

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

European Space Research
& Technology Centre
Keplerlaan 1
Postbus 299
2200 AG Noordwijk
The Netherlands

oliver.hall@esa.int
asteronomer.com
GitHub/ojhall94
@asteronomer
ORCID/
0000-0002-0468-4775
Tel: (+31)(0)614227748

selected presentations

- 2020 Feb. **CSH Symposium** Centre for Space and Habitability, Switzerland
Invited talk: "Asteroseismology & Rotational Evolution: Bayesian Inference in Stellar Astrophysics"
- 2020 Jan. **ESA Research Fellow Jamboree** ESA ESTEC, The Netherlands
"Asteroseismic Follow-Up of *CHEOPS* Target Hosts"
- 2019 Nov. **Seminar** University of Exeter, UK
"Asteroseismology & Applied Statistics"
- 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 *Gaia* DR2: Hierarchical Models & the Red Clump"
- 2018 Jul. **TASC4/KASC11** Aarhus University, Denmark
"Testing asteroseismology with *Gaia* DR2: Luminosity of the Red Clump"
- 2017 Jul. **TASC3/KASC10** University of Birmingham, UK
Poster: "Mixture Models applied to *Kepler* backgrounds & development for TESS"

conferences & workshops

- 2020 Sep. online.TESS.science Online
- 2020 Feb. CSH Symposium (**invited**) Centre for Space and Habitability, Switzerland
- 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** & **seismology** modules of **Lightkurve**.
- 2018 Jan. **Visit to SAC [1 week]** Aarhus University, Denmark
Invited to investigate & build tools for background subtraction of TESS FFIs.

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 Outstanding Intern 2015 - shortlisted The Ogden Trust, UK

education & employment

| | | |
|------------|---|--|
| 2020 →now | ESA Research Fellow Mentor: Jos de Bruijne | European Space Research & Technology Centre, Netherlands |
| 2016 →2020 | PhD in Physics & Astronomy Supervisor: Dr. Guy R. Davies <i>Thesis:</i> "Ensemble Asteroseismology and Hierarchical Bayesian Models: New Inferences of Astrophysics with Oscillating Stars" | University of Birmingham, UK |
| 2012 →2016 | M.Sci. Physics & Astrophysics Dissertation supervisor: Prof. William J. Chaplin 1 st Class w. Honours <i>Thesis:</i> "Detecting Signatures of Stellar Activity Cycles in Solar-Type Stars Using Asteroseismic Analysis of P-Mode Amplitude Shifts" | 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 Supported applicants from disenfranchised backgrounds through the A2B scheme. | University of Birmingham |
| 2017 →2019 | 2nd Year Laboratory Projects Demonstrator Taught students to build apparatus and understand their results. I marked their work and provided constructive feedback. | University of Birmingham, UK |
| 2016 →2019 | 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 Research 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 at 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 →2019 | 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. | |

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 (T'DA)</i> collaboration | |
| 2016 →now | Member of the <i>TESS Asteroseismic Science Consortium (TASC)</i> | |
| 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
2. **Hall, O. J.**, Davies, G. R., van Saders, J. and 9 coauthors
New asteroseismic rotation rates of Kepler dwarfs show strong agreement with weakened magnetic braking on the late-age main sequence
Submitted undergoing review, Nature Astronomy
Summary: Made new measurements of asteroseismic rotation rates, and compared these to population models of rotational evolution to indicate the presence of weakened magnetic braking.

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 hierarchical 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 ν Indi
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.**, Sagar, 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