

Curriculum Vitae
Josh Borrow

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Education & Academic Experience

2023- **Research Software Engineer**
University of Pennsylvania & Simons Observatory

Software development for visualisation, analysis, and data management for the Simons Observatory.

2021-2023 **Postdoctoral Researcher**
MIT Kavli Institute for Astrophysics & Space Research

Supervisor: Prof Mark Vogelsberger.
Projects: PI of THESAN-HR project, supervised PhD student projects, led novel analysis of the Illustris-TNG simulations. 20% FTE as deputy co-ordinator of the subMIT project, training users and developing physics computing systems.

2017-2021 **PhD Computational Astrophysics**
Institute for Computational Cosmology, Durham University

Thesis title: The next Generation of Cosmological Hydrodynamics Simulations
Project supervisor: Prof. Richard Bower
Project: Core member of international team developing the SWIFT cosmological simulation code, and implementing novel galaxy formation and hydrodynamics models. Led development of an open-source analysis pipeline and novel numerical methods for visualisation.

2013-2017 **1st Class (Hons) MPhys Physics and Astronomy**
Durham University

Thesis title: Towards a Physical Model of the Interstellar Medium
Thesis supervisor: Prof. Richard Bower

Awards and Successful Grants

Computing Time and Research Software Engineering Effort

2020	PI	DiRAC Seedcorn, 100 K CPU/h, for The Universe Uncertainty Project.
2020	PI	DiRAC RSE, 3 months Research Software Engineering time for swiftsimio.
2020	Co-I	PRACE DECI-16, 5 M CPU/h, for Beehive, PI: Yannick Bahe.
2019	Co-I	PRACE, 60 M CPU/h, for COLIBRE, PI: Joop Schaye.
2019	Co-I	PRACE, 40 M CPU/h, for EAGLE-XL, PI: Richard Bower.

Grants (Including Travel)

2023	Co-I	MIT NEC Fund, \$90k, with Mark Vogelsberger
2020	Co-I	STFC Spark Award, £15K, for Your Place in the Universe as Co-I with Carlton Baugh.
2020	PI	CASPEN Travel Grant, £3K.
2019	PI	HPC-Europa Travel Grant, £4K, includes 50 K CPU/h.
2019	PI	CASPEN Travel Grant, £3K.
2019		NORDITA, fully-funded attendance of two week conference.
2018		Kavli Summer Program in Astrophysics, fully-funded 8-week program in NYC.
2018		STFC Industrial Partnership Studentship, approx. £4.5K.
2017		STFC PhD Studentship for 3.5 years, approx. £70K.
2016		IPPP Summer Studentship, £300.
2015		LEAPS summer program, 3 months fully-funded (incl. stipend) program.
2014		Summer student stipend with Richard Bower, £1.5K.

Prizes

2021		SPHERIC Libersky Prize, 2nd Place.
2020		DiRAC Day Poster Competition, Winner.
2019		SPHERIC Libersky Prize, 3rd Place.
2019		DEX Best Short Talk, Winner.
2018		CIUK Student Poster Competition, Winner.
2016		Level 3 Computing Project Poster Prize, Winner.
2014		Physics Department Award for Outstanding Achievement.

Teaching, Supervision, Service, and Consultancy Work

2022		Supervision: Sole supervisor of Feifan Liu, undergraduate at Carnegie Mellon University working on applied data science techniques.
2022		Supervision: Sole supervisor of Talia O'Shea (senior Thesis), undergraduate, project using galpy and Illustris-TNG to investigate the impact of dynamical friction on measurements of splashback radius.
2022		Supervision: Secondary supervisor for Clara Xu, undergraduate, project

- employing swift-emulator (machine learning) to calibrate dust models for high redshift galaxies, leading to MNRAS publication (to be submitted)
- 2022 Supervision: Secondary supervisor for Jessica Yeh, undergraduate, project using THESAN-HR to calculating escape fractions, led to MNRAS publication.
- 2021 Supervision: Main supervisor of Stephanie O’Neil, graduate student, project on splashback in Illustris-TNG-300 leading to MNRAS publication.
- 2021 Supervision: Sole supervisor of Murtaza Jafry, undergraduate, project on particle tracking in cosmological galaxy formation simulations.
- 2021 Supervision: Sole supervisor of April Cheng, undergraduate, project on galaxy tracking in cosmological galaxy formation simulations.
- 2020 Supervision: Leading supervision of a Master's student, with Richard Bower.
- 2020 Supervision: Research Software Engineer Alexei Borrisov, working on swiftsimio optimisations for petabyte-scale datasets.
- 2022-2023 Service: Led search for new postdoc in group at MIT.
- 2022- Service: 20% FTE role within MIT assisting researchers with computing.
- 2021- Service: Assisted MKI system administrators and users with benchmarking and
and
setup of a new computing cluster.
- 2021- Service: Lead organiser of the ECR talk series ‘Brown Bag Lunch Talk’ (twice weekly, at MIT MKI). Aimed to include speakers from a diverse range of backgrounds (notably from universities not typically represented at MIT talk series) through varied recruitment tactics.
- 2020- Service: Reviewer for MNRAS, ApJ, and JOSS
- 2020 Consultancy: Python performance for COVID models with JUNE.
- 2020 Teaching: Level 3 Physics Computing Project demonstrator.
- 2019 Teaching: Level 4 MPhys Programming Drop-in demonstrator.
- 2018 Teaching: Level 2 Numerical Methods and Programming demonstrator.
- 2017 Teaching: Level 3 Nuclear and Particle Physics demonstrator.

Public Engagement

- 2020 Lead designer for Your Place in the Universe exhibit.
Writing grant proposals, development of an app and liaising with suppliers.
Worked managing a team of ~20 to produce content for the exhibition.
Exhibition unfortunately rescheduled for 2021, but anticipated ~15 K visitors.
- 2017-2020 Led organisation of a yearly visit from a local school to the institute.
- 2017-2020 Various direct public engagement activities using Galaxy Makers (100s of hours either setting up or directly interacting with public).
- 2018-2019 Managed a team of ~15 people to run the Pint of Science science festival in Durham.
- 2016 Developer of galaxymakers.org, a re-engagement website for the Galaxy Makers exhibit that is still used today.
Published study in Communicating Astronomy with the Public.

Aided with creation of material for the Royal Society Summer Science Exhibition and presented in-person in London.

Exhibition has now engaged 10's of thousands of people.

2014

Worked with EAGLE team to develop icc.dur.ac.uk/Eagle.

Organised EAGLE reddit Ask me Anything with ~750 public comments.

Organised visit of YouTuber Tom Scott and assisted with video now with over 100k views.

2014-2017

Cafe Scientifique Durham City: Led organisation of up-to weekly science talks for the public.

Included liaising with venues, recruiting speakers, and promotion for over 50 total talks, as well as on-the-day management.