

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

- 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