

Arthur Loureiro

RESEARCHER · ASTROPHYSICS & COSMOLOGY

The Oskar Klein Centre for Cosmoparticle Physics, Department of Physics, Stockholm University, Stockholm SE-106 91, Sweden
Visitor at Imperial Centre for Cosmology and Inference, Imperial College London, Physics Department, London, UK

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Research & Work Experience

Stockholm University

Stockholm, Sweden

RESEARCHER

March. 2023 - Ongoing

Researcher working with Prof. Jens Jasche, Prof. Hiranya Peiris, and LSST DESC software in-kind contributions.

Imperial College London

London, United Kingdom

POST-DOCTORAL RESEARCH ASSOCIATE (CURRENTLY VISITING RESEARCHER)

Dec. 2019 - PRESENT

PDRA (2019-2020) and visiting researcher (currently) working with Profs. Heavens & Jaffe on Field Level Inference for Cosmic Shear on the sphere.

University of Edinburgh

Edinburgh, United Kingdom

SENIOR SCIENTIST/DEVELOPER (50% FTE UNTIL OCT. 2022)

Sept. 2021 - Feb. 2023

Euclid SGS Senior Scientist/Developer working with Prof. Andy Taylor on weak lensing shape measurement calibration and sensitivity.

University College London

London, United Kingdom

RESEARCH FELLOW (50% FTE FROM SEPT. 2021)

Apr. 2020 - Sept. 2022

UCL Research Fellow working with Prof. Benjamin Joachimi on Bayesian methods for cosmological galaxy surveys such as the Euclid Satellite.

University College London

London, United Kingdom

POST-DOCTORAL RESEARCH ASSISTANT

Dec. 2018 - Dec. 2019

Euclid SGS PDRA working with Prof. Benjamin Joachimi on pipeline development, testing, and validation for Weak Lensing power spectra.

Education

University College London

London, United Kingdom

PHD IN ASTROPHYSICS

2015 - 2019

Advisors: Dr. Filipe Abdalla and Prof. Ofer Lahav

Thesis: The Universe in Harmonic Space: Neutrinos and Dark Energy

University of São Paulo

São Paulo, Brazil

MASTERS IN MATHEMATICAL PHYSICS

2013 - 2015

Advisor: Prof. L. Raul Abramo

Thesis: Galaxy Power Spectrum: A Monte-Carlo Approach

Université de Montréal

Montréal, Canada

UNDERGRADUATE EXCHANGE

2012

Exchange program as a bachelor student in Physics under the Science without Borders Scholarship.

Universidade Federal do Rio Grande do Sul

Porto Alegre, Brazil

UNDERGRADUATE DEGREE IN PHYSICS WITH EMPHASIS IN ASTROPHYSICS

2010 - 2013

Advisor: Prof. Silvio R. Dahmen

Dissertation: Relativistic Thermodynamics applied to Cosmological Models

Grants & Awards

UNIVERSITY COLLEGE LONDON (UNITED KINGDOM)

2020-2022 **UCL Provost Strategic Fund Fellowship**, University College London

£112 554

NATIONAL COUNCIL FOR SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT (BRAZIL)

2015-2018 **Science without Borders PhD Fellowship**, University College London

£131 378

2013-2015 **CNPq Masters Scholarship**, University of São Paulo

R\$30 000

2012 **Science without Borders Exchange Scholarship**, Université de Montréal

CAN\$6700

Skills & Professional Services

Programming	Advanced Python, Jupyter Notebook, Bash, and Slurm for HPC; intermediate C/C++, Julia, SQL.
Cosmological Codes	CLASS, Hi-CLASS, CAMB, Monte Python, Flask, CCL, Healpix, and Glass (co-developer)
Peer Reviewer	Journal of Cosmology and Astroparticle Physics, Monthly Notices of the Royal Astronomical Society, The Open Journal of Astrophysics
Scientific Collaborations	LSST Dark Energy Science Collaboration, Euclid Consortium, Kilo Degree Survey, Aquila Consortium
Leadership Roles	PDRA Representative at UCL's Astro Group (2020-2022), Co-Lead Euclid LE3 Weak Lensing Pre-Launch Key Project (2021-2022)
Languages	English: Fluent (speaking, reading, writing); Portuguese: Native; French: Intermediate (speaking, reading) and basic (writing); Spanish: Basic (writing, speaking, reading);

Publications

An up-to-date list of publications and citations can be found in [ADS here](#).

* Identify publications for which I am a corresponding author but not the first author.

1. *Almanac: MCMC-based signal extraction of power spectra and maps on the sphere*
E. Sellentin, **A. Loureiro***, L. Whiteway et al. *The Open Journal of Astrop.*, 6, 31, 2023
2. *GLASS: Generator for Large Scale Structure*
N. Tessore, **A. Loureiro***, B. Joachimi et al., *The Open Journal of Astrop.*, 6, 11, 2023
3. *Almanac: Weak Lensing power spectra and map inference on the masked sphere*
A. Loureiro, L. Whiteway, E. Sellentin, J. S. Lefaurie, A. H. Jaffe, A. F. Heavens, *The Open Journal of Astrop.*, 6, 6, 2023
4. *Euclid preparation. TBD. Galaxy power spectrum modelling in real space*
Euclid Collab., A. Pezzotta et al. (incl. **A. Loureiro**), ArXiv:2312.00679, Submitted to A&A, 2023
5. *Euclid Preparation. TBD. Galaxy colour selections with Euclid and ground photometry for cluster weak-lensing analyses*
Euclid Collab., G. F. Lesci et al. (incl. **A. Loureiro**), ArXiv:2311.16239, Submitted to A&A, 2023
6. *Euclid preparation TBD. Modelling spectroscopic clustering on mildly nonlinear scales in beyond- Λ CDM models*
Euclid Collab., B. Bose et al. (incl. **A. Loureiro**), ArXiv:2311.13529, Submitted to A&A, 2023
7. *Euclid preparation TBD. Spectroscopy of active galactic nuclei with NISP*
Euclid Collab., E. Lusso et al. (incl. **A. Loureiro**), ArXiv:2311.12096, Submitted to A&A, 2023
8. *Euclid Preparation. TBD. Impact of magnification on spectroscopic galaxy clustering*
Euclid Collab., G. Jelic-Cizmek et al. (incl. **A. Loureiro**), ArXiv:2311.03168, Submitted to A&A, 2023
9. *Euclid preparation. TBD. The effect of baryons on the Halo Mass Function*
Euclid Collab., T. Castro et al. (incl. **A. Loureiro**), ArXiv:2311.01465, Submitted to A&A, 2023
10. *Euclid preparation. TBD. Forecast impact of super-sample covariance on 3x2pt analysis with Euclid*
Euclid Collab., D. Sciotti et al. (incl. **A. Loureiro**), ArXiv:2310.15731, Submitted to A&A, 2023
11. *Euclid preparation. TBD. The effect of linear redshift-space distortions in photometric galaxy clustering and its cross-correlation with cosmic shear*
Euclid Collab., K. Tanidis et al. (incl. **A. Loureiro**), ArXiv:2309.00052, Submitted to A&A, 2023
12. *Euclid Preparation. TBD. Characterization of CNNs for the identification of galaxy-galaxy strong lensing events*
Euclid Collab., L. Leuzzi et al. (incl. **A. Loureiro**), ArXiv:2307.08736, Submitted to A&A, 2023
13. *Euclid preparation. XXIX. Water ice in spacecraft Part I: The physics of ice formation and contamination*
Euclid Collab., M. Schirmer et al. (incl. **A. Loureiro**), A&A, 675, 2023
14. *Euclid preparation. XXXI. The effect of the variations in photometric passbands on photometric-redshift accuracy*
Euclid Collab., S. Paltani et al. (incl. **A. Loureiro**), ArXiv:2310.14716, Submitted to A&A, 2023
15. *Euclid preparation. XXX. Performance assessment of the NISP Red-Grism through spectroscopic simulations for the Wide and Deep surveys*
Euclid Collab., L. Gabarra et al. (incl. **A. Loureiro**), A&A, 676, 2023
16. *Euclid preparation. XXVII. A UV-NIR spectral atlas of compact planetary nebulae for wavelength calibration*
Euclid Collab., K. Paterson et al. (incl. **A. Loureiro**), A&A, 674, 2023
17. *Euclid preparation: XXVIII. Modelling of the weak lensing angular power spectrum*
Euclid Collab., A. C. Deshpande et al. (incl. **A. Loureiro**), ArXiv:2302.04507, Submitted to A&A, 2023
18. *Euclid preparation. XXXII. Evaluating the weak lensing cluster mass biases using the Three Hundred Project hydrodynamical simulations*
Euclid Collab., C. Giocoli et al. (incl. **A. Loureiro**), ArXiv:2302.00687, Submitted to A&A, 2023
19. *Euclid Preparation XXVIII: Forecasts for 10 different higher-order weak lensing statistics*
Euclid Collab., V. Ajani et al. (incl. **A. Loureiro**), A&A, 675, 2023
20. *Euclid preparation: XXIII. Derivation of galaxy physical properties with deep learning using mock fluxes and H-band images*

- Euclid Collab., L. Bisigello et al. (incl. **A. Loureiro**), *MNRAS*, 520, 2023
21. [Euclid preparation. XXV. The Euclid Morphology Challenge – Towards model-fitting photometry for billions of galaxies](#)
Euclid Collab., E. Merlin et al. (incl. **A. Loureiro**), *A&A*, 671, 2023
 22. [Euclid preparation XXVI: The Euclid Morphology Challenge. Towards structural parameters for billions of galaxies](#)
Euclid Collab., H. Bretonnière et al. (incl. **A. Loureiro**), *A&A*, 671, 2023
 23. [Euclid preparation. XXIV. Calibration of the halo mass function in \$\Lambda\(\nu\)\$ CDM cosmologies](#)
Euclid Collab., T. Castro et al. (incl. **A. Loureiro**), *A&A*, 671, 2023
 24. [Fisher matrix for the angular power spectrum of multi-tracer galaxy surveys](#)
L. R. Abramo, J. V. D. Ferri, I. L. Tashiro & **A. Loureiro**, *JCAP*, 08, 2022
 25. [KiDS & Euclid: Cosmological implications of a pseudo- \$C_\ell\$ analysis of KiDS-1000 cosmic shear tomography](#)
A. Loureiro, L. Whittaker, A. Spurio Mancini, KiDS Collaboration & Euclid Collab., *A & A*, 665, 2022
 26. [Euclid preparation. XXVII. Covariance model validation for the 2-point correlation function of galaxy clusters](#)
Euclid Collab., A. Fumagalli et al. (incl. **A. Loureiro**), *ArXiv:2211.12965*, Submitted to *A&A*, 2022
 27. [Euclid: Covariance of weak lensing pseudo- \$C_\ell\$ estimates. Calculation, comparison to simulations, and dependence on survey geometry](#)
R. Upham et al. (incl. **A. Loureiro**), *A & A*, 660, 2022
 28. [Euclid preparation: XX. The Complete Calibration of the Color-Redshift Relation survey: LBT observations and data release](#)
Euclid Collab., R. Saglia et al. (incl. **A. Loureiro**), *A & A*, 664, 2022
 29. [Upper Bound of Neutrino Masses from Combined Cosmological Observations and Particle Physics Experiments](#)
A. Loureiro, A. Cuceu, et al., *Physical Review Letters*, 123, 2019
 30. [Cosmological measurements from angular power spectra analysis of BOSS DR12 tomography](#)
A. Loureiro, B. Moraes, et al., *MNRAS*, 485, 2019
 31. [Fourier analysis of multitracer cosmological surveys](#)
L. R. Abramo, L. F. Secco & **A. Loureiro**, *MNRAS*, 455, 2016

Research Supervision

2023	Ivan Sladoljev (MSc Erasmus) , Supervisor for Erasmus Exchange Research Trainee from U. of Zagreb on a project “Field Level Inference for PNGs in the CMB”	Stockholm University
2020 - 2021	Lisa Goh (MSc) , Co-supervisor together with Dr Lee Whittaker and Dr Benjamin Joachimi on a project “Pseudo- C_ℓ likelihood for the Euclid galaxy survey”	UCL
2018	Andrei Cuceu (undergrad) , Co-supervisor with Dr Bruno Moraes on a Summer Internships (12 weeks) project “Simultaneous constraints of Cosmology and redshift distribution from galaxy surveys and CMB data” (Funded by RAS)	UCL
2018	Marion Thomas (undergrad) , Co-supervisor on a Summer Internship (12 weeks) project “Synergies between Spectroscopic and Photometric Galaxy Surveys” (Funded by RAS)	UCL
2018	Joshua Lawton (undergrad) , Co-supervisor on a Summer Internship (12 weeks) project “Creating a Galaxy Clustering Catalogue with PanSTARRS”	UCL
2017	Andrei Cuceu (undergrad) , Co-supervisor with Dr Bruno Moraes on a Summer Internship (12 weeks) project “Cosmological Constraints from Supernova Surveys and Planck CMB data”	UCL

Teaching Experience

University of Edinburgh

TEACHING ASSISTANT - PHD LEVEL

Teaching assistant at the PhD Hackathon on data analysis (2022)

Edinburgh, UK

2022

University College London

TEACHING ASSISTANT - UNDERGRADUATE LEVEL

Practical Astronomy 2 (2017, 2018), Observational Astronomy 1 (2017), Practical Physics 2 (2017), Practical Skills for Astronomy (2016)

London, UK

2016 - 2018

University of São Paulo

TEACHING ASSISTANT - UNDERGRADUATE LEVEL

Physical Cosmology (2015), Advanced Quantum Mechanics (2014)

São Paulo, BR

2014 - 2015

Universidade Federal do Rio Grande do Sul

TEACHING ASSISTANT - UNDERGRADUATE LEVEL

Basic Astronomy (2011, 2013), Psychology of Education (2010)

Porto Alegre, BR

2010 - 2013

Private

TUTOR - HIGH-SCHOOL LEVEL

Physics & Mathematics for high-school

Porto Alegre, BR

2011 - 2013

Outreach

Project Collaborator for #AstroThreadBR and #AstroMiniBR

SOCIAL MEDIA ENGAGEMENT

Twitter

2019-2022

Engagement with the science enthusiasts community in Brazil via the #AstroThreadBR and #AstroMiniBR projects using twitter threads to educate the general public about astronomy. Threads have, on average, a reach of 10-20k impressions.

Talk: “Weighing Ghost Particles with the Universe”

YouTube

PUBLIC ENGAGEMENT TALK

2020

Outreach talk for Astronomy on Tap London, live on YouTube. URL: <https://youtu.be/MLwBvdc675A>

Article: “Ghost particles: how galaxies helped us weigh the lightest neutrino”

The Conversation

PRESS RELEASE

2019

Article published at The Conversation portal related to Loureiro et al. 2019b, informing the general public about the main results in the paper.

Talk: “Hunting Ghosts with Galaxies”

Porto Alegre, BR

PUBLIC ENGAGEMENT TALK

2018

Outreach talk at a high school about Cosmology, Neutrinos, and data science.

If a Tree falls in the Forrest: Cosmology meets Art

Grizdale Forest, UK

ART EXHIBITION

2018

Art exhibition in collaboration with the Royal College of Arts. Presentation of a workpiece “Confirmation of Time” in collaboration with the artist Franziska Hatton. URL: <http://ifatreefalls.rca.ac.uk>

L’Observatoire Bizarre

London, UK

ROYAL ACADEMY OF ARTS LATES

2018

Public engagement in collaboration with the Royal College of Arts at the Dada & Surrealism RA Late. Organised by Dr. Andrew Pontzen and Michaela French.

Physics Club: “Time in Cosmology”

Porto Alegre, BR

PUBLIC ENGAGEMENT TALK

2015

Outreach talk at the Physics Club, Universidade Federal do Rio Grande do Sul.

Selected Talks

2023	Dark Sector Cosmology Talk , Jet Propulsion Lab, NASA/Caltech	Passadena, US
2023	Cosmology Talk , The Oskar Klein Centre, Stockholm University	Stockholm, SE
2022	Talk at GR effects in observing the Large-Scale Structure of the Universe , Universidade do Porto	Porto, PT
2022	Cosmology Seminar , Queen Mary University of London	London, UK
2022	Cosmology Seminar , University of Portsmouth	Portsmouth, UK
2021	Cosmology Group Talk , University of São Paulo	São Paulo, BR
2021	Stobie Talk on Science Funding Crisis in Brazil , University of Edinburgh	Edinburgh, UK
2021	Cosmology Seminar at the PPGCosmo , Federal University of Espirito Santo	Vitória, BR
2021	Talk at the DES Harmonic Space Working Group , Dark Energy Survey	Online
2021	Cosmology Seminar , CosmoStat, Commissariat à l'énergie atomique (CEA)	Saclay, FR
2021	Cosmology Seminar , Max Planck Institute for Astrophysics	Munich, GE
2020	Talk at the Kilo Degree Survey Busy Week , German Centre for Cosmological Lensing	Bochum, GE
2019	Seminar at the Royal Observatory's Coffee Talks , University of Edinburgh	Edinburgh, UK
2019	Seminar at the EEP Group Meeting , University of Sussex	Brighton, UK
2019	Talk at the Spectroscopic Surveys Meeting , University College London	London, UK
2019	Talk at the Euclid Consortium Meeting , University of Helsinki	Helsinki, FN
2018	Talk at the Dark Energy Survey Collaboration Meeting , University of Campinas	Campinas, BR
2018	Astrophysics Seminar , Universidade Federal do Rio Grande do Sul	Porto Alegre, BR
2018	Department of Mathematical Physics Seminar , University of São Paulo	São Paulo, BR
2018	Astrophysics Seminar , National Institute for Space Research	SJ dos Campos, BR
2018	Seminar for UCL's Lunch Talks , University College London	London, UK
2017	Talk at the Dark Energy Survey Collaboration Meeting , University of Chicago	Chicago, US
2018	Talk at the Euclid Consortium Meeting , University College London	London, UK
2017	Talk at the Euclid UK Collaboration Meeting , University of Portsmouth	Portsmouth, UK
2017	Talk at the Euclid OU-LE3 Meeting , Royal Astronomical Society	London, UK
2016	Talk at the Dark Energy Collaboration Meeting , Cambridge University	Cambridge, UK
2015	Talk at the J-PAS Warm-up Meeting , University of São Paulo	São Paulo, BR

Event Organisation

Euclid Collab. Meeting, Session on Field Level Inference

Copenhagen, DN

CO-ORGANISER

May/2023

Euclid Weak Lensing Science Working Group Meeting

CO-ORGANISER

GR effects in observing the Large-Scale Structure of the Universe

SESSION CHAIR

Cosmology and Extragalactic Seminars at UCL

ORGANISER

Euclid CalWG, Garage Day & OU-LE3 Meeting

ORGANISER

Euclid Consortium Meeting

ORGANISATIONAL GROUP

Euclid Level 3 Simulations Meeting

ORGANISER

CosmoClub

ORGANISER

Edinburgh, UK

Dec/2022

Porto, PT

Jun/2022

London, UK

Jan/2019 - Jan/2021

London, UK

2017

London, UK

2017

London, UK

2017

São Paulo, BR

2014

References

Prof. Hiranya Peiris

PROFESSOR IN ASTROPHYSICS (1909)

Contact: hiranya.peiris@ast.cam.ac.uk

University of Cambridge

Prof. Alan Heavens

CHAIR IN ASTROSTATISTICS

Contact: a.heavens@imperial.ac.uk

Imperial College London

Prof. Jens Jasche

ASSOCIATE PROFESSOR OF PHYSICS

Contact: jens.jasche@fysik.su.se

Stockholm University

Prof. Benjamin Joachimi

READER IN ASTRONOMY

Contact: b.joachimi@ucl.ac.uk

University College London

Prof. Andrew Jaffe

PROFESSOR OF ASTROPHYSICS AND COSMOLOGY AND DIRECTOR OF IMPERIAL CENTER FOR COSMOLOGICAL INFERENCE

Contact: a.jaffe@imperial.ac.uk

Imperial College London

Prof. L. Raul Abramo

PROFESSOR AT THE MATHEMATICAL PHYSICS DEPARTMENT

Contact: abramo@if.usp.br

University of São Paulo