

Daniel Hey

Scientific positions

2022– **Institute for Astronomy, University of Hawai'i**
Variable Stars Postdoctoral Research Fellow
Host: Dr. Daniel Huber

Education

2018-2021 **University of Sydney, Australia, PhD, Astronomy & Astrophysics**
Advisors: Prof. Tim Bedding & Dr. Simon Murphy
Thesis: *Asteroseismology and pulsation timing of the A-type stars observed by Kepler*

2013-2017 **University of Wollongong, Australia, BSc Physics (Hons),**
First class honours, deans merit
Advisor: Prof. Enbang Li
Thesis: *Synthetic Gauge Potentials for Light in Time-Dependent Media*

Grants & Awards

Metrics Total PI funding: US \$720,000
Total Co-I funding: US \$420,000
As PI

2024– **PI**, Archival Data Analysis Program (ADAP), NASA, US \$530,000
A benchmark sample for stellar astrophysics: pulsation timing of intermediate-mass stars using Kepler, K2, and TESS

2024– **PI**, TESS Guest Investigator Cycle 7, NASA, US \$70,000
Wide binary demographics and exoplanet occurrence around intermediate-mass stars using TESS pulsation timing

2023-2024 **PI**, TESS Guest Investigator Cycle 6, NASA, US \$70,000
Wide binary demographics and exoplanet occurrence around intermediate-mass stars using TESS pulsation timing

2018-2022 **PI**, Research Training Program Scholarship, NSW Government, US ~\$50,000
As Co-I

2024– *Co-I*, TESS Guest Investigator Cycle 7, NASA US \$70,000
(PI: J. Ong) *Asteroseismic probes of convective boundary mixing with 200s TESS FFIs*

2024– *Co-I*, TESS Guest Investigator Cycle 7, NASA US \$70,000
(PI: Y. Li) *A Pilot Study On Stellar Oscillations In Solar- Type Stars Through Simultaneous Intensity And RV Observations*

2023-2024 *Co-I*, TESS Guest Investigator Cycle 6, NASA US \$70,000
(PI: D. Huber) *Precise Exoplanet Transits For The Brightest Stars Using Tess 20-Second Cadence Data*

2023-2024 *Co-I*, TESS Guest Investigator Cycle 6, NASA US \$70,000
(PI: J. Ong) *Magnetic Activity On Rapidly-Rotating Red Giants With 200-Second TESS FFIs*

2022-2023 *Co-I*, TESS Guest Investigator Cycle 5, NASA US \$70,000
(PI: D. Huber) *Ages of Young Moving Groups using High-Frequency Delta Scuti Stars with Regular Spacings*

2022-2023 *Co-I*, TESS Guest Investigator Cycle 5, NASA US \$70,000
(PI: D. Huber) *Precise Exoplanet Transits For The Brightest Stars Using Tess 20-Second Cadence Data*

Scientific meetings

Invited speaker

- 2024 TESS Science Conference III *Invited asteroseismology speaker*
 2024 AAS 243 (New Orleans) *Invited stellar astrophysics*
Contributed talks
 2023 TESS Asteroseismic Science Conference, (Hawai'i)
 2023 AAS 242 (Seattle)
 2022 IfA Colloquium, U'Hawai'i
 2020 TESS Ninja 3, U'Sydney
 2024 TESS & Kepler Asteroseismic Science Conference, (Boston)
 2019 University of Sydney Morning Tea
 2019 TESS Science Conference I, (Boston)
 2019 Planets in Peculiar Places, (Sydney)
 2019 Stars in Canberra
 2018 Third Australia-China Symposium on Terahertz Science, (Sydney)
Workshops
 2023 MIAPbP: Stellar Astrophysics, (Garching bei München)
 2023 Lightkurve programmers workshop, Flatiron, CCA, (NY)
 2020 TESS Data Analysis workshop, (U'Hawai'i)
 2020 TESS Ninja 3, (U'Sydney)
 2019 PHOEBE workshop, (Villanova)

Advising

PhD

- 2024- Ian Berry (U'Hawai'i, Co-advising with D. Huber) *PhD dissertation*
 2024- Rita Wang (U'Hawai'i, Co-advising with D. Huber) *PhD dissertation*

Undergraduate

- 2023- Kaleo Toguchi-Tani (Whitman College, primary advisor), *Goldwater fellow* *Undergraduate*
 2023- Kiana Ejercito (U'Hawai'i, primary advisor), *NASA Space Grant* *Undergraduate & Honours*
 2021 Natasha Barac (U'Sydney, Co-advisor with T. Bedding) *Honours*
 2021 William Giang (U'Sydney, Co-advisor with T. Bedding) *Honours*

REU

- 2024 Logan Wilson (Harvard, primary advisor) *REU*
 2023 Ella Roselli (Columbia University, primary advisor) *REU*
 2023 Jack Kohm (Northern Arizona University, primary advisor) *REU*
 2023 Kenta Sakamoto (St Olaf College, primary advisor) *REU*
 2023 Mia Mansfield (U'Penn, primary advisor) *REU*
 2023 Alicia Chun (U'Chicago, co-advisor) *REU*
 2023 Aidan Chun (U'Hawaii, co-advisor) *REU*
 2022 Jessica Nagasako (U'Hawai'i, primary advisor) *REU*
 2022 Luke Benavitz (U'Hawai'i, primary advisor) *REU*
 2022 J.C. Dumaslan (U'Hawai'i, primary advisor) *REU*
 2022 Kaleo Toguchi-Tani (U'Hawai'i, primary advisor) *REU*
 2022 Kiana Ejercito (U'Hawai'i, primary advisor) *REU*

Professional service

- 2023– California Planet Search, *KPF observer*
- 2023 National Science Foundation, *Panel reviewer*
- 2023 Institute for Astronomy DEI group, *Founding member*
- 2023 TASC VII/KASC XIV, *Local organizing committee*
- 2020– Lightkurve, *Core developer*
- 2022 PHOEBE workshop, Villanova, *Scientific organizer*

Referee MNRAS, ApJ, A&A, Nature astron., JOSS, AJ

Telescopes Keck HIRES, KPF, Gemini

Selected press

- 2023 CNN: Scientists spot a planet that shouldn't exist
- 2020 NASA: Surprise! TESS Shows Ancient North Star Undergoes Eclipses
- 2020 NASA: NASA's TESS Enables Breakthrough Study of Perplexing Stellar Pulsations
- 2020 Phys.org: Astronomers find regular rhythms among pulsating stars

Publications

Metrics 10 first-author, 38 co-author, ADS library

h-index: 18

Citations: 2054

First author

- 1 **Hey**, D., Tonry, J., Shappee, B., et al. 2024c. arXiv e-prints arXiv:2410.16273. “*The period-luminosity relation of long-period variables in the Large Magellanic Cloud observed with ATLAS*”, arXiv:2410.16273
- 2 **Hey**, D., & Aerts, C. 2024b. A&A 688, A93. “*Confronting sparse Gaia DR3 photometry with TESS for a sample of around 60 000 OBAF-type pulsators*”, arXiv:2405.01539
- 3 **Hey**, D., Huber, D., Ong, J., et al. 2024a. arXiv e-prints arXiv:2403.02489. “*Precise Time-Domain Asteroseismology and a Revised Target List for TESS Solar-Like Oscillators*”, arXiv:2403.02489
- 4 **Hey**, D. R., Huber, D., Shappee, B. J., et al. 2023. AJ 166, 249. “*The Far Side of the Galactic Bar/Bulge Revealed through Semi-regular Variables*”, arXiv:2305.19319
- 5 **Hey**, D. R., Kochoska, A., Monier, R., et al. 2022. MNRAS 511, 2648-2658. “*Parameters of the eclipsing binary α Draconis observed by TESS and SONG*”,
- 6 **Hey**, D. R., Montet, B. T., Pope, B. J. S., et al. 2021. AJ 162, 204. “*A Search for Transits among the Delta Scuti Variables in Kepler*”, arXiv:2108.03785
- 7 **Hey**, D., Murphy, S., Foreman-Mackey, D., et al. 2020. The Journal of Open Source Software 5, 2125. “*Maelstrom: A Python package for identifying companions to pulsating stars from their light travel time variations*”,
- 8 **Hey**, D. R., Murphy, S. J., Foreman-Mackey, D., et al. 2020. AJ 159, 202. “*Forward Modeling the Orbits of Companions to Pulsating Stars from Their Light Travel Time Variations*”, arXiv:2003.02379
- 9 **Hey**, D. R., Holdsworth, D. L., Bedding, T. R., et al. 2019. MNRAS 488, 18-36. “*Six new rapidly oscillating Ap stars in the Kepler long-cadence data using super-Nyquist asteroseismology*”, arXiv:1906.04353
- 10 **Hey**, D., & Li, E. 2018. Royal Society Open Science 5, 172447. “*Advances in synthetic gauge fields for light through dynamic modulation*”, arXiv:1803.01977

Co-author

- 1 Malla, S. P., Stello, D., Montet, B. T., et al. 2024. MNRAS 534, 1775-1786. “*Benchmarking the spectroscopic masses of 249 evolved stars using asteroseismology with TESS*”, arXiv:2409.11736
- 2 Mombarg, J. S. G., Aerts, C., Van Reeth, T., et al. 2024. arXiv e-prints arXiv:2410.05367. “*Estimates of (convective core) masses, radii, and relative ages for $\sim 14,000$ Gaia-discovered gravity-mode pulsators monitored by TESS*”, arXiv:2410.05367
- 3 Gootkin, K., Hon, M., Huber, D., et al. 2024. ApJ 972, 137. “*A New Catalog of 100,000 Variable TESS A-F Stars Reveals a Correlation between δ Scuti Pulsator Fraction and Stellar Rotation*”, arXiv:2405.19388
- 4 Fritzewski, D. J., Vanrespaille, M., Aerts, C., et al. 2024. arXiv e-prints arXiv:2408.06097. “*Mode identification and ensemble asteroseismology of 164 B Cep stars discovered from Gaia light curves and monitored by TESS*”, arXiv:2408.06097
- 5 Saunders, N., Grunblatt, S. K., Chontos, A., et al. 2024. AJ 168, 81. “*TESS Giants Transiting Giants. VI. Newly Discovered Hot Jupiters Provide Evidence for Efficient Obliquity Damping after the Main Sequence*”, arXiv:2407.21650
- 6 Zieba, S., Zwintz, K., Kenworthy, M., et al. 2024. A&A 687, A309. “*The β Pictoris b Hill sphere transit campaign. II. Searching for the signatures of the β Pictoris exoplanets through time delay analysis of the δ Scuti pulsations*”, arXiv:2406.04870
- 7 Donlon, T., Chakrabarti, S., Lam, M. T., et al. 2024. arXiv e-prints arXiv:2407.06482. “*The Anomalous Acceleration of PSR J2043+1711: Long-Period Orbital Companion or Stellar Flyby?*”, arXiv:2407.06482
- 8 Sepulveda, A. G., Huber, D., Bedding, T. R., et al. 2024. AJ 168, 13. “*HIP 65426 is a High-frequency Delta Scuti Pulsator in Plausible Spin–Orbit Alignment with its Directly Imaged Exoplanet*”, arXiv:2312.05310
- 9 Hoogendam, W. B., Hinkle, J. T., Shappee, B. J., et al. 2024. MNRAS 530, 4501-4518. “*Discovery and follow-up of ASASSN-23bd (AT 2023clx): the lowest redshift and luminosity optically selected tidal disruption event*”, arXiv:2401.05490
- 10 Ong, J. M. J., Hon, M. T. Y., Soares-Furtado, M., et al. 2024. ApJ 966, 42. “*The Gasing Pangkah Collaboration. I. Asteroseismic Identification and Characterization of a Rapidly Rotating Engulfment Candidate*”, arXiv:2402.16971
- 11 Chiti, F., van Saders, J. L., Heintz, T. M., et al. 2024. arXiv e-prints arXiv:2403.12129. “*Rotation at the Fully Convective Boundary: Insights from Wide WD + MS Binary Systems*”, arXiv:2403.12129
- 12 Holdsworth, D. L., Cunha, M. S., Lares-Martiz, M., et al. 2024. MNRAS 527, 9548-9580. “*TESS Cycle 2 observations of roAp stars with 2-min cadence data*”, arXiv:2312.04199
- 13 Read, A. K., Bedding, T. R., Mani, P., et al. 2024. MNRAS 528, 2464-2473. “*Identifying 850 δ Scuti pulsators in a narrow Gaia colour range with TESS 10-min full-frame images*”, arXiv:2401.07413
- 14 Chakrabarti, S., Simon, J. D., Craig, P. A., et al. 2023. AJ 166, 6. “*A Noninteracting Galactic Black Hole Candidate in a Binary System with a Main-sequence Star*”, arXiv:2210.05003
- 15 Li, Y., Bedding, T. R., Stello, D., et al. 2023. MNRAS 523, 916-927. “*A prescription for the asteroseismic surface correction*”, arXiv:2208.01176
- 16 Hon, M., Huber, D., Rui, N. Z., et al. 2023. Nature 618, 917-920. “*A close-in giant planet escapes engulfment by its star*”, arXiv:2306.15877
- 17 Greenbaum, A. Z., Llop-Sayson, J., Lew, B. W. P., et al. 2023. ApJ 945, 126. “*First Observations of the Brown Dwarf HD 19467 B with JWST*”, arXiv:2301.11455
- 18 Bedding, T. R., Murphy, S. J., Crawford, C., et al. 2023. ApJ 946, L10. “*TESS Observations of the Pleiades Cluster: A Nursery for δ Scuti Stars*”, arXiv:2212.12087

- 19 Barac, N., Bedding, T. R., Murphy, S. J., et al. 2022. MNRAS 516, 2080-2094. “*Revisiting bright δ Scuti stars and their period-luminosity relation with TESS and Gaia DR3*”, arXiv:2207.00343
- 20 Li, Y., Bedding, T. R., Murphy, S. J., et al. 2022. Nature Astronomy 6, 673-680. “*Discovery of post-mass-transfer helium-burning red giants using asteroseismology*”, arXiv:2204.06203
- 21 Murphy, S. J., Bedding, T. R., White, T. R., et al. 2022. MNRAS 511, 5718-5729. “*Five young δ Scuti stars in the Pleiades seen with Kepler/K2*”, arXiv:2111.04203
- 22 Prša, A., Kochoska, A., Conroy, K. E., et al. 2022. ApJS 258, 16. “*TESS Eclipsing Binary Stars. I. Short-cadence Observations of 4584 Eclipsing Binaries in Sectors 1-26*”, arXiv:2110.13382
- 23 Lund, M. N., Handberg, R., Buzasi, D. L., et al. 2021. ApJS 257, 53. “*TESS Data for Asteroseismology: Light-curve Systematics Correction*”, arXiv:2108.11780
- 24 Holdsworth, D. L., Cunha, M. S., Kurtz, D. W., et al. 2021. MNRAS 506, 1073-1110. “*TESS cycle 1 observations of roAp stars with 2-min cadence data*”, arXiv:2105.13274
- 25 Murphy, S. J., Li, T., Sekaran, S., et al. 2021. MNRAS 505, 2336-2348. “*A binary with a δ Scuti star and an oscillating red giant: orbit and asteroseismology of KIC 9773821*”, arXiv:2105.13577
- 26 Foreman-Mackey, D., Luger, R., Agol, E., et al. 2021. The Journal of Open Source Software 6, 3285. “*exoplanet: Gradient-based probabilistic inference for exoplanet data & other astronomical time series*”, arXiv:2105.01994
- 27 Addison, B. C., Wright, D. J., Nicholson, B. A., et al. 2021. MNRAS 502, 3704-3722. “*TOI-257b (HD 19916b): a warm sub-saturn orbiting an evolved F-type star*”, arXiv:2001.07345
- 28 Murphy, S. J., Saio, H., Takada-Hidai, M., et al. 2020. MNRAS 498, 4272-4286. “*On the first δ Sct-roAp hybrid pulsator and the stability of p and g modes in chemically peculiar A/F stars*”, arXiv:2009.00730
- 29 Li, G., Guo, Z., Fuller, J., et al. 2020. MNRAS 497, 4363-4375. “*The effect of tides on near-core rotation: analysis of 35 Kepler γ Doradus stars in eclipsing and spectroscopic binaries*”, arXiv:2007.14853
- 30 Conroy, K. E., Kochoska, A., **Hey**, D., et al. 2020. ApJS 250, 34. “*Physics of Eclipsing Binaries. V. General Framework for Solving the Inverse Problem*”, arXiv:2006.16951
- 31 Malla, S. P., Stello, D., Huber, D., et al. 2020. MNRAS 496, 5423-5435. “*Asteroseismic masses of four evolved planet-hosting stars using SONG and TESS: resolving the retired A-star mass controversy*”, arXiv:2006.07649
- 32 Bedding, T. R., Murphy, S. J., **Hey**, D. R., et al. 2020. Nature 581, 147-151. “*Very regular high-frequency pulsation modes in young intermediate-mass stars*”, arXiv:2005.06157
- 33 Murphy, S. J., Barbara, N. H., **Hey**, D., et al. 2020. MNRAS 493, 5382-5388. “*Finding binaries from phase modulation of pulsating stars with Kepler - VI. Orbits for 10 new binaries with mischaracterized primaries*”, arXiv:2003.02282
- 34 Bedding, T. R., **Hey**, D. R., & Murphy, S. J. 2019. RNAAS 3, 163. “*A Dance with Dragons: TESS Reveals α Draconis is a Detached Eclipsing Binary*”, arXiv:1910.12449
- 35 Cunha, M. S., Antoci, V., Holdsworth, D. L., et al. 2019. MNRAS 487, 3523-3549. “*Rotation and pulsation in Ap stars: first light results from TESS sectors 1 and 2*”, arXiv:1906.01111
- 36 Ziaali, E., Bedding, T. R., Murphy, S. J., et al. 2019. MNRAS 486, 4348-4353. “*The period-luminosity relation for δ Scuti stars using Gaia DR2 parallaxes*”, arXiv:1904.08101
- 37 Murphy, S. J., **Hey**, D., Van Reeth, T., et al. 2019. MNRAS 485, 2380-2400. “*Gaia-derived luminosities of Kepler A/F stars and the pulsator fraction across the δ Scuti instability strip*”, arXiv:1903.00015
- 38 Lightkurve Collaboration, Cardoso, J. V. de M., Hedges, C., et al. 2018. Astrophysics Source Code Library ascl:1812.013. “*Lightkurve: Kepler and TESS time series analysis in Python*”, ascl:1812.013