Ian Harrison

Personal Details

Nationality: UK
www.jb.man.ac.uk/~harrison/

Jodrell Bank Centre for Astrophysics
Alan Turing Building, Oxford Rd
Manchester M13 9PL, UK

Employment History

Jul 2018 - Present	Postdoctoral Research Fellow (Visiting), *University of Oxford*
Oct 2013 - Present	Research Associate, *The University of Manchester*

- with Professor Sarah Bridle *Jul 2018 - Present*
- with Professor Michael Brown *Oct 2013 - Jul 2018*

Education

Oct 2010 - Sep 2013	**Cardiff University**, PhD in Astrophysics Thesis: *'Cosmology with Extreme Galaxy Clusters'* Supervisor: Professor Peter Coles
Oct 2006 - Jun 2010	**Imperial College London**, MSci Physics with Theoretical Physics (First class with Honours)

Research Profile

- My research interests are in observational cosmology, with a focus on weak gravitational lensing, radio wavelengths and statistics. Major collaborations I am a member of include the Dark Energy Survery (DES), SKA Cosmology Science Working Group (core member) and LSST-DESC.
- The world leading expert on weak lensing in the radio
- Pivotal role in all aspects of the SuperCLASS e-MERLIN legacy survey
- Leading the work towards high quality inference from images and visibilities with the next generation of radio continuum surveys
- Exploring synergies between next generation radio observations and gravitational waves
- Extensive experience of optical weak lensing and access to a world-leading data set in DES
- Passionate about the application of principled Bayesian statistical analysis

Leadership

SuperCLASS *e*-MERLIN Legacy Survey. Lead multiple analysis efforts and regularly chair telecons and coordinate publications within the collaboration ($\sim$ 30 people).	2013 - present
Co-chair, SKA weak lensing Focus Group. Leadership of the group ($\sim$10 people) developing the scientific case and techniques for weak lensing surveys with the Square Kilometre Array, with significant interaction with the organisation building the telescope and on commensality with other science cases.	2015 - present
Core Team member, SKA Cosmology Science Working Group. Core Team ($\sim$10 people) member co-ordinating the full working group ($\sim$100 people) making the cosmology science case for the Square Kilometre Array.	2015 - present
Founding member, SkyPy forward modelling collaboration. Developing international collaboration (currently $\sim$20 people) to create a coherent software framework for forward modelling of astrophysical data across multiple wavelengths.	2019 - present
Early Career Scientist Representative, DES. Representative for early career scientists within the Dark Energy Survey collaboration, organising seminars, workshops and collaboration meeting events.	2018 - present
Instigator, Oxford VR Public Engagement Programme. Instigated programme of virtual reality development in the Department of Physics. Wrote successful funding proposal, purchased and co-ordinate use of equipment and organise and deliver workshops on VR for public engagement.	2018 - present

Professional Experience

Session Organiser, EWASS/NAM. Co-organised session on *Opening new frontiers in cosmology with the Square Kilometre Array.* — Apr 2018

LOC, STFC Astronomy Summer School. Co-organised astronomy summer school for $>$ 200 new PhD students from across the UK, including organising lectures and workshops. — Aug 2017

SOC/LOC Chair, Techniques for Radio Weak Lensing Meeting. Instigator and main organiser, including writing proposal and securing funding. — Oct 2014

Invited Talks

Invited Conference Talks

CASTLE Cosmology Synergies Meeting, Tagliolo, Italy (2018)

Invited Seminars/Colloquia

University College London, UK (Feb 2020); AEI Hannover, Germany (May 2019); Queen Mary University of London, UK (May 2019); MSSL, University College London, UK (Feb 2018); Royal Observatory Edinburgh, UK (Jan 2018); Queen Mary University of London, UK (Nov 2017); ICG Portsmouth, UK (Nov 2018); SKA Organisation, Cape Town, South Africa (Nov 2015); University of Sussex, UK (Nov 2013); Bristol University, UK (May 2013); BIPAC, University of Oxford, UK (Feb 2012)

Contributed talks and posters at 16 other national and international conferences since 2011.

Indicators of esteem

- **Referee for grant proposals**. Royal Astronomical Society (2017), European Research Council (2020)
- **Referee for papers in peer-reviewed journals**. Monthly Notices of the Royal Astronomical Society, Publications of the Astronomical Society of the Pacific (2012 - present)
- **Referee for observing proposals**. *e*-MERLIN Radio Telescope (2014)

Funding Awards

2019	Oxford PER Seed Fund *Virtual Reality in Astronomy Outreach* (Co-PI, GBP2800)
2015	SKA Astrocompute in the Cloud *Batch Visibility Simulations for RadioGREAT* (Co-PI, USD5400)
2015	RadioNet WP3 *RadioGREAT Collaboration Meeting* (Co-PI, EUR2000)
2014	RadioNet WP4 *Techniques for Radio Weak Lensing Meeting* (Co-PI, EUR2000)

Large survey membership

- **Member of:** SuperCLASS *e*-MERLIN Legacy Survey, SKA Cosmology Science Working Group, SKA Gravitational Waves Science Working Group, Dark Energy Survey, SkyPy forward modelling project, LSST Dark Energy Science Collaboration.

Teaching Experience

Lecturer, Summer Institute at Oriel College, Oxford. Developed and delivered a final year undergraduate-level course on cosmology. 12 hours of lectures to ∼30 students. **Student feedback rating of 4.71/5 (94%)** — Aug 2019

Lecturer, JBCA Autumn Computing Sessions. Developed and delivered two lectures on Bayesian methods in cosmology for $\sim$ 20 PhD students. — Sep 2018

Teaching Assistant. Laboratory demonstrator for computing and maths classes for physics unergraduates. — 2010 - 2016

Student Supervision

PhD students

2018 - Present	Juan Pablo Cordero Garayar, *Redshift distribution uncertainty in weak lensing cosmology*

2016 - 2020	Thomas Hillier, *Advances in Radio Weak Lensing*
2014 - 2017	Ben Tunbridge, *Combining Optical and Radio Weak Gravitational Lensing*
	MSc students
2015 - 2016	Nialh McCallum, *Contaminating Radio Weak Lensing with AGN* (now PhD)
	Undergraduate summer project students
2017	Max Thapa, *Virtual Reality in Astronomy Outreach*
2016	James Stringer, *A Model Interferometer for SKA Outreach* (now PhD)
2014	Susana Fernandez, *Shape Measurement in Radio Images*
2013	Chris Lovell, *The Largest Voids in the Universe* (now postdoc)

Public Engagement

Over 20 public engagement science events (co-ordination, content creation and delivery) since 2009, including TV appearance (BBC Newsround) and multiple Jodcast (global 2nd most popular astronomy podcast) appearances. Lead development of two outreach activities: VR Universe and Physical Pynterferometer interferometry demonstrator, including developing VR training programme for researchers to deveop future activities.

Publication Record

Total publications/preprints: 26, First author publications/preprints: 8
Total citations: 424
Highest cited paper: 75, highest cited first author: 43, H-index: 11
Source: SAO/NASA Astrophysics Data System (ADS)

Under Review

Gatti, M., et al. inc. **Harrison, I.**, Submitted to MNRAS. arXiv:1911.05568
Dark Energy Survey Year 3 results: cosmology with moments of weak lensing mass maps - validation on simulations

Tessore, N., **Harrison, I.**, Submitted to OJAp. arXiv:2003.11558
Source Distributions of Cosmic Shear Surveys in Efficiency Space

2020

Harrison, I., Brown, M. L., Tunbridge, B., Thomas, D. B., Hillier, T., Thomson, A. P., Whittaker, L., et al., MNRAS in press (2020). arXiv:2003.01736
SuperCLASS – III. Weak lensing from radio and optical observations in Data Release 1

Manning, S. M., et al. inc. **Harrison, I.**, MNRAS in press (2020). arXiv:2003.01735
SuperCLASS – II: Photometric Redshifts and Characteristics of Spatially-Resolved uJy Radio Sources

Battye, R. A., Brown, M. L., Casey, C. M., **Harrison, I.**, Jackson, N. J., Smail, I., Watson, R. A., et al., MNRAS in press (2020) arXiv:2003.01734
SuperCLASS – I. The Super CLuster Assisted Shear Survey: Project overview and Data Release 1.

Bacon, D. J., Battye, R. A., Bull, P., Camera, S., Ferreira, P. G., **Harrison**, I., Parkinson, D., Poutsidou, A., Santos, M. G., Wolz, L., et al., PASA in press (2020). arXiv:1811.02743
Cosmology with Square Kilometre Array Phase 1 – Red Book 2018: Technical specifications and performance forecasts

Weltman, A., et al. inc. **Harrison, I.**, PASA in press (2020). arXiv:1810.02680
Fundamental physics with the Square Kilometre Array

2019

Hillier, T., Brown, M. L., **Harrison**, I., Whittaker, L., MNRAS 488 5420 (2019). arXiv:1810.01220
Radio Weak Lensing with 3 GHz JVLA COSMOS Observations

Cunnington, S., **Harrison**, I., Pourtsidou, A., Bacon, D., MNRAS 482 3341 (2019). arXiv:1805.04498
HI Intensity Mapping for Clustering-Based Redshift Estimation

Rivi, M., Lochner, M., Balan, S. T., **Harrison**, I., Abdalla, F. B., MNRAS 482 1096 (2019). arXiv:1805.06799
Radio Galaxy Shape Measurement with Hamiltonian Monte Carlo in the Visibility Domain

Bonaldi, A., Bonato, M., Galluzzi, V., **Harrison**, I., Massardi, M., Kay, S., De Zotti, G., Brown, M. L., MNRAS 482 2 (2019). arXiv:1805.05222
The Tiered Radio Extragalactic Continuum Simulation (T-RECS)

2018

Bull, P., **Harrison, I.**, Huff, E., ASP 517, 7, 803 (2018). arXiv:1806.08339
Weak gravitational lensing with CO galaxies

Riseley, C. J., SuperCLASS Collaboration inc. **Harrison, I.**, MNRAS 474 5598 (2018). arXiv:1711.11199
AMI-LA Observations of the SuperCLASS Super-cluster

2017

Camera, S., **Harrison**, I., Bonaldi, A., Brown, M. L., MNRAS 464 4747 (2017). arXiv:1606.03451
SKA Weak Lensing III: Added Value of Multi-Wavelength Synergies for the Mitigation of Systematics

2016

Jarvis, M., et al. inc. **Harrison**, I., PoS MeerKAT2016 6 (2016). arXiv:1810.02680
The MeerKAT International GHz Tiered Extragalactic Exploration (MIGHTEE) Survey

Bonaldi, A., **Harrison**, I., Camera, S., Brown, M. L. (Joint first authorship), MNRAS 463 3686 (2016). arXiv:1601.03947
SKA Weak Lensing II: Simulated Performance and Survey Design Considerations

Harrison, I., Camera, S., Zuntz, J., Brown, M. L., MNRAS 463 3674 (2016). arXiv:1601.03947
SKA Weak Lensing I: Cosmological Forecasts and the Power of Radio-Optical Cross-Correlations

Tunbridge, B., **Harrison**, I., Brown, M. L., MNRAS 463 3339 (2016). arXiv:1607.02875
Radio-Optical Shape Correlations in the COSMOS Field

Riseley, C. J., Scaife, A. M. M., Hales, C., **Harrison**, I., SuperCLASS Collaboration, MNRAS 462, 917 (2016). arXiv:1607.04056
Deep observations of the Super-CLASS super-cluster at 325 MHz with the GMRT: the low-frequency source catalogue

2015

Patel, P., **Harrison**, I., Makhathini, S., Abdalla, F. B., Bacon, D. J., Brown, M. L., Jarvis, M., Smirnov, O., PoS AASKA14 30 (2015). arXiv:1501.03892
Weak Lensing Simulations for the SKA

Brown, M. L., Abdalla, F. B., Bacon, D. J., Bridle, S., Camera, S., **Harrison**, I., Jarvis, M., Joachimi, B., Kitching, T. D., Metcalf, R. B., Miller, L., Patel, P., Pourtsidou, A., Takahashi, K., Zuntz, J. A., PoS AASKA14 23 (2015). arXiv:1501.03828
Weak Gravitational Lensing with the Square Kilometre Array

2013

Harrison, I., Hotchkiss, S., JCAP 07 022 (2013). arXiv:1210.4369
A Consistent Approach to Falsifying ΛCDM with Rare Galaxy Clusters

2012

Harrison, I., Coles, P., MNRAS 421, L19 (2012). arXiv:1111.1184
Testing Cosmology with Extreme Galaxy Clusters

2011

Harrison, I., Coles, P., MNRAS 418, L20 (2011). arXiv:1108.1358
Exact Extreme Value Statistics and the Halo Mass Function

Preprints and Technical Notes

Harrison, I., Brown, M. L., SKA ECP150007 (2015). arXiv:1507.06639
Gridded Visibilities to Enable Precision Cosmology with Radio Weak Lensing

Harrison, I., Lochner, M., Brown, M. L. arXiv:1704.08278
Redshifts for galaxies in radio continuum surveys from Bayesian model fitting of HI 21-cm lines