Oliver James Hall

ESA Research Fellow - Asteroseismology & Statistics

programming

Python, Git
Unix, LaTeX,
SQL

skills

Stan
PyMC3
emcee
Bayesian statistics
Hierarchical models
Asteroseismology
Jupyter Notebooks
Science Communication & Writing
Software development & publication

languages

English, Dutch (bilingual)

contact

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presentations

2019 Nov.	**Seminar** "Asteroseismology & Applied Statistics"	University of Exeter, UK
2019 Jul.	**TASC5/KASC12** **Invited talk:** "Accessible Asteroseismology with Lightkurve" Poster: "Improving gyrochronology of field stars with asteroseismic age and rotation"	MIT, MA, USA
2018 Dec.	**Birmingham-Warwick Science Meet-Up** "Testing asteroseismology with *Gaia* DR2: Hierarchical Models & the Red Clump"	University of Warwick, UK
2018 Jul.	**TASC4/KASC11** "Testing asteroseismology with *Gaia* DR2: Luminosity of the Red Clump"	Aarhus University, Denmark
2017 Jul.	**TASC3/KASC10** Poster: "Mixture Models applied to *Kepler* backgrounds & development for TESS"	University of Birmingham, UK
2017 Apr.	**T'DA 2** "Estimating TESS backgrounds with mixture models – Update"	Aarhus University, Denmark
2016 Nov.	**T'DA 1** "Estimating TESS backgrounds with mixture models"	University of Birmingham, UK

conferences & workshops

2019 Oct.	T'DA 9 (**invited**)	Institute for Astronomy, HI, USA
2019 Aug.	Astro Hack Week 2019	Kavli Institude for Cosmology, UK
2019 Jul.	TASC5/KASC12 (**invited**)	MIT, MA, USA
2019 Jan.	T'DA 8	Aarhus University, Denmark
2018 Oct.	T'DA 5 (**invited**)	Ohio State University, OH, USA
2018 Jul.	T'DA 4	Aarhus University, Denmark
2018 Jul.	TASC4/KASC11	Aarhus University, Denmark
2018 Jun.	The Wetton Workshop 2018	University of Oxford, UK
2017 Dec.	T'DA 3	KU Leuven, Belgium
2017 Jul.	TASC3/KASC10	University of Birmingham, UK
2017 Apr.	T'DA 2	Aarhus University, Denmark
2016 Nov.	Asteroseismology of stellar activity cycles	Observatoire de la Côte d'Azur, France
2016 Nov.	T'DA 1	University of Birmingham, UK

research visits

2018 Oct.	**Visit to the KeplerGO office [3 weeks]** Invited to build the **periodogram** & **seismology** modules of **Lightkurve**.	NASA Ames Research Centre, CA, USA
2018 Jan.	**Visit to SAC [1 week]** Invited to investigate & build tools for background subtraction of TESS FFIs.	Aarhus University, Denmark

grants & awards

2019	**£815** - Ogden Trust Alumni Fund One-Off Grants	The Ogden Trust, UK
2018	**£300** - IOP Research Student Conference Fund *(declined)*	Institute of Physics, UK
2016	**£3000** - Royal Society Partnership Grant	The Royal Society, UK
2015	Teach Physics Oustanding Intern 2015 - shortlisted	The Ogden Trust, UK

education & employment

2020 →now **ESA Research Fellow** — European Space Research & Technology Centre, Netherlands
Supervisor: Ana Heras

2016 →2020 **PhD** in Physics & Astronomy — University of Birmingham, UK
Supervisor: Dr. Guy R. Davies
Thesis: "Ensemble Asteroseismology and Hierarchical Bayesian Models: New Inferences of Astrophysics with Oscillating Stars"

2012 →2016 **M.Sci.** Physics & Astrophysics — University of Birmingham, UK
Dissertation supervisor: Prof. William J. Chaplin
1st Class w. Honours
Thesis: "Detecting Signatures of Stellar Activity Cycles in Solar-Type Stars Using Asteroseismic Analysis of P-Mode Amplitude Shifts"

2006 →2012 **Gymnasium** — Gemeentelijk Gymnasium Hilversum, Netherlands
8.5/10 average across eleven subjects

teaching and research

2019 **Advanced HE - Associate Fellow (AFHEA)** — Advanced HE

2019 **Access to Birmingham (A2B) supervisor** — University of Birmingham
Supported applicants from disenfranchised backgrounds through the A2B scheme.

2017 →2019 **2nd Year Laboratory Projects Demonstrator** — University of Birmingham, UK
Taught students to build apparatus and understand their results. I marked their work and provided constructive feedback.

2016 →2019 **3rd Year Observatory Laboratory Supervisor** — University of Birmingham, UK
Supervised students using an observatory. Helped students understand their results as well as the use of IRAF, Unix, and Python.

2015 **Summer Undergraduate Research Experience (SURE)** — University of Leicester, UK
Performed a six-week project using Python to program a robotic arm system for testing a prototype focal plane for the Cherenkov Telescope Array.

2015 **Ogden Trust Teach Physics Intern** — Bishop Challoner Catholic College, Birmingham, UK
Helped teach pupils throughout lessons, prepared and taught a lesson & careers workshop of my own design.

outreach & engagement

2019 →now ***Author*, Astrobites Collaboration**
Write and edit monthly summaries of astronomy papers at an undergraduate level.
Committee member for **Advertising**, **Moderating**, **Hiring**, **Undergraduate Engagement**, and **Equality, Diversity & Inclusion**

2019 ***Developer*, State of The Universe collaboration** — Astro Hack Week 2019
Helped build and maintain an informative package for teachers and planetarium guides.

2018 →2019 ***Organiser*, 9th BEAR Conference** — University of Birmingham, UK
Organised local annual high performance computing conference.

2018 →2019 ***Demonstrator*, Applicant Visit Day** — University of Birmingham, UK
Developed and taught laboratory sessions for undergraduate applicants.

2016 →2017 ***Partnered Researcher*, Royal Society Partnership Grant**
Developed and taught a series of lessons and lab activities engaging Year 9 pupils with exoplanet characterisation and asteroseismology.

community services

2018 →now	Member of the **Lightkurve** collaboration	NASA Ames Research Centre, CA, USA
2016 →now	Member of the *TESS Data for Asteroseismology* (**T'DA**) collaboration	
2016 →now	Member of the *TESS Asteroseismic Science Consortium* (TASC)	
2017	LOC member for TASC3/KASC11	University of Birmingham, UK

selected publications

first author publications:

1. **Hall, O. J.**, Davies, G. R., Elsworth, Y. P. and 9 coauthors
   Testing asteroseismology with Gaia DR2: Hierarchical models of the Red Clump
   Monthly Notices of the Royal Astronomical Society, 2019
   Summary: Constrained the luminosity of the Red Clump and the *Gaia* DR2 parallax zero-point offset simultaneously using hierarchical latent variable models.
   `doi:10.1093/mnras/stz1092, arXiv:1904.07919`

contributing author publications:

2. Khan, S., **Hall, O. J.**, Miglio, A., Davies, G. R., Mosser, B., Girardi, L., Montalbán, J.
   The Red-giant Branch Bump Revisited: Constraints on Envelope Overshooting in a Wide Range of Masses and Metallicities
   The Astrophysical Journal, 2018
   Contribution: Used Mixture Models to constrain the position of the Red-Giant Branch Bump.
   `doi:10.3847/1538-4357/aabf90, arXiv:1804.06669`

3. Bugnet, L., García, R. A., Davies, G. R., Mathur, S., Corsaro, E., **Hall, O. J.**, Rendle, B. M.
   FliPer: A global measure of power density to estimate surface gravities of main-sequence solar-like stars and red giants
   Astronomy & Astrophysics, 2018
   Contribution: Helped develop the FliPer metric & its machine learning implementation.
   `doi:0.1051/0004-6361/201833106, arXiv:1809.05105`

4. Silva Aguirre, V., Stello, D., Stokholm, A. and 75 coauthors including **Hall, O. J.**
   Detection and characterisation of oscillating red giants: first results from the TESS satellite
   The Astrophysical Journal
   Contribution: Obtained fundamental seismic parameters for stellar sample.
   `doi:10.3847/2041-8213/ab6443, arXiv:1912.07604`

5. Montalbán, J., Mackereth, J. T., Miglio, A. and 16 coauthors including **Hall, O. J.**
   Chronologically dating the early assembly of the Milky Way
   arxiv e-prints, 2020. Under review for publication in Nature Astronomy
   Contribution: Obtained seismic parameters for stellar sample and helped develop hierachical model.
   `https://arxiv.org/abs/2001.04653`

6. Chaplin, W., Serenelli, A. M., Miglio, A. and 83 coauthors including **Hall, O. J.**
   Age dating of an early Milky Way merger via asteroseismology of the naked-eye star νIndi
   Nature Astronomy
   Contribution: Advised on systematic uncertainties in spectroscopic methods.
   `doi:10.1038/s41550-019-0975-9, arXiv:2001.04653`

7. Bugnet, L., García, R. A., Mathur, S., Davies, G. R., **Hall, O. J.**, Lund, M. N., Rendle, B. M.
   FliPer$_{Class}$: In search of solar-like pulsators among TESS targets
   arXiv e-prints, 2019
   Contribution: Aided with interpretation of systematic uncertainties on effective temperature.
   `doi:10.1051/0004-6361/201834780, arXiv:1902.09854`

8. Huber, D., Chaplin, W. J., Chontos, A and 139 coauthors including **Hall, O. J.**
   A Hot Saturn Orbiting An Oscillating Late Subgiant Discovered by TESS
   arXiv e-prints, 2019

Contribution: Checked proper use and interpretation of *Gaia* parallaxes.
doi:10.3847/1538-3881/ab1488, arXiv:1901.01643

9. Davies, G. R., Lund, M. N., Miglio, A., Elsworth, Y. P. and 13 coauthors including **Hall, O. J.**
Using red clump stars to correct the Gaia *DR1 parallaxes*
Astronomy & Astrophysics, 2017
Contribution: Verified results found by lead authors.
doi:10.1051/0004-6361/201630066, arXiv:1701.02506

software publications:

9. Lightkurve Collaboration, Cardoso, J. V. d. M., Hedges, C., Gully-Santiago, M., Saunders, N., Cody, A-M., Barclay, T., **Hall, O. J.**, Sagear, S., Turtelboom, E., Zhang, J., Tzanidakis, A., Mighell, K., Coughlin, J., Bell, K., Berta-Thompson, Z., Williams, P., Dotson, J., Barentsen, G.
Lightkurve: Kepler and TESS time series analysis in Python
Astrophysics Source Code Library, 2018
Contribution: Led development of the 'periodogram' and 'seismology' modules.
ascl:1812.013

white papers:

10. Khullar, G., Kholer, S., Konchady, T. and 32 coauthors including **Hall, O. J.**
Astrobites as a Community-led Model for Education, Science Communication, and Accessibility in Astrophysics
arXiv e-prints, 2019
arXiv:1907.09496