Léo Vacher

PH.D Student in astrophysics and cosmology

Institut de recherche en astrophysique et planétologie (IRAP). Toulouse, France

+33642851972 | leo.vacher@irap.omp.eu | https://leovacher.github.io | LeoVacher

Education

Institut de recherche en astrophysique et planétologie (IRAP) — *Toulouse, France*

PH.D in Astrophysics and cosmology — *2020 - present*

- Advisors: Dr. Jonathan Aumont and Dr. Ludovic Montier

Université de Lorraine — *Nancy, France*

Master's degree, Logic, Philosophy and History of sciences — *2021 - present*

- Specializing in philosophy and history of physics

Université Grenoble-Alpes — *Grenoble, France*

Magister, Subatomic physics and cosmology — *2018 - 2020*

- With high honors

Université Clermont Auvergne — *Clermont-Fd, France*

Bachelor Degree, Fundamental physics — *2015 - 2018*

- With high honors

Publications

1. Bruno Régaldo-Saint Blancard, Erwan Allys, Constant Auclair, François Boulanger, Michael Eickenberg, François Levrier, **Léo Vacher**, Sixin Zhang. 2022. Generative Models of Multi-channel Data from a Single Example – Application to Dust Emission. Submitted to ApJ. Preprint available at arXiv:2208.03538.

2. **Léo Vacher**, João F. Dias, Nils Schöneberg, C. J. A. P. Martins, Samy Vinzl, Savvas Nesseris, Guadalupe Cañas-Herrera, Matteo Martinelli. 2022. Constraints on extended Bekenstein models from cosmological, astrophysical, and local data. Submitted to PRD. Preprint available at arXiv:2207.03258.

3. Alessia Ritacco, François Boulanger, Vincent Guillet, Jean-Marc Delouis, Jean-Loup Puget, Jonathan Aumont, **Léo Vacher**. 2022. Dust polarization spectral dependence from Planck HFI data. Turning point on CMB polarization foregrounds modelling. Submitted to A&A. Preprint available at arXiv:2206.07671.

4. **L. Vacher**, J. Chluba, J. Aumont, A. Rotti, L. Montier. 2022. High precision modeling of polarized signals: moment expansion method generalized to spin-2 fields. Submitted to A&A. Preprint available at arXiv:2205.01049.

5. The LiteBIRD collaboration. 2022. Probing Cosmic Inflation with the LiteBIRD Cosmic Microwave Background Polarization Survey. Submitted to PTEP. Preprint available at arXiv:2202.02773.

6. **L. Vacher**, J. Aumont, L. Montier, S. Azzoni, F. Boulanger, M. Remazeilles (for the LiteBIRD collaboration). 2022. Moment expansion of polarized dust SED: a new path towards capturing the CMB B-modes with LiteBIRD. A&A: 10.1051/0004-6361/202142664. Preprint available at arXiv:2111.07742.

7. P. Vielva et al. 2022. Polarization angle requirements for CMB B-mode experiments. Application to the LiteBIRD satellite. JCAP 2022(04):029. Preprint available at arXiv:2202.01324.

8. N. Krachmalnicoff et al. 2022. In-flight polarization angle calibration for LiteBIRD: blind challenge and cosmological implications. JCAP 2022(01):039. Preprint available at arXiv:2111.09140.

9. C.J.A.P. Martins and **L. Vacher**. 2019. Astrophysical and local constraints on string theory: runaway dilaton models. Phys.Rev. D 100, 123514. Preprint available at arXiv:1911.10821.

Presentations and conferences

1. Talk. 2022. Cosmology session of the 56th Rencontres de Moriond. La Thuile, Italy. Proceedings available at arXiv:2203.07246.

2. Talk 2022. PHD Day. IRAP, France. First prize for best oral presentation.

3. Talk. 2022. CMB france #3. IAP, France.

4. Talk. 2021. IJUP, Universidade do Porto, Portugal. Award for best oral communication in "Maths, Physics & Astronomy" category.

5. Talk. 2021. CMB france #2. IAP, France.

6. Talk. 2021. Ibericos. Universidade de Coimbra, Portugal.

7. Talk. Cosmo21. University of Illinois, USA

8. Talk. 2021. PHD Day. Second prize for best oral presentation.

9. Talk. 2020. CMB france #1. IAP, France.

Academic teaching

2022 **Astrophysics**, Teaching Assistant (12 h). Université Paul Sabatier.
2021, 2022 **Thermodynamics**, Teaching Assistant (45h). Université Paul Sabatier.
2021 **Point Mechanics**, Teaching Assistant (15h). Université Paul Sabatier.
2021 **Light** & **colors**, Teaching Assistant (18h). Université Paul Sabatier.
2021, 2022 **Mechanics** & **Electrokinetics**, Lab Assistant (40h). Université Paul Sabatier.

Mentoring

2022-2023 **J. Delhomelle**, L2, Université Paul Sabatier
2020-2021 **S. Vinzl**, L2, Université Paul Sabatier
2021-2022 **N. Gentil**, L2, Université Paul Sabatier

Collaborations

LiteBIRD collaboration. Involved in systematics, foreground separation and galactic science groups.

Euclid consortium. Active member of Work Package 10 of the theoretical cosmology working group.

Outreach and services

Other teaching activities

2021 **PLANCKS**, Marker for the international competition, cosmology session *Porto*
2016-2018 **Insignis**, Weekly group lessons of mathematics from secondary to high school *Clermont-Fd*
2016-2021 **High-school interventions**, Discussion in class of philosophy about modern physics *Clermont-Fd*
2016-2021 **Primary school interventions**, Introduction to astronomy. *Lyon*

Associative activities

2020-2022 **Les étoiles brillent pour tous**, Public science outreach (hospitals, prisons ...) *Toulouse*
2020-2023 **UniverSciel**, Animations related to astronomy in schools. *Toulouse*
2020-2023 **UPS in space**, Astronomical observations and public talks. *Toulouse*
2018 **Le campus des étoiles**, Public astronomical observations, science outreach. *Clermont-Fd*

Writings

2021-today **Yolonomy**, Teaching and outreach in physics
2021 **Exploreur**, Web journal article. «LiteBIRD en quête des premières fractions de secondes de l'Univers.»
2021 **Pulsar #41**, Book review. « A General Relativity Workbook by Thomas A. Moore»