023 Member of the Scientific Organisation Committee for the Euclid consortium annual meeting in Copenhagen, June 2023
- 2018–2020 Representative of the PhD students of the Institut d'Astrophysique Spatiale

- 2019 Member of the Local Organisation Committee for the 8th Euclid France Symposium
- 2018–2019 Co-organizer of monthly PhD student research seminars at IAS
- Mar. 2018 Co-organizer of a career event for PhD students in Astronomy and Astrophysics

Personal Information

date of birth 5 August 1993
nationality French

Languages

French Native
English Fluent
Portuguese Fluent

Invited talks and seminars

- Apr. 2025 Centre de Physique des Particules de Marseille, *Optimal and robust CMB lensing power spectrum*, invited seminar
- Mar. 2025 Royal Obsertory of Edinburgh, *Optimal and robust CMB lensing power spectrum*, invited talk
- Feb. 2025 Institut d'Astrophysique Spatiale, Orsay, *Optimal and robust CMB lensing power spectrum*, invited seminar
- Jun. 2024 Instituto de Astronomia, Geofísica e Ciências Atmosféricas, University of São Paulo, Brasil, *Cosmology with gravitational lensing of the CMB*, invited seminar
- Apr. 2024 Principia institute, São Paulo, Brasil, São Paulo Research Group meetings in Astro and Cosmo <https://www.ictp-saifr.org/astrocosmomeeting/>
- Mar. 2024 Observatoire de la Cote d'Azur, Laboratoire Lagrange, Nice, France, *Cosmology with gravitational lensing of the CMB*, invited seminar
- Mar. 2024 ICTP-SAIFR, IFT UNESP, Sao Paulo, Brasil, *Cosmology with gravitational lensing of the CMB*, invited colloquium
- Feb. 2024 Observatorio Nacional, Rio de Janeiro, Brasil, *Cosmology with gravitational lensing of the CMB*, invited seminar
- Jan. 2024 University of Heidelberg, Germany, *Cosmology with gravitational lensing of the CMB*, invited seminar
- Dec. 2023 CBPF, Rio de Janeiro, Brasil, *Cosmology with gravitational lensing of the CMB*, invited seminar
- Oct. 2023 University of São Paulo, Brasil, *Cosmology with gravitational lensing of the CMB*, invited colloquium
- Sep. 2022 Federal University of Rio de Janeiro, Brasil, *Next generation of CMB lensing estimation*, invited seminar
- July 2022 International workshop: Key challenges in galaxy and CMB lensing, Centre for Theoretical Cosmology, Cambridge UK, *Iterative CMB lensing power spectrum estimation*, invited talk
- May 2022 Institute for Particle Physics and Astrophysics, ETH-Zurich, Switzerland, *Next generation of CMB lensing estimation*, invited seminar
- Mar. 2022 Institut d'Astrophysique Spatiale, University Paris-Saclay, Orsay, France, *CMB lensing with deep polarization surveys*, invited seminar

Oct 2021 Scuola internazionale superiore di studi avanzati (SISSA), Trieste, Italy, *CMB lensing power spectrum with deep polarisation experiments*, invited seminar

Contributed talks and posters

- Feb. 2025 Cosmology on the Steep Rise, Sexten, *Optimal and robust CMB lensing power spectrum*, talk
- Dec. 2024 CMB France meeting, Institut Henry Poincaré, *Optimal and robust CMB lensing power spectrum*, talk
- Dec. 2024 Euclid UK meeting, Royal Astronomical Society, *Introducing the Euclid Early Career Committee*, talk
- Oct. 2024 Cambridge-LMU meeting 2024, University of Cambridge, *Optimal CMB lensing reconstruction*, talk
- Sep. 2024 New Physics from Old Light: Illuminating the Universe with CMB Secondaries, University of Cambridge *CMB lensing power spectrum with CMB-S4*, talk
- Apr. 2024 58th Rencontres de Moriond, La Thuile, Italy, *Optimal lensing power spectrum*, talk
- Aug. 2022 COSMO'2022, Rio de Janeiro, Brazil, *CMB lensing with next generation surveys*, talk
- Jul. 2022 Key Challenges in Galaxy and CMB Lensing, Centre for Theoretical Cosmology, DAMTP, Cambridge, UK
- Jul. 2022 Cosmology from home 2022, online, *CMB lensing with next generation surveys*, talk
- May 2022 From Planck to the future of CMB, Ferrara, Italy, *CMB lensing power spectrum with deep surveys*, poster
- May. 2022 CMB-S4 consortium meeting, *CMB lensing spectrum for next generation surveys*, flashtalk
- Feb. 2022 56th Rencontres de de Moriond, La Thuile, Italy *Next generation CMB lensing power spectrum*, poster
- Jul. 2021 Cosmology from home 2021, *Optimal CMB lensing power spectrum estimation*, flashtalk
- Apr. 2021 Réunion Euclid-France Clustering, *Angular redshift fluctuations: A new statistic to probe the dark sector*, talk
- Mar. 2021 CMB-S4 consortium meeting, *Optimal CMB lensing power spectrum estimation*, flashtalk
- Nov. 2020 9th Euclid France Symposium, *Probing the dark sector with Angular Redshift Fluctuations*, talk
- Feb. 2020 Cosmic Flows conference, Stellenbosch Institute for Advanced Study, South Africa, *Angular redshift fluctuations and CMB lensing*, talk
- Jun. 2019 The golden age of cosmology from Planck to Euclid, Institut d'Astrophysique de Paris, France, *Angular redshift fluctuations and CMB lensing*, poster
- May 2019 COSMOS collaboration annual meeting 2019, Flatiron Institute, New York, *The stellar to halo mass relationship in the COSMOS field*, talk
- Feb. 2019 Conférence Elbereth 2019, Institut d'Astrophysique de Paris, *Euclid and CMB lensing*, talk

- Nov. 2018 7th Euclid France Symposium, Observatoire de la Côte d'Azur, Nice, France, *Cross correlations between CMB lensing and Euclid*, talk
- Oct. 2018 Journées Nationales du PNCG 2018, Institut d'Astrophysique de Paris, France, *Stellar to halo mass relationship*, talk
- Apr. 2018 Statistical challenges for large-scale structures, Oxford, *Stellar to halo mass relationship*, talk
- Nov. 2017 Conférence Elbereth 2017, Institut d'Astrophysique de Paris, France, *Dark matter and evolution of galaxies*, talk