

NISHA GREWAL

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RESEARCH EXPERIENCE

University of Edinburgh School of Physics & Astronomy, Scotland, UK

Postdoctoral Research Associate, Supervisor: Andy Taylor

Dec 2024 - present

Test and mitigate the point spread function leakage in the Euclid DR1 data.

Doctoral Researcher, Supervisor: Joe Zuntz

Sept 2020 - Nov 2024

Exploring the Dark Sector with Higher-Order Statistics in Weak Lensing Analyses

Measured a suite of two-point and higher-order statistics from weak lensing and clustering maps. Evaluated different shear to convergence reconstruction methods, measuring baryonic systematics.

MSc Student Researcher, Supervisor: Joe Zuntz

Sept 2019 - Aug 2020

Evaluating the Effectiveness of Clustering Maps in Minkowski Functional Analysis

Measured higher-order statistics Minkowski functionals (MF) from weak lensing and clustering maps. Built an interpolator for MFs.

College of William & Mary, Williamsburg, VA, USA

June 2015 - Aug 2015

National Science Foundation REU Physics Intern

Compared squeezed light quantum state from a simulation of coherent light passing through a rubidium cell with experimental data using lenses, wave plates, and a polarising beamsplitter.

Wesleyan University, Middletown, CT, USA

Jan 2015 - May 2015

Undergraduate Student Researcher

Simulated ionisation of small molecules at highly energised quantum states from a pulsed laser in a molecular beam machine.

EDUCATION

University of Edinburgh, Scotland, UK

PhD: Astrophysics

Sept 2020 - Nov 2024

MSc: Particle & Nuclear Physics

Sept 2019 - Aug 2020

Wesleyan University, Middletown, CT, USA

Aug 2013 - May 2017

BA: Physics, Economics

WORK EXPERIENCE

University of Edinburgh School of Physics & Astronomy, Scotland, UK

Sept 2020 - Nov 2024

Teaching Assistant

Lead tutorials for undergraduate and masters students and mark assessments.

Earthwave, Scotland, UK

Jan 2024 - Jun 2024

Data Science Intern

Developed a pipeline to calculate glacier mass changes from radar interferometry, involving preprocessing, interpolation, and denoising of complex geospatial datasets.

Pleasanton Unified School District, Pleasanton, CA

Mar 2020 - Mar 2022

Data Engineer

Built extensive data management tool to track symptoms, exposures, and cases of COVID-19, send case-specific automated letters, and calculate return dates for 15,000 students and staff. Created comprehensive reports and data visualisations.

IBM, Washington, D.C.

Oct 2017 - Aug 2019

Advanced Analytics Consultant

Developed and utilized code in SAS, SQL, and Excel to produce performance reports for the United States Postal Service and led a team to generate over 50 reports per quarter. Established data standards, maintained

data quality, and created visual analytic tools as Technical Lead for the Office of Personnel Management Data Team.

Amador Valley High School, Pleasanton, CA

Aug 2017 - Sept 2017

Math and Physics Substitute Teacher

Led high school Physics, Advanced Placement Statistics, and Honors Pre-Calculus classes. Created, adapted, and implemented lesson plans and assigned and evaluated coursework and assessments.

PUBLICATIONS

Minkowski Functionals in Joint Galaxy Clustering & Weak Lensing Analyses

N. Grewal, J. Zuntz, T. Tröster, A. Amon, *Open Journal of Astrophysics*, 2022

Comparing Mass Mapping Reconstruction Methods with Minkowski Functionals

N. Grewal, J. Zuntz, T. Tröster, *Open Journal of Astrophysics*, 2024

Preparing Higher-Order Statistics for LSST Weak Lensing (in prep)

N. Grewal, J. Zuntz

AWARDS

Student Experience Grant, £5,000 - University of Edinburgh

Jan 2022

A one-off contribution of up to £5,000 to support innovative projects and initiatives that will enhance students' academic, entrepreneurial, or cultural development.

Karl Van Dyke Award - Wesleyan University

May 2017

Awarded each year to a student majoring in physical science or having a predominant interest in physical science and technology and who shows outstanding achievement in academic work and a promise of productivity in a professional career.

Edgar Beckham Excellence in the Sciences - Wesleyan University

Apr 2016

Awarded to a student who has dedicated themselves to improving inclusivity in the sciences, contributing to Edgar Beckham's work of promoting diversity in the name of social justice at Wesleyan.

LEADERSHIP AND SERVICE

President, Postgraduate Society of Physics & Astronomy

Sept 2022 - Aug 2023

University of Edinburgh School of Physics & Astronomy

Granted £3000 from the School of Physics & Astronomy to organise a full day soft skills seminar for 90 PhD students including postdoc applications, talks, academic writing, and mental health sessions.

Elected Postgraduate Representative

Sept 2020 - Aug 2022

University of Edinburgh School of Physics & Astronomy

Applied for and granted £5000 of funding from the Student Experience Grant and £4000 from the School of Physics & Astronomy. Organised and led a three-day conference for 50 PhD students, which included workshops, discussions, presentations, and team-building activities. Top three finalist for the university-wide *Student Event of the Year Award*.

Chair & MSc Representative, Student Staff Liaison Committee

Sept 2019 - Aug 2020

University of Edinburgh School of Physics & Astronomy

Community Service Chair, Network for Emerging Women

July 2018 - Aug 2019

IBM Washington, D.C.

Founder & President, Society for Physics Students

Mar 2016 - May 2017

Wesleyan University

OUTREACH

Speaker, Royal Observatory Public Engagement

Mar 2025

Delivered a talk [Exploring the Dark Sector](#) for the *Astronomy for All* series.

Volunteer Tutor , <i>Edinburgh Sudanese Community Group</i>	<i>Sept 2024 - present</i>
Creating lessons for and tutoring secondary school students in maths.	
Student Ambassador , <i>James Clerk Maxwell Foundation</i>	<i>Sept 2021 - present</i>
Lead tours at the James Clerk Maxwell's museum, sharing insights about his life and scientific achievements.	
Speaker , <i>Edinburgh Pint of Science</i>	<i>May 2022</i>
Delivered a talk Seeing the Dark Universe for the <i>From Atoms to Galaxies</i> series.	
Speaker , <i>Edinburgh Science Festival</i>	<i>Apr 2022</i>
Covered for Royal Astronomer Catherine Heymans and delivered the talk Scotland's Einstein with Prof Martin Hendry at the National Museum of Scotland.	
Astronomy Mentor , <i>Artlink Foundation</i>	<i>Sept 2021 - Dec 2021</i>
Mentored a neurodivergent student, discussing astronomy concepts and career pathways in the field.	
Physics Outreach Team , <i>University of Edinburgh</i>	<i>Sept 2019 - Aug 2020</i>
Engaged local school students in hands-on science activities.	

INVITED TALKS

Astronomy Seminar	<i>Jan 2025</i>
<i>NASA Jet Propulsion Laboratory, CA, USA</i>	
Cosmology Journal Club	<i>Nov 2024</i>
<i>University of Oxford, UK</i>	
Cosmo/ExGal Seminar	<i>Nov 2024</i>
<i>University College London, UK</i>	
CMB/LSS Reading Group	<i>Oct 2024</i>
<i>University of Cambridge, UK</i>	
Astrophysics Seminar	<i>Oct 2024</i>
<i>Imperial College London, UK</i>	
Astrophysics Journal Club	<i>Sept 2024</i>
<i>Newcastle University, UK</i>	
Cosmology Reading Group	<i>Jul 2023</i>
<i>Princeton University, NJ, USA</i>	
Conference Session, Cosmology with Weak Lensing: Beyond 2pt Statistics	<i>Apr 2022</i>
<i>Yukawa Institute for Theoretical Physics, Kyoto University, Japan</i>	

TECHNICAL EXPERIENCE

Data Analysis: parameter estimation, minimization, hypothesis testing, weighted performance analytics
Machine Learning: neural networks (deep learning, convolutional learning)
Parallel Programming: microprocessing
Data Science: data mining, data management, data visualisation

PROGRAMMING SKILLS

Intermediate Proficiency: C++, Matlab, Mathematica
Advanced Proficiency: Python, L^AT_EX, CCL, Emcee, SQL, SAS, VBA, Stata, Watson Analytics, Slurm