Dr. Enrique Paillas

Postdoctoral Fellow
Waterloo Centre for Astrophysics
200 University Av. W., Waterloo, ON, Canada N2L3G1

Citizenship: Chile
enrique.paillas@uwaterloo.ca
epaillas.github.io

Positions

University of Arizona   Starting Fall 2024
Steward Observatory Prize Fellow

University of Waterloo   2021 — 2024
WCA Postdoctoral Fellow
Advisor: Prof. Will Percival

Education

Pontificia Universidad Católica de Chile (PUC)   2017 — 2021
Ph. D. in Astrophysics (*summa cum laude*)
Advisor: Dr. Nelson Padilla

Pontificia Universidad Católica de Chile (PUC)   2015 — 2017
M. Sc. in Astrophysics (*summa cum laude*)
Advisor: Dr. Nelson Padilla

Universidad Nacional Andrés Bello (UNAB)   2010 — 2014
Licenciate in Astronomy (*cum laude*)

Fellowships & Awards

Steward Observatory Prize Fellowship   2024
Prize Fellowship in Cosmological Data Analysis at Steward
Observatory, University of Arizona.

WCA Postdoctoral Fellowship   2024
Postdoctoral Fellowship at the Waterloo Centre for Astrophysics,
University of Waterloo.

Excellence in Doctoral Thesis Award   2021
Yearly award granted by the Research Vice-Rectory at PUC.

Adelina Gutiérrez Travel Grant   2017
Research stipend awarded by the Chilean Astronomical Society.

ANID Graduate Research Fellowship   2017—2021
Fellowship awarded by the Chilean Ministry of Education.

Leadership roles

Co-lead of the Alternative Clustering Methods topical group in DESI   2022 - present

A sub-group within the Galaxy & Quasar clustering WG in DESI, which encapsulates projects related to galaxy clustering statistics beyond the standard power spectrum analysis. The leads organize weekly telecons and coordinate efforts from all the different projects.

Co-lead of the Optimal Reconstruction task force for DESI Key Project 4   2022 - present

Task force that focuses on calibrating the pipeline that DESI will use to optimally extract the baryon acoustic oscillation signal from the galaxy and quasar samples, by using the technique of density-field reconstruction.

Grants

ComputeCanada Resources for Research Groups 2022 competition   2022A — present

1,349 core years on the narval-compute system awarded to "Cosmology from galaxy surveys" (PI: Percival; ID 4030)

Student Supervision & Mentoring

Tristan Fraser (Mentor; PhD student)   2021B—present

Project: "Alcock-Paczynski and RSD constraints from the void-galaxy cross-correlation in DESI Y1 data" | Institution: Waterloo Centre for Astrophysics, University of Waterloo.

James Morawetz (Mentor; Msc student)   2022B—present

Project: "Cosmological measurements with the multi-tracer and density-split techniques" | Institution: Waterloo Centre for Astrophysics, University of Waterloo.

Service

Reviewer for Monthly Notices of the Royal Astronomical Society	2023—present
Reviewer for The Astrophysical Journal	2018—present
Reviewer for Astronomy & Astrophysics	2022—present

Teaching

Teaching Assistant, Introduction to Astronomy (PUC)	2018A
Teaching Assistant, Differential Calculus (UNAB)	2014A
Teaching Assistant, Differential Equations (UNAB)	2013A
Teaching Assistant, Introduction to Mathematics (UNAB)	2012—2013

Software

Selected software under active development:

acm — Alternative Clustering Methods – an analysis pipeline for DESI   2019—present
Lead developer | github.com/epaillas/acm

densitysplit — characterization of density-dependent galaxy clustering   2019—present
Lead developer | github.com/epaillas/densitysplit

sunbird – emulation of clustering statistics with neural networks   2022—present
Co-developer | github.com/florpi/sunbird

Publication List

First and second author

9. **Paillas**, Ding, Chen et al.: *Optimal Reconstruction of Baryon Acoustic Oscillations for DESI 2024*, submitted to JCAP, arXiv:2404.03005

8. **Paillas**, Cuesta-Lazaro, Percival et al.: *Cosmological constraints from density-split clustering in the BOSS CMASS galaxy sample*, submitted to MNRAS, arXiv:2309.16541

7. Cuesta-Lazaro, **Paillas**, Yuan et al.: *SUNBIRD: A simulation-based model for full-shape density-split clustering*, submitted to MNRAS, arXiv:2309.16539

6. **Paillas**, Cuesta-Lazaro, Zarrouk et al.: *Constraining $\nu\Lambda CDM$ through density-split clustering*, Monthly Notices of the Royal Astronomical Society (2023), 522, 606P

5. **Paillas**, Cai, Padilla *&* Sánchez: *Redshift-space distortions with split densities*, Monthly Notices of the Royal Astronomical Society (2021), 505, 5731

4. Davies, **Paillas**, Cautun *&* Li: *Optimal void finders in weak lensing maps*, Monthly Notices of the Royal Astronomical Society (2020), 500, 2417

3. **Paillas**, Cautun, Li et al.: *The Santiago-Harvard-Edinburgh-Durham void comparison II: unveiling the Vainshtein screening using weak lensing*, Monthly Notices of the Royal Astronomical Society (2020), 484, 1149

2. Cautun, **Paillas**, Cai et al.: *The Santiago-Harvard-Edinburgh-Durham void comparison I: SHEDding light on chameleon gravity tests*, Monthly Notices of the Royal Astronomical Society (2020), 476, 3195

1. **Paillas**, Lagos, Padilla et al.: *Baryon effects on void statistics in the EAGLE simulation*, Monthly Notices of the Royal Astronomical Society (2017), 470, 4434

Co-authored publications

18. Chen, Howlett et al. (including **Paillas**): *Baryon Acoustic Oscillation Theory and Modelling Systematics for the DESI 2024 results*, submitted to MMNRAS

17. DESI Collaboration (including **Paillas**): *DESI 2024 III: Baryon Acoustic Oscillations from Galaxies and Quasars*, submitted to JCAP

16. DESI Collaboration (including **Paillas**): *DESI 2024 IV: Baryon Acoustic Oscillations from the Lyman Alpha Forest*, submitted to JCAP

15. DESI Collaboration (including **Paillas**): *DESI 2024 VI: Cosmological Constraints from the Measurements of Baryon Acoustic Oscillations*, submitted to JCAP

14. Rashkovetskyi et al. (including **Paillas**): *Semi-analytical covariance matrices for two-point correlation function for DESI 2024 data*, submitted to JCAP

13. Mena-Fernández et al. (including **Paillas**): *HOD-Dependent Systematics for Luminous Red Galaxies in the DESI 2024 BAO Analysis*, submitted to JCAP

12. Garcia-Quintero et al. (including **Paillas**): *HOD-Dependent Systematics in Emission Line Galaxies for the DESI 2024 BAO analysis*, submitted to JCAP

11. Ding et al. (including **Paillas**): *Suppressing the sample variance of DESI-like galaxy clustering with fast simulations*, submitted to JCAP

10. Beyond-2pt Collaboration (including **Paillas**): *A mock data challenge for beyond-2pt statistics*, in preparation

9. Woodfinden et al. (including **Paillas**): *Cosmological measurements from void-galaxy and galaxy-galaxy clustering in the Sloan Digital Sky Survey*, Monthly Notices of the Royal Astronomical Society, 523, 6360W

8. DESI Collaboration (including **Paillas**): *Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument*, submitted to the Astronomical Journal

7. DESI Collaboration (including **Paillas**): *The Early Data Release of the Dark Energy Spectroscopic Instrument*, submitted to the Astronomical Journal

6. Radinovic et al. (including **Paillas**): *Euclid: Cosmology forecasts from the void-galaxy cross-correlation function with reconstruction*, in collaboration-wide review

5. Kulier et al. (including **Paillas**): *The evolution of the baryon fraction in haloes as a cause of scatter in the galaxy stellar mass in the EAGLE simulation*, Monthly Notices of the Royal Astronomical Society (2019), 482, 3261K

4. Mao et al. (including **Paillas**): *DESCQA: An Automated Validation Framework for Synthetic Sky Catalogs*, The Astrophysical Journal (2018), 234, 36

3. Takáts et al. (including **Paillas**): *SN 2009ib: A Type II-P Supernova with an Unusually Long Plateau*, Monthly Notices of the Royal Astronomical Society (2015), 450, 3137

2. Bufano et al. (including **Paillas**): *SN2011hs: a Fast and Faint Type IIb Supernova from a Supergiant Progenitor*, Monthly Notices of the Royal Astronomical Society (2014), 439, 1807

1. Takáts. (including **Paillas**): *SN 2009N: Linking normal and subluminous type II-P Sne*, Monthly Notices of the Royal Astronomical Society (2014), 438, 368

Invited Talks

Seminar talk, Berkeley Center for Cosmological Physics, Berkeley, CA	01/2023
Science Talk, Euclid Consortium, Voids WP Telecon	03/2022
Seminar Talk, Waterloo Centre for Astrophysics, University of Waterloo, Waterloo, ON, Canada	01/2022
Mock Innsbruck: the connection between galaxies and dark matter haloes, Innsbruck, Austria	04/2020
Seminar Talk, University Observatory, Ludwig-Maximilians-Universität München, Munich, Germany	06/2019
Dynamics of the Large-scale Structure, Excellence Cluster 'Origins', MIAPP, Munich, Germany	06/2019
Seminar Talk, Max Planck Institute for Astronomy, Munich, Germany	06/2019
Mock Córdoba: galaxy formation for gravity and cosmology, Observatorio Astronómico de Córdoba, Córdoba, Argentina.	04/2019

Selected Contributed Talks

New Strategies For Extracting Cosmology From Future Galaxy Survey, Sexten, Italy	07/2023
DESI Collaboration Meeting, DoubleTree Berkeley Marina Hotel, San Francisco, CA, USA	06/2022
Friends-of-Friends meeting, virtual conference, hosted by Observatorio Astronómico de Córdoba	05/2021
The Cosmic Web: from galaxies to cosmology, Royal Observatory, Edinburgh, UK	05/2019
LSST DESC Collaboration Meeting, SLAC, San Francisco, CA, USA	03/2018

Outreach (Selected talks, events & positions)

General public talk at Astronomy on Tap in Kitchener/Waterloo: "A quest for dark energy: mapping the Universe on the largest scales"	August 2023
Author at "Astrobitos", the spanish-speaking version of the astro-ph reader's digest "Astrobites" [link]	2016 – 2017