

Oliver James Hall

PhD student in asteroseismology

programming

Python, Git
Unix, LaTeX,
SQL

skills

Stan
PyMC3
emcee
Bayesian statistics
Hierarchical models
Asteroseismology
Jupyter Notebooks
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 catalogues 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 | MIT, MA, USA |
| | Invited talk: "Accessible Asteroseismology with Lightkurve" | |
| | Poster: "Improving gyrochronology of field stars with asteroseismic age and rotation" | |
| 2018 Dec. | Birmingham-Warwick Science Meet-Up | University of Warwick, UK |
| | "Testing asteroseismology with <i>Gaia</i> DR2: Hierarchical Models & the Red Clump" | |
| 2018 Jul. | TASC4/KASC11 | Aarhus University, Denmark |
| | "Testing asteroseismology with <i>Gaia</i> DR2: Luminosity of the Red Clump" | |
| 2017 Jul. | TASC3/KASC10 | University of Birmingham, UK |
| | Poster: "Mixture Models applied to <i>Kepler</i> backgrounds & development for TESS" | |
| 2017 Apr. | T'DA 2 | Aarhus University, Denmark |
| | "Estimating TESS backgrounds with mixture models – Update" | |
| 2016 Nov. | T'DA 1 | University of Birmingham, UK |
| | "Estimating TESS backgrounds with mixture models" | |

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] | NASA Ames Research Centre, CA, USA |
| | Invited to build the periodogram module of Lightkurve | |
| 2018 Jan. | Visit to SAC [1 week] | Aarhus University, Denmark |
| | Invited to investigate & build tools for background subtraction of TESS FFIs | |

education

2016 → 2020	PhD in Physics & Astronomy Supervisor: Dr. Guy R. Davies <i>Thesis: "Applied advanced statistics in asteroseismology"</i>	University of Birmingham, UK
2012 → 2016	M.Sci. Physics & Astrophysics Dissertation supervisor: Prof. William J. Chaplin 1 st Class w. Honours <i>Thesis: "Detecting Signatures of Stellar Activity Cycles in Solar-Type Stars Using Asteroseismic Analysis of P-Mode Amplitude Shifts"</i>	University of Birmingham, UK
2006 → 2012	Gymnasium 8.5/10 average across eleven subjects	Gemeentelijk Gymnasium Hilversum, Netherlands

teaching and research

2019	Advanced HE - Associate Fellow (AFHEA)	Advanced HE
2019	Access to Birmingham (A2B) supervisor Support applicants from disenfranchised backgrounds through the A2B scheme.	University of Birmingham
2017 → now	2nd Year Laboratory Projects Demonstrator Taught students to build apparatus, understand their results. I marked their work and provided constructive feedback.	University of Birmingham, UK
2016 → now	3rd Year Observatory Laboratory Supervisor Supervised students using an observatory. Helped students understand their results as well as the use of IRAF, Unix, and Python.	University of Birmingham, UK
2015	Summer Undergraduate Reserach Experience (SURE) Performed a six-week project using Python to program a robotic arm system for testing a prototype focal plane for the Cherenkov Telescope Array.	University of Leicester, UK
2015	Ogden Trust Teach Physics Intern Helped teach pupils throughout lessons, prepared and taught a lesson & careers workshop of my own design.	Bishop Challoner Catholic College, Birmingham, UK

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 Helped build and maintain an informative package for teachers and planetarium guides.	Astro Hack Week 2019
2018 → 2019	Organiser, 9th BEAR Conference Organised local annual high performance computing conference.	University of Birmingham, UK
2018 → now	Demonstrator, Applicant Visit Day Developed and taught laboratory sessions for undergraduate applicants.	University of Birmingham, UK
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.	

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

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

selected publications

refereed publications:

1. [Hall, O. J.](#), Davies, G. R., Elsworth, Y. P. and 9 coauthors [9 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](#)
2. Khan, S., [Hall, O. J.](#), Miglio, A., Davies, G. R., Mosser, B., Girardi, L., Montalbán, J. [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](#)
3. Bugnet, L., García, R. A., Davies, G. R., Mathur, S., Corsaro, E., [Hall, O. J.](#), Rendle, B. M. [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:0.1051/0004-6361/201833106](#), [arXiv:1809.05105](#)
4. 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](#)
5. Huber, D., Chaplin, W. J., Chontos, A and 139 coauthors including [Hall, O. J.](#) [14 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](#)
6. Davies, G. R., Lund, M. N., Miglio, A., Elsworth, Y. P. and 13 coauthors including [Hall, O. J.](#) [24 citations]
Using red clump stars to correct the Gaia DR1 parallaxes
Astronomy & Astrophysics, 2017
[doi:10.1051/0004-6361/201630066](#), [arXiv:1701.02506](#)

software publications:

1. Lightkurve Collaboration, Cardoso, J. V. d. M., Hedges, C., Gully-Santiago, M., Saunders, N., Cody, A-M., Barclay, T., [Hall, O. J.](#), Sagar, S., Turtelboom, E., Zhang, J., Tzanidakis, A., Mighell, K., Coughlin, J., Bell, K., Berta-Thompson, Z., Williams, P., Dotson, J., Barentsen, G. [5 citations]
Lightkurve: Kepler and TESS time series analysis in Python
Astrophysics Source Code Library, 2018
[ascl:1812.013](#)

unrefereed publications:

1. Khullar, G., Kholer, S., Konchady, T., Foley, M., Hornsby, A. L., de los Reyes, M. A., Chirsari, N. E., Villar, V. A., Shin, K., Doughty, D., Shipp, N., Ramasawmy, J., Penoyre, Z., Lichtenberg, T., Storey-Fisher, K., [Hall, O. J.](#), Lewis, B., Pearlman, A. B., Cárdenas-Avendaño, A., Bridge, J. S., González-Egea, E., Panwar, V., Slepian, Z., Zimmerman, M.
Astrobites as a Community-led Model for Education, Science Communication, and Accessibility in Astrophysics
arXiv e-prints, 2019
[arXiv:1907.09496](#)