KRISHNA NAIDOO | *CURRICULUM VITAE*

RESEARCH FELLOW IN LARGE SCALE STRUCTURE
INSTITUTE OF COSMOLOGY AND GRAVITATION
UNIVERSITY OF PORTSMOUTH

Computational cosmologist specialising in modified gravity, nonlinear structure formation, cosmic-web statistics, and Stage-IV cosmological surveys.

krishna.naidoo@port.ac.uk | www.krishnanaidoo.com | ORCID: 0000-0002-9182-1802

CAREER SUMMARY

My research focuses on testing cosmological models beyond ΛCDM through theoretical modelling, numerical simulations, and novel large-scale structure statistics. I am currently a postdoctoral researcher at the University of Portsmouth working on modified gravity and dynamical dark energy, a member of the DESI and Euclid collaborations and co-lead of the Beyond-wCDM Models Topical Team within Rubin LSST DESC. My work connects fundamental physics to observations from next-generation cosmological surveys.

Technical expertise: High-performance computing • Scientific software engineering • Bayesian inference • Numerical simulations • Statistical data analysis • Python/C++ • Parallel computing

KEY CAREER METRICS

- 38 refereed publications (12 first author)
- 117 publications overall
- 4,398 total citations (h-index 18)
- 14 invited talks
- 37,000+ software downloads
- Rubin LSST DESC topical-team co-lead

RESEARCH HIGHLIGHTS

Cosmic-Web Statistics and Neutrino Mass

Developed minimum spanning tree and graph-based statistics for large-scale structure analysis, demonstrating enhanced sensitivity to neutrino mass and enabling field-level analyses now incorporated into the DESI Alternative Clustering Methods Key Project.

Open-Source Cosmology Software

Developed research software including MiSTree, MIMIC, CACTUS, FIESTA and SHIFT, and led major redevelopment of Hi-COLA v2 for modified gravity simulations and inference.

Stage-IV Cosmology

Developed statistical methods and software infrastructure for DESI and Euclid, including covariance estimation adopted within the Euclid Science Ground Segment.

Modified Gravity and Dynamical Dark Energy

Developed theoretical, numerical, and observational frameworks for testing Horndeski gravity and dynamical dark energy using large-scale structure observables and N-body simulations.

SELECTED PUBLICATIONS

Selected publications representative of research in modified gravity, cosmic-web statistics, survey methodology, and cosmological software.

- **Naidoo**, Hallam, Baker, Sirera (2026), *Constraints on Horndeski Gravity with Phantom Crossing*, arXiv, arXiv:2606.20794.
- **Naidoo**, Jaber, Hellwing & Billicki (2024), *A dark matter solution to the H_0 and S_8 tensions, and the integrated Sachs-Wolfe void anomaly*, Phys. Rev. D, 109, 083511.
- **Naidoo** & Lahav (2025), *Methods for robustly measuring the minimum spanning tree and other field-level statistics from galaxy surveys*, RASTI, 4, rzaf014.
- **Naidoo**, Massara & Lahav (2022), *Cosmology and neutrino mass with the Minimum Spanning Tree*, MNRAS, 513, 3596.
- Euclid Collaboration; **Naidoo** et al. (2026), *Euclid preparation: LXXXIX. Accurate and precise data-driven angular power spectra covariances*, A&A, 708, A167.
- **Naidoo** (2019), *MiSTree: a Python package for constructing and analysing Minimum Spanning Trees*, JOSS, 4, 1721.

ACADEMIC APPOINTMENTS

Research Fellow, University of Portsmouth	09/2024–present
Research Fellow (Euclid Mission), UCL	03/2023–08/2024
Postdoctoral Research Associate, CTP PAS	09/2020–02/2023
Postdoctoral Research Associate, UCL	06/2020–08/2020

EDUCATION

PhD Physics & Astronomy, University College London (Advisor: Ofer Lahav)	10/2016–05/2020
MSci Astrophysics (First Class Honours), University College London	09/2011–07/2015

SOFTWARE

- Lead developer of **Hi-COLA v2**, including major redevelopment and support for simulating and constraining broader regions of Horndeski parameter space.
- Developed **MiSTree**, a public package for minimum spanning tree analyses of large-scale structure (>37,000 downloads).
- Developed software including CACTUS, MIMIC, FIESTA, MAGPIE, SHIFT, SkySegmentor, pyGenISW, and TheoryCL.
- **DICES** covariance estimation framework adopted within the Euclid Science Ground Segment.

SERVICE & LEADERSHIP

- Co-lead, Rubin LSST DESC Beyond-wCDM Models Topical Team (2026–2028)
- Lead minimum spanning tree analysis, DESI Alternative Clustering Methods Key Project
- Contributor to Euclid covariance estimation and photometric-redshift calibration pipelines
- Mentor, DESI Mentorship Programme (2024–present)
- Co-organiser, UCL Cosmology & Extragalactic Seminar Series (2024)
- Referee for A&A, ApJ, JCAP and MNRAS
- Organiser, CACTUS/MIMIC Workshop, UCL (2023)

INVITED TALKS

Seminars and Colloquiums

Seminar, Royal Holloway	09/2026
Computational Astrophysics Seminar, University of Hertfordshire	05/2026
Seminar, Liverpool John Moores University	03/2026
Friday Lunchtime Astrophysics Talk (FLAT), Durham, UK	02/2025
Cosmology & Extragalactic Seminar, University College London, London, UK	10/2023
Friday Lunchtime Astrophysics Talk (FLAT), Durham, UK	02/2023
CosmoVerse Seminar	11/2022

Invited Conference and Collaboration Talks

DESC MCP-Beyond wCDM Telecon	06/2026
Early Career Science DESI Talk	02/2025
Connecting the Dots Workshop, University College London, London, UK	07/2024
LSST-DESC Photometric Redshifts Working Group	11/2022
Forward Modelling in Cosmology, RAS, London, UK	12/2019
From Deep Learning to the Dark Universe, Cumberland Lodge, UK	04/2019

SUPERVISION & MENTORING

- James Hallam (PhD co-supervisor, Portsmouth, 2025 – present)
- Leonor Simões (MSci, UCL, 2023–24) – Brian Duff Memorial Prize 2024; PhD student at UCL
- Jisu Kim (MSc, UCL, 2023–24) – PhD student at University of Paris-Saclay
- Harvey Mycroft (BSc, Portsmouth, 2024–25)
- Leonor Simões (Summer Student, funded by the Brian Duff Studentship, UCL, 2023)
- DESI Mentorship Programme: Rasa Cereskaite (2024), Holly Seo (2025–26)