

James Matthews

Astrophysicist

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Academic Career

- 2022–present **Royal Society University Research Fellow**, *University of Oxford*.
Project: "Extreme Cosmic Accelerators: High-energy particles and feedback from black hole jets and winds"
- 2019–2022 **Herchel Smith Fellow**, *Institute of Astronomy, University of Cambridge*.
Postdoctoral Fellowship, "The origin and physics of the highest energy particles in nature"
- 2016–2019 **Postdoctoral Researcher**, *University of Oxford*.
Project title: "The origin of ultra-high energy cosmic rays", PIs: Profs. A. R. Bell and K. M. Blundell
- 2012–2016 **PhD Physics**, *University of Southampton*.
Thesis: "Disc Winds Matter: Modelling Accretion and Outflow On All Scales", Supervisor: Prof. C. Knigge
- 2012 **Research Year Abroad**, *Harvard-Smithsonian CfA*.
Thesis: "Searching For Nearby Planets During Predicted Microlensing Events", Supervisor: Dr. R. Di Stefano
- 2008–2012 **MPhys Astrophysics**, *University of Southampton*, first-class honours.

Research Interests & Goals

- Understanding the origin of the highest energy cosmic rays (CRs).
- Building models for particle acceleration and transport in magnetised plasmas.
- Studying the physics and observational signatures of accretion discs and their associated outflows.
- Understanding the connection between outflows and galaxy evolution, including the impact of CRs.
- Developing state-of-the-art radiative transfer and MHD methods to complement observations.
- Testing exotic particle physics (e.g. axions) with astrophysical probes.

Programming Skills

- Advanced Python, C, Fortran, git/github, travis-CI, L^AT_EX, OpenMPI Parallelisation, Visit.
- Familiar IDL, Topcat, Bash, MCMC methods.
- Astro (magneto)hydrodynamics, Monte Carlo radiative transfer, CLOUDY, CRPROPA, PLUTO.
- Developer PYTHON (MCRT Code), MSYNCHRO, ALPRO, CR-VAR-JET, CR-REVERB.

Awards, Grants & Successful Proposals

- 2022 **Royal Society URF Enhanced Research Expenses**, *PI*, £400K.
- 2022 **Royal Society URF**, *PI*, approx. £700K.
- 2019 **HST Prop., co-I**, *UV spectroscopy of a super-Eddington BHXT (abr.)*, *PI*: Castro-Segura.
- 2019 **Herchel Smith Fellowship**, approx. £150K.
- 2018 **LBS Prop., co-I**, *Laboratory model of particle acceleration in Supernova shocks*, *PI*: Chen.
- 2017 **HST Prop., co-I**, *Wide band spectra of nova-like variables*, *PI*: Long.
- 2016 **Springer Thesis Prize for Outstanding PhD Research**, *University of Southampton*.
- 2015 **SALT Proposal, PI**, *The spectra of nova-like variables*.
- 2013 **RAS Grant**, *Visit to Columbia University*.
- 2008–2012 **Academic Scholarship**, *Top 5 students in physics, University of Southampton*.

Responsibilities, Service and Outreach

- 2020–2022 IoA Student-Postdoc Liason Officer
- 2020–2022 IoA Forum on Racial Equality in Astronomy, Co-founder
- 2020–2022 IoA Equality & Diversity Committee Member

2016-present Referee: ApJ, MNRAS, PASA, A&A, Nature Astronomy
 2021 EAS 2021: Mentor
 2021 EUCapt White Paper: Convener (Cosmic Accelerators)
 2021 EUCapt White Paper: Contributor (Travelling Messengers)
 2020 IoA Lunchtime Seminar Organiser
 2020,2021 LPN Summer School Speaker (Physics)
 2019 Oxford women in physics career advice panel
 2018-2019 Oxford Astrophysics Outreach for the Homeless, Organiser and founder
 2018-2019 Undergraduate Tutor, Astrophysics C1
 2018 Invited reviewer for “100 years of jets” review anthology.
 2018 Astrophysics summer project admissions and co-ordination
 2017-2019 SPI-MAX seminar organiser
 2017-2019 Galaxies coffee organiser
 2017, 2018 Summer project supervisor: Ziyang Li, Andrew Sellek
 2017 Local Organising Committee, Plasma Astrophysics Conference, Oxford
 2016 AstroAirport Demonstrator
 2015, 2016 SETI Cipher Challenge Helper
 2015 Local Organising Committee, TORUS 2015, Winchester
 2012-2016 Outreach Demonstrator, University of Southampton Astrodome
 2012-2016 Teaching Demonstrator, University of Southampton

Talk Highlights

At least 35 talks (21 invited) at international conferences and colloquia in Europe, Asia, USA.

2021 **Invited Review**, *23rd European Cosmic Ray Symposium, Nijmegen.*
 2021 **Invited Colloquium**, *University of Bristol (remote).*
 2021 **Invited Review**, *HRSAP Summer School (remote).*
 2021 **Invited Talk**, *IoP UK CTA Meeting (remote).*
 2021 **Invited Review**, *EUCapt Symposium, CERN (remote).*
 2020 **Invited Colloquium**, *University of Amsterdam (remote).*
 2020 **Invited Review**, *EAS 2020, Leiden (remote).*
 2019 **Invited Review**, *A Centenary of Astrophysical Jets, Manchester.*
 2019 **Invited Colloquium**, *University of Bath.*
 2019 **Invited Colloquium**, *University of Glasgow.*
 2018 **Invited Talk**, *Hillas Symposium, Heidelberg.*
 2018 **Invited Talk**, *Particle Acceleration and Transport, Calabria.*
 2018 **Invited Colloquium**, *Queen’s University, Belfast.*
 2018 **Contributed Talk**, *UHECR 2018, Paris.*
 2018 **Invited Colloquium**, *University of Manchester.*
 2017 **Invited Review**, *Broadband Astrophysical Processes, Southampton.*
 2017 **Invited Colloquium**, *University of Southampton.*
 2017 **Contributed Talk**, *AGN Winds on the Georgia Coast, Jekyll Island, GA.*
 2015 **Contributed Talk**, *TORUS 2015, Winchester.*
 2015 **Invited Talk**, *The Golden Age of CVs, Palermo.*
 2015 **Contributed Talk**, *Black Hole Accretion and AGN feedback, Shanghai.*

Publications

45 articles published or in press, 11 first-author, H-index: 18, citations: 820 (ADS) 889(Google Scholar), Please see [ADS publication list](#).

References

Prof. Tony Bell FRS, *University of Oxford*, tony.bell@physics.ox.ac.uk.

Connection: PI at Oxford.

Prof. Christopher Reynolds, *University of Cambridge*, csr12@ast.cam.ac.uk.

Connection: Collaborator at Cambridge.

Prof. Christian Knigge, *University of Southampton*, C.Knigge@phys.soton.ac.uk.

Connection: PhD Supervisor

Prof. Katherine Blundell OBE, *University of Oxford*, katherine.blundell@physics.ox.ac.uk.

Connection: PI at Oxford.

Dr. Knox Long, *STScI/Eureka Scientific*, long@stsci.edu.

Connection: Collaborator and co-supervisor.

Prof. Paul Hewett, *University of Cambridge*, phewett@ast.cam.ac.uk.

Connection: Collaborator at Cambridge.