Josh Borrow

Computational Astrophysicist

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Education

Institute for Computational Cosmology, Durham University: PhD: 2017-2021

Core member of the Virgo Consortium, EAGLE, and SWIFT teams, supervised by Prof. Richard Bower.

Led development of a new cosmological simulation analysis pipeline.

Led development and implementation of a novel smoothed particle hydrodynamics scheme.

Core developer on the SWIFT cosmological simulation code (to be used for EAGLE).

Awarded over **100 million CPU hours** in computing time (as a Co-I), £10'000 in Research Software Engineer effort (PI), **£15'000 in outreach funding**, and approximately £20'000 in travel funding and grants.

Four published first author publications, with two more to be submitted, and a seventh in preparation, as well as over **30 talks at international venues**.

Durham University: 1st Class (Hons) MPhys: 2013-2017

Studied for an integrated masters degree. Attained grade averages of 75, 82, 73, 79 in the four years respectively, and won the prize for the Level 3 'Computing Project' out of 150 students.

Achieved the 'Outstanding Achievement in Physics' award twice for attaining exceptional grades in Physics modules.

Skills

Programming

Languages: **seven years python** (including full data science stack with **numpy**, matplotlib, pandas, **scipy**, etc.), **three years C and MPI** experience. Also have HTML/CSS, JS, PHP, and swift experience.

Seven years git (and GitHub/GitLab) experience, with nine years LaTeX experience and **seven years experience using Tier-1 HPC facilities**.

Lead developer and maintainer of **several open-source** libraries used for **big data analysis**, including swiftsimio and velociraptor-python.

Core developer on the **SWIFT** MPI+threads cosmological simulation code that runs on Tier-0/1 facilities.

Technical Communication

Five first author peer-reviewed publications in the scientific press have led to the development of **expert level technical writing skills**. I am also well regarded for the quality of my **conference presentations** and **scientific visualisation**, having won awards for both.

Being a lead/core developer on several large open-source libraries has given me experience in **code documentation**. This also has given me experience in writing **computing time** and RSE application **proposals**, including **code profiling.**

Selected Prizes, Computing Awards, and Grants

Prizes

3rd Place Libersky prize at the SPHERIC international conference.

Winner, DiRAC day poster competition.

Winner, CIUK poster competition.

Winner, MLH *Durhack* hackathon.

Computing Awards

Over 100 M Cpu/h as Co-I for various projects.

Over 150k hours awarded as PI for various small projects.

3 months dedicated RSE allocation through DiRAC for swiftsimio.

Grants

£15'000 STFC Spark for public engagement as one of two Co-Is.

HPC-Europa, NORDITA, CASPEN, and KSPA travel grants totalling over an estimated £20'000 during my PhD.

Outreach

Heavily involved in general outreach over the past seven years; developed icc.dur.ac.uk/Eagle and galaxymakers.org; presented at multiple science festivals; led school visits to the physics department; lead developer and designer on a Royal Society Summer Science Festival exhibition.