

Jim Fuller

Curriculum Vitae

POSITION: Assistant Professor of Astronomy, California Institute of Technology

CONTACT:

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RESEARCH INTERESTS:

I am interested in theoretical astrophysics, especially stellar and planetary systems. Much of my work focuses on wave propagation within stars and planets. Applications include binary stellar evolution, tidal interactions, stellar and planetary structure, asteroseismology, eruptive transients, and supernovae.

EDUCATION:

Ph.D., 2014	Cornell University	<i>Astronomy and Space Sciences Minor Field: Physics Ph.D. Advisor: Professor Dong Lai</i>
M.S., 2011	Cornell University	<i>Astronomy and Space Sciences</i>
B.A., 2008	Whitman College	<i>Physics-Astronomy</i>

RESEARCH EXPERIENCE:

2017-	Assistant Professor of Astronomy	California Institute of Technology
2013-2017	DuBridge Postdoctoral Fellow	California Institute of Technology
2013-2017	KITP Postdoctoral Scholar	Kavli Institute for Theoretical Physics
2011-2013	NASA Earth and Space Sciences Fellow	Cornell University
2011	Graduate Fellow	Kavli Institute for Theoretical Physics
2009-2011	Research Assistant	Cornell University
2008-2009	First Year Graduate Fellow	Cornell University
2007-2008	Undergraduate Researcher	High Altitude Observatory

TEACHING EXPERIENCE:

2017-, Professor, Astronomy Department, California Institute of Technology
2014-16, Guest Lecturer, (various), California Institute of Technology

2012, Guest Lecturer, Introduction to Astrophysics and Space Sciences, Cornell University
2009-2011, Teaching Assistant, Astronomy 101/102, Cornell University
2009, Completed course “Teaching and Learning Physics”, Cornell University
2006-2008, Teaching Assistant, Astronomy 177/178/179, Whitman College

AWARDS AND HONORS:

2018, Alfred P. Sloan Research Fellow
2017, Rose Hills Foundation Innovator award, Caltech
2014, Division of Astrophysics Thesis Prize Finalist
2012, Astronomical Society of New York Graduate Student Prize
2012, Cranson W. and Edna B. Shelley Award for Outstanding Research, Cornell University
2007, Outstanding REU Research Award, Laboratory for Atmospheric and Space Physics,
University of Colorado

GRANTS AND FELLOWSHIPS:

2018, Sloan Fellowship, (FG-2018-10515)
2018, PI on NASA ATP Grant, “Pre-supernova Outbursts” (80NSSC18K1017)
2017, PI on Hubble Space Telescope Theory Grant, “Pre-supernova properties of progenitors detected by HST” (HST-AR-15021.001-A)
2017, Co-PI on Heising-Simons grant, “Down but not out: the white dwarf survivors of low-luminosity thermonuclear supernovae” (Grant #2017-274)
2013, DuBridge Postdoctoral Fellowship, California Institute of Technology
2012, Co-I on Kepler GO proposal, “Heartbeat Stars: A New Class of Binary System with Extreme Periastron Brightenings and Tidally Excited Modes” (11-KEPLER11-0056)
2011, Graduate Fellowship, Kavli Institute for Theoretical Physics
2011, NASA Earth and Space Science Fellowship
2008, First Year Graduate Fellowship, Department of Astronomy, Cornell University
2004, William O. Douglas Fellowship, Whitman College

RECENT TALKS AND PRESENTATIONS:

“The Art of Succeeding in Science”, Stem3 Academy, Valley Glen, May 2017
“Surprising impacts of gravity waves”, Astronomy Colloquium, Caltech, Pasadena, April 2017
“Saturn ring seismology”, Astronomy Colloquium, Charles University, Prague, March 2017
“New insights on tidal queues”, Royal Astronomical Society, London, March 2017
“The era of bright star astronomy”, NOAO Meeting, Tucson, February 2017
“Surprising impacts of gravity waves”, CCA Colloquium, New York, November 2017
“Tidally excited oscillations in heartbeat stars”, K2 conference, Mountain View, June 2017

“Wave-driven pre-supernova outbursts”, FOE conference, Corvallis, June 2017
“Strong internal magnetic fields revealed by asteroseismology of red giant stars”, Astronomy Colloquium, STScI, Baltimore, May 2017
“Surprising impacts of gravity waves”, Astronomy Colloquium, University of California, Berkeley, May 2017
“Asteroseismic windows into stellar cores”, KITP massive star conference, Santa Barbara, March 2017
“Saturn ring seismology”, UTIG colloquium, Austin, February 2017
“Crucial consequences of waves in massive stars”, IAU conference, Auckland, November 2016
“Tidal evolution of Saturn’s moons”, DPS Meeting, Pasadena, October 2016
“Asteroseismic windows into the hearts of red giants”, CoolStars19, Uppsala, June 2016

SELECTED PUBLICATIONS:

1. **Fuller, J.**, Ro, S., 2018, “Pre-supernova outbursts via wave heating in massive stars II: Hydrogen-poor stars”, *MNRAS*, 476, 1853
2. Luan, J., **Fuller, J.**, Quataert, E., 2018, “How Cassini can constrain tidal dissipation in Saturn”, *MNRAS*, 473, 5002
3. **Fuller, J.**, Hambleton, K., Shporer, A., Isaacson, H., Thompson, S., 2017, “Accelerated tidal circularization via resonance locking in KIC 8164262”, *MNRAS Letters*, 472, 25
4. **Fuller, J.**, 2017, “Heartbeat stars, tidally excited oscillations, and resonance locking”, *MNRAS*, 472, 1538
5. Hambleton, K., **Fuller, J.**, et al., “KIC 8164262: a heartbeat star showing tidally induced pulsations with resonant locking”, *MNRAS* (submitted), arXiv:1706.05051
6. **Fuller, J.**, 2017, “Pre-supernova outbursts via wave heating in massive stars - I. Red supergiants”, *MNRAS*, 470, 1642
7. Vick, M., Lai, D., **Fuller, J.**, 2017, “Tidal dissipation and evolution of white dwarfs around massive black holes: an eccentric path to tidal disruption,” *MNRAS*, 468, 2296
8. Guo, Z., Gies, D., **Fuller, J.**, 2017, “Tidally induced pulsations in Kepler eclipsing binary KIC 3230227”, *ApJ*, 834, 59
9. Pablo, H., Richardson, N., **Fuller, J.**, et al., 2017, “The most massive heartbeat: an in-depth analysis of ι Orionis”, *MNRAS*, 467, 2494
10. Lecoanet, D., Vasil, G., **Fuller, J.**, Cantiello, M., Burns, K., 2017, “Conversion of internal gravity waves into magnetic waves”, *MNRAS*, 466, 2181

11. **Fuller, J.**, Luan, J., Quataert, E., 2016, “Resonance locking as the source of rapid tidal migration in the Jupiter and Saturn moon systems”, *MNRAS*, 458, 3867
12. Shporer, A., **Fuller, J.**, et al., 2016, “Radial velocity monitoring of Kepler heartbeat stars”, *ApJ*, 829, 34
13. Cantiello, M., **Fuller, J.**, Bildsten, L., 2016, “Asteroseismic signatures of evolving internal stellar magnetic fields”, *ApJ*, 824, 14
14. Stello, D., Cantiello, M., **Fuller, J.**, García, R., Huber, D., 2016, “Suppression of quadrupole and octupole modes in red giants observed by Kepler”, *PASA*, 33, 11
15. Stello, D., Cantiello, M., **Fuller, J.**, García, R., Bildsten, L., Huber, D., Bedding, T., and Silva Aguirre, V., 2016, “A prevalence of dynamo-generated magnetic fields in the cores of intermediate-mass stars”, *Nature*, 529, 364
16. **Fuller, J.**, Cantiello, M., Stello, D., García, R., and Bildsten, L., 2015, “Asteroseismology can reveal strong internal magnetic fields in red giant stars”, *Science*, 350, 423
17. **Fuller, J.**, Cantiello, M., Lecoanet, D., and Quataert, E., 2015, “The spin rate of pre-collapse stellar cores: wave-driven angular momentum transport in massive stars”, *ApJ*, 810, 101
18. Belyaev, M., Quataert, E., **Fuller, J.**, 2015, “The properties of g-modes in layered semiconvection”, *MNRAS*, 452, 2700
19. **Fuller, J.**, Ott, C., 2015, “Dark matter-induced collapse of neutron stars: a possible link between fast radio bursts and the missing pulsar problem”, *MNRAS Letters*, 450, 71
20. **Fuller, J.**, Klion, H., Abdikamalov, E., Ott, C., 2015, “Supernova seismology: gravitational wave signatures of rapidly rotating core collapse”, *MNRAS*, 450, 414
21. **Fuller, J.**, Lecoanet, D., Cantiello, M., and Brown, B., 2014, “Angular momentum transport via internal gravity waves in evolving stars”, *ApJ*, 796, 17
22. **Fuller, J.**, 2014, “Saturn ring seismology: Evidence for stable stratification in the deep interior of Saturn”, *Icarus*, 242, 283
23. Borkovits, T., Derekas, A., **Fuller, J.**, et al., 2014, “HD 183648: a Kepler eclipsing binary with anomalous ellipsoidal variations and a pulsating component”, *MNRAS*, 443, 3068
24. **Fuller, J.**, and Lai, D., 2014, “Dynamical tides in compact white dwarf binaries: influence of rotation”, *MNRAS*, 444, 3488
25. **Fuller, J.**, Lai, D., and Storch, N., 2014, “Non-radial oscillations in rotating giant planets with solid cores: application to Saturn and its rings”, *Icarus*, 231, 34

26. **Fuller, J.**, and Lai, D., 2013, “Dynamical tides in compact white dwarf binaries: helium core white dwarfs, tidal heating, and observational signatures”, *MNRAS*, 430, 274
27. **Fuller, J.**, Derekas, A., Borkovits, T., Huber, D., Bedding, T., and Kiss, L., 2013, “Tidally induced oscillations and orbital decay in compact triple star systems”, *MNRAS*, 429, 2425
28. **Fuller, J.**, and Lai, D., 2012, “Tidal novae in compact binary white dwarfs”, *ApJL*, **756**, 17
29. **Fuller, J.**, and Lai, D., 2012, “Dynamical tides in compact white dwarf binaries: tidal synchronization and dissipation”, *MNRAS*, **421**, 426
30. **Fuller, J.**, and Lai, D., 2012, “Dynamical tides in eccentric binaries and tidally-excited stellar pulsations in *Kepler* KOI-54”, *MNRAS*, **420**, 3126
31. **Fuller, J.**, and Lai, D., 2011, “Tidal excitation of oscillation modes in compact white dwarf binaries: I. Linear theory”, *MNRAS*, **412**, 1331
32. **Fuller, J.**, and Gibson, S., 2009, “A survey of coronal cavity density profiles”, *ApJ*, **700**, 1205
33. **Fuller, J.**, Gibson, S., de Toma, G., and Fan, Y., 2008, “Observing the unobservable? Modeling coronal cavity densities”, *ApJ*, **678**, 515