

Oliver James Hall

PhD student in asteroseismology

programming

Python, Git
Unix, LaTeX,
R, SQL (basic)

skills

Stan
PyMC3
emcee
Bayesian statistics
Hierarchical models
Asteroseismology
Software development &
publication (Python)

languages

English, Dutch (bilingual)

contact

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Astronomy
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research interests

With the recent successes of the *Kepler*, *K2*, *Gaia* and TESS missions, we have access to vast catalogues of astronomical data. I am interested in leveraging these data to draw new inferences of stellar physics through Bayesian population studies of asteroseismic data. I previously used hierarchical latent variable models to constrain the red clump distance ladder to an unprecedented precision. I am currently studying the relation between mass, age and rotation of solar-like stars in the *Kepler* field, and the correlation between properties of red clump giant populations.

presentations

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|-----------|--|------------------------------|
| 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 <i>Gaia</i> DR2: Hierarchical Models & the Red Clump" | University of Warwick, UK |
| 2018 Jul. | TASC4/KASC11
"Testing asteroseismology with <i>Gaia</i> DR2: Luminosity of the Red Clump" | Aarhus University, Denmark |
| 2017 Jul. | TASC3/KASC10
Poster: "Mixture Models applied to <i>Kepler</i> 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

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|-----------|---|--|
| 2019 Oct. | T'DA 9 (invited) | Institute for Astronomy, HI, USA |
| 2019 Aug. | Astro Hack Week 2019 | Kavli Institute 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 module 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 |

education

- 2016 → 2020 **PhD in Physics & Astronomy** University of Birmingham, UK
Supervisor: Dr. Guy R. Davies
Thesis: "Applied advanced statistics in asteroseismology"
- 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
Support applicants from disenfranchised backgrounds through the A2B scheme.
- 2017 → now **2nd Year Laboratory Projects Demonstrator** University of Birmingham, UK
Taught students to build apparatus, understand their results. I marked their work and provided constructive feedback.
- 2016 → now **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 Reserach 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 for 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 → now **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 <i>TESS Data for Asteroseismology</i> (T'DA) collaboration	
2016 →now	Member of the <i>TESS Asteroseismic Science Consortium</i> (TASC)	
2017	LOC member for TASC3/KASC11	University of Birmingham, UK

grants & awards

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

publications

- Hall, O. J.**, Davies, G. R., Elsworth, Y. P. et al. [7 citations]
Testing asteroseismology with Gaia DR2: Hierarchical models of the Red Clump
 Monthly Notices of the Royal Astronomical Society, 2019
 doi:10.1093/mnras/stz1092, arXiv:1904.07919
- Khullar, G., Kholer, S., Konchady, T. ... **Hall, O. J.** ... et al.
Astrobites as a Community-led Model for Education, Science Communication, and Accessibility in Astrophysics
 arXiv e-prints, 2019
 arXiv:1907.09496
- Huber, D., Chaplin, W. J., Chontos, A. ... **Hall, O. J.** ... et al. [12 citations]
A Hot Saturn Orbiting An Oscillating Late Subgiant Discovered by TESS
 arXiv e-prints, 2019
 doi:10.3847/1538-3881/ab1488, arXiv:1901.01643
- Bugnet, L., García, R. A., Mathur, S., Davies, G. R., **Hall, O. J.**, Lund, M. N., Rendle, B. M. [1 citation]
FliPer_{Class}: In search of solar-like pulsators among TESS targets
 arXiv e-prints, 2019
 doi:10.1051/0004-6361/201834780, arXiv:1902.09854
- Lightkurve Collaboration, Cardoso, J. V. d. M., Hedges, C. ... **Hall, O. J.** ... et al. [5 citations]
Lightkurve: Kepler and TESS time series analysis in Python
 Astrophysics Source Code Library, 2018
 ascl:1812.013
- Bugnet, L., García, R. A., Davies, G. R. ... **Hall, O. J.** ... et al. [9 citations]
FliPer: A global measure of power density to estimate surface gravities of main-sequence solar-like stars and red giants
 Astronomy & Astrophysics, 2018
 doi:10.1051/0004-6361/201833106, arXiv:1809.05105
- Khan, S., **Hall, O. J.**, Miglio, A. et al. [7 citations]
The Red-giant Branch Bump Revisited: Constraints on Envelope Overshooting in a Wide Range of Masses and Metallicities
 The Astrophysical Journal, 2018
 doi:10.3847/1538-4357/aabf90, arXiv:1804.06669
- Davies, G. R., Lund, M. N. and Miglio, A. ... **Hall, O. J.** ... et al. [24 citations]
Using red clump stars to correct the Gaia DR1 parallaxes
 Astronomy & Astrophysics, 2017
 doi:10.1051/0004-6361/201630066, arXiv:1701.02506