

Benjamin Brown

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Professional development

I received a B.S. (with high distinction) in Physics from Harvey Mudd College in Claremont, CA in 2003 and began graduate studies at the University of Colorado at Boulder later that year. There I received a M.S. in 2005 and a Ph.D. in 2009 from the Department of Astrophysical and Planetary Sciences. From October 2009 to September 2013, I was a National Science Foundation (NSF) Astronomy and Astrophysics Postdoctoral Fellow (AAPF) at the University of Wisconsin at Madison, and an associate specialist at the Kavli Institute for Theoretical Physics (KITP) in Santa Barbara, California from September 2013 to July 2014. Since August 2014, I have been an assistant professor in the Department of Astrophysical and Planetary Sciences and the Laboratory for Atmospheric and Space Physics at University of Colorado, Boulder.

Research focus

My research focuses on astrophysical fluid dynamics and magnetohydrodynamics (MHD) of stellar interiors. I explore stellar dynamo physics by studying the coupling of rotation, convection and magnetism through numerical simulations on massively-parallel supercomputers. This research is conducted using both the ASH code and the open-source Dedalus pseudospectral framework. My research focuses especially on global-scale dynamo action and the properties of convection, studying how large-scale fields can be built in the convection zone of a star. Further research is exploring how such dynamos couple to the stably-stratified radiative interior through tachoclines of shear and penetrative convection, and has lead to improved treatments of gravity waves within anelastic and other low-mach number models. Stellar structure codes, including MESA and CESAM, are used in building the models of lower-mass stars. Results from the dynamo models are being connected with astrophysical observations and laboratory based dynamo experiments.

Teaching and outreach experience

Advisor to five graduate students at U. Colorado: Evan Anders, Baylee Bordwell, Ryan Diaz-Perez, Raven Larson, Gabriel Ortiz-Pena (2014–present)

Research Advisor to four undergraduate students at U. Colorado: Cathryn Manduca, Christopher Panella, Tayler Quist, Yun Wen (2015–present)

Lecturer in Fluid Dynamics: Other World Labs exoplanetary science summer school, U. California, Santa Cruz (Summer 2017)

Taught undergraduate ASTR-1000 Solar System at U. Colorado (Fall 2016, Fall 2017, ~ 200 students)

Taught graduate ASTR-5400 Introduction to Fluid Dynamics at U. Colorado (Spring 2018, 20 students)

Taught graduate ASTR-5410 Fluid Instabilities, Waves and Turbulence at U. Colorado (Fall 2018, 20 students)

Taught graduate ASTR-5540 Mathematical Methods at U. Colorado (Fall 2014, 10 students; Fall 2015, 9 students)

Taught graduate ASTR-5550 Observations and Statistics at U. Colorado (Spring 2017, Spring 2019, ~ 20 students)

Co-taught undergraduate class *AST 310: Stellar Interiors* with Ellen Zweibel at U. Wisconsin, 27 students, instructor of record (Fall 2012)

Created/taught graduate seminar *Being a Professional Scientist: Career Skills in Astronomy & Astrophysics*, U. Wisconsin, 15+ students (Spring 2011, Spring 2013)

Research mentor for five undergraduate students at U. Wisconsin: Jacob Swan, Elise Larson, Jesse Nims, Garrett Frankson, Kevin Meany (May 2010–2013)

External mentor for two graduate students at U. Colorado: Kyle Augustson & Nicholas Nelson (May 2007–2013)

Substantial collaboration on “Journey to the Stars” planetarium show, Hayden Planetarium, American Museum of Natural History. 2 min screen time (8% of show) in final cut (2009)

Author of content for Science on a Sphere (SOS) (2007–present)

Author/lecturer of modern “Birth of Stars and Planets” planetarium show, Fiske Planetarium, U. Colorado. Used for astronomy classes and public shows. 10+ presentations, 30–200 attendees/show (2006–present)

Exam committee service

Hilary Egan	2015	Comps II	non-advocate chair
Evan Anders	2016	Comps II	research advisor
Jhett Bordwell	2016	Comps II	research advisor
Piyush Agrawal	2016	Comps II	
Daniel Everding	2016	Comps II	
Tristan Weber	2016	Comps II	
Ryan Orvedahl	2016	Comps II	
Loren Matilsky	2017	Comps II	non-advocate chair
Ryan Horton	2017	Comps II	non-advocate chair
Aaron Stemo	2017	Comps II	
Avery Schiff	2017	Comps II	
Ryan Díaz-Pérez	2018	Comps II	research advisor
Connor Bice	2018	Comps II	non-advocate chair
Elizabeth Butler	2018	Comps II	
Samantha Walker	2018	Comps II	non-advocate chair
Gabriel Ortiz-Pena	2019	Comps II	research advisor
Jesse Lord	2014	PhD	CU APS
Ben Greer	2015	PhD	CU APS
Tyler Gorda	2016	PhD	CU Physics
Erika Zetterlund	2018	PhD	CU APS
Javier Orjuela Koop	2018	PhD	CU Physics

Experience acquiring external resources

Awarded Grants

P-I NASA Solar System Workings: *Atmospheric waves in giant planets: energy and chemical transport*, (2018–2021, \$442,774)

P-I NASA Living With a Star Focused Science Team, *Stellar insights into solar magnetism: exploring fundamental dynamo physics across the lower main sequence*, (2015–2019, \$960,132)

P-I NSF Astronomy and Astrophysics Postdoctoral Fellowship, *Magnetism in the habitable zone: simulations of dynamo activity in lower-mass stars*, (2009–2013, \$249,000)

P-I NASA GSRP graduate fellowship (2006–2009)

Co-I NASA Heliophysics Supporting Research grant, *Seeking the deep origins of sunspots*, (PI: Toomre, 2018–2021, \$742,405)

Co-I NSF Astronomy & Astrophysics Grant, *Resolving the source of the solar acoustic oscillations: Preparing for the DKIST era*, (PI: Rast, 2016–2019, \$651,725)

Co-I NASA Astrophysical Theory Program grant, *Tiny stars, strong fields: exploring the origin of intense magnetism in M stars*, (PI: Toomre, 2015–2018, \$591,563)

Co-I NASA Heliophysics Theory Program grant (PI: Toomre, 2010–2015)

Other Competitive Resources

P-I awarded NASA HEC supercomputing allocation (2015–present, 22M cpu-hours/year)

P-I awarded CU Research Computing supercomputing allocation (2015–present, 4M cpu-hours/year)

Co-I awarded DOE INCITE supercomputing allocation (2014–2017, ~ 250M cpu-hours/year)

Co-I awarded NASA supercomputing allocation (2010–2017, ~ 60M cpu-hours/year)

Co-I awarded NSF Teragrid supercomputing allocation (2010–2013, ~ 14M cpu-hours/year)

P-I stellar flare program on South African Large Telescope (SALT/RSS, ~ 60 hrs over 3 seasons)

Co-I stellar differential rotation program on Center for High Angular Resolution Astronomy interferometer (CHARA/VEGA)

Supercomputing experience

NASA resource *Pleiades* at Ames (2011–present)

CU Boulder resource *Summit* at CU (2016–present)

CU Boulder resource *Janus* at CU (2008–2016)

NSF Teragrid resource *Kraken* at NICS (2008–2014)

NSF Teragrid resource *Stampede* at TACC (2013–2014)

NSF Teragrid resource *Ranger* at TACC (2008–2013)

NASA resource *Columbia* at Ames (2005–2013)

NSF Teragrid resource *Bigben* at PSC (2005–2010)

NSF Teragrid resource *Blue Gene/L* at SDSC (2004–2009)

NSF Teragrid resource *Datastar* at SDSC (2004–2008)

NSF Teragrid resource *Lemieux* at PSC (2003–2006)

Service

Core member development team, Dedalus open source community code <http://dedalus-project.org/>

Director and Search Committee Chair of George Ellery Hale Postdoctoral Fellowship in Solar and Space Physics program within APS department at CU Boulder (2014–present)

Chair of Graduate Admissions Committee at CU Boulder (2017)

Question author and grader APS department Comps Exam (2014–present)

Faculty member of Graduate Admissions Committee at CU Boulder (2014–present)

Member of American Astronomical Society Employment Committee (2013–present)

Faculty member of Sommers-Bausch Observatory Oversight Committee at CU Boulder (2016–2017)

Faculty member of Fiske Planetarium Oversight Committee at CU Boulder (2014–2017)

Member of Computational Infrastructure for Geodynamics: Geodynamo working group (2013–2017)

Theory group leader, Bcool stellar magnetism collaboration (2012–2016)

Lead author, 1 white paper for *Helio2010: A Decadal Strategy for Solar and Space Physics*

Contributing author, 1 white paper for *NASA: Best Practices for Future Open Code Policy*

Contributing author, 2 white papers for *Helio2010: A Decadal Strategy for Solar and Space Physics*

Contributing author, 1 white paper for *Astro2010: The Astronomy and Astrophysics Decadal Survey*

Contributing scientist on the VAPOR project (<http://www.vapor.ucar.edu>) for volume visualization of large datasets (2008–present)

Referee, *Living Reviews in Solar Physics* (2014–present)

Referee, *Astronomy & Astrophysics* (2011–present)

Referee, *Astrophysical Journal* (2010–present)

Referee, *Geophysical and Astrophysical Fluid Dynamics* (2008–present)

Referee, *Monthly Notices of the Royal Astronomical Society* (2012–present)

NSF and NASA grant reviewer

Awards

University of Colorado Marinus Smith Award (2018)

University of Colorado Postdoctoral Mentor, honorable mention (2017)

NSF AAPF fellowship (2009–2013)

NASA GSRP fellowship (2006–2009)

University of Colorado departmental teaching assistant award (2005, 2006)

Publications

Ph.D. thesis

Convection and dynamo action in rapidly rotating suns, 2009, Advisor: Juri Toomre

Open Source Community Codes

Dedalus: a flexible framework for spectrally solving differential equations

Burns, K. J., Vasil, G. M., Oishi, J. S., Lecoanet, D. & **Brown, B. P.**, <http://dedalus-project.org/>
(and on bitbucket, & Astronomy Source Code Library)

Journal articles

h-index: 21

citations: 1560 (from scholar.google.com)

Papers led by students who I mentored marked with **

36. *Tensor calculus in spherical coordinates using Jacobi polynomials. Part-II: Implementation and Examples*
Lecoanet, D., Vasil, G. M., Burns, K. J., **Brown, B. P.**, & Oishi, J. S. 2019, in press *Journal of Computational Physics* & ArXiv e-prints, arXiv:1804.09283
35. *Tensor calculus in spherical coordinates using Jacobi polynomials. Part-I: Mathematical analysis and derivations*
Vasil, G., Lecoanet, D., Burns, K., Oishi, J., & **Brown, B.**, 2019, in press *Journal of Computational Physics* & ArXiv e-prints, arXiv:1804.10320
34. ** *Predicting the Rossby number in convective experiments*
Anders, E. H., Manduca, C. M., **Brown, B. P.**, Oishi, J. S., & Vasil, G. M., 2019, *ApJ*, 872, 138
33. ** *Accelerated evolution of convective simulations*
Anders, E. H., **Brown, B. P.**, & Oishi, J. S. 2018, *Physical Review Fluids*, 3(8), 083502
32. ** *Convective Dynamics and Disequilibrium Chemistry in the Atmospheres of Giant Planets and Brown Dwarfs*
Bordwell, B, **Brown, B P**, & Oishi, J S, 2018, *ApJ*, 854, 8
31. ** *Convective heat transport in stratified atmospheres at low and high Mach number*
Anders, E H & **Brown, B P**, 2017, *Physical Review Fluids*, 2(8), 083501
30. *On Differential Rotation and Overshooting in Solar-like Stars*
Brun, A S, Strugarek, A, Varela, J, Matt, S P, Augustson, K C, Emeriau, C, DoCao, O L, **Brown, B**, & Toomre, J, 2017, *ApJ*, 836, 192 (**27 citations**)
29. *Tensor calculus in polar coordinates using Jacobi polynomials*
Vasil, G M, Burns, K J, Lecoanet, D, Olver, S, **Brown, B P**, & Oishi, J S, 2016, *Journal of Computational Physics*, 325, 53–73 (**14 citations**)
28. *Turbulent Chemical Diffusion in Convectively Bounded Carbon Flames*
Lecoanet, D, Schwab, J, Quataert, E, Bildsten, L, Timmes, F X, Burns, K J, Vasil, G M, Oishi, J S, & **Brown, B P**, 2016, *ApJ*, 832, 71 (**22 citations**)

27. *Performance benchmarks for a next generation numerical dynamo model*
Matsui, H, Heien, E, Aubert, J, Aurnou, J M, Avery, M, **Brown, B**, Buffett, B A, Busse, F, Christensen, U R, Davies, C J, Featherstone, N, Gastine, T, Glatzmaier, G A, Gubbins, D, Guermond, J-L, Hayashi, Y-Y, Hollerbach, R, Hwang, L J, Jackson, A, Jones, C A, Jiang, W, Kellogg, L H, Kuang, W, Landeau, M, Marti, P, Olson, P, Ribeiro, A, Sasaki, Y, Schaeffer, N, Simitev, R D, Sheyko, A, Silva, L, Stanley, S, Takahashi, F, Takehiro, S-i, Wicht, J, & Willis, A P, 2016, *Geochemistry, Geophysics, Geosystems*, 17, 1586–1607 (**29 citations**)
26. *M Dwarf Flare Continuum Variations on One-second Timescales: Calibrating and Modeling of UL-TRACAM Flare Color Indices*
Kowalski, A F, Mathioudakis, M, Hawley, S L, Wisniewski, J P, Dhillon, V S, Marsh, T R, Hilton, E J, & **Brown, B P**, 2016, *ApJ*, 820, 95 (**13 citations**)
25. *A validated non-linear Kelvin-Helmholtz benchmark for numerical hydrodynamics*
Lecoanet, D, McCourt, M, Quataert, E, Burns, K J, Vasil, G M, Oishi, J S, **Brown, B P**, Stone, J M, & O’Leary, R M, 2016, *MNRAS*, 455, 4274–4288 (**27 citations**)
24. *Numerical simulations of internal wave generation by convection in water*
Lecoanet, D, Le Bars, M, Burns, K J, Vasil, G M, **Brown, B P**, Quataert, E, & Oishi, J S, 2015, *Phys. Rev. E*, 91, 063016:1–10 (**17 citations**)
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- Prior to CU Boulder
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23. *Angular momentum transport via internal gravity waves in evolving stars*
Fuller, J, Lecoanet, D, Cantiello, M, & **Brown, B P**, 2014, *ApJ*, 796, 17:1–12 (**64 citations**)
22. *Properties of 42 solar-type Kepler targets from the Asteroseismic Modeling Portal*
Metcalf, T. S., Creevey, O. L., Dogan, G., et al. (including **Brown, B P**), 2014, *ApJS*, 214, 27:1–13 (**105 citations**)
21. *** Conduction in low Mach number flows: Part I Linear and weakly nonlinear regimes*
Lecoanet, D, **Brown, B P**, Zweibel, E G, Burns, K J, Oishi, J S, & Vasil, G M, 2014, *ApJ*, 797, 94:1–16 (**16 citations**)
20. *Buoyant magnetic loops generated by global convective dynamo action*
Nelson, N J, **Brown, B P**, Brun, A S, Miesch, M S, & Toomre, J, 2014, *Sol. Phys.*, 289, 441–458 (**52 citations**)
19. *Energy conservation and gravity waves in sound-proof treatments of stellar interiors: Part II Lagrangian constrained analysis*
Vasil, G M, Lecoanet, D, **Brown, B P**, Wood, T S, & Zweibel, E G, 2013, *ApJ*, 773, 169:1–23 (**38 citations**)
18. *Magnetic wreaths and cycles in convective dynamos*
Nelson, N J, **Brown, B P**, Brun, A S, Miesch, M S, & Toomre, J, 2013a, *ApJ*, 762, 73:1–20 (**120 citations**)
17. *Magnetic activity cycles in the exoplanet host star epsilon Eridani*
Metcalf, T S, Buccino, A P, **Brown, B P**, Mathur, S, Soderblom, D R, Henry, T J, Mauas, P J D, Petrucci, R, Hall, J C, & Basu, S, 2013, *ApJ*, 763, L26:1–6 (**61 citations**)
16. *Energy conservation and gravity waves in sound-proof treatments of stellar interiors: Part I anelastic approximations*
Brown, B P, Vasil, G M, & Zweibel, E G, 2012, *ApJ*, 756, 109:1–20 (**44 citations**)
15. *Convection and differential rotation in F-type stars*
Augustson, K C, **Brown, B P**, Brun, A S, Miesch, M S, & Toomre, J, 2012, *ApJ*, 756, 169:1–23 (**40 citations**)

14. *Role of large-scale velocity fluctuations in a two-vortex kinematic dynamo*
Kaplan, E J, **Brown, B P**, Rahbarnia, K, & Forest, C B, 2012, *Phys. Rev. E*, 85(6), 066315:1–9
(8 citations)
13. *Direct observation of the turbulent emf and transport of magnetic field in a liquid sodium experiment*
Rahbarnia, K, **Brown, B P**, Clark, M M, Kaplan, E J, Nornberg, M D, Rasmus, A M, Zane Taylor, N, Forest, C B, Jenko, F, Limone, A, Pinton, J-F, Plihon, N, & Verhille, G, 2012, *ApJ*, 759, 80:1–6
(21 citations)
12. *Optimized boundary driven flows for dynamos in a sphere*
Khalzov, I V, **Brown, B P**, Cooper, C M, Weisberh, D B, & Forest, C B, 2012a, *Physics of Plasmas*, 19(11), 112106:1–11 (12 citations)
11. *Resistive and ferritic-wall plasma dynamos in a sphere*
Khalzov, I V, **Brown, B P**, Kaplan, E J, Katz, N, Paz-Soldan, C, Rahbarnia, K, Spence, E J, & Forest, C B, 2012b, *Physics of Plasmas*, 19(10), 104501:1–4 (12 citations)
10. *Modeling the Parker instability in a rotating plasma screw pinch*
Khalzov, I V, **Brown, B P**, Katz, N, & Forest, C B, 2012c, *Physics of Plasmas*, 19(2), 022107:1–10
9. *Convective Babcock-Leighton dynamo models*
Miesch, M S & **Brown, B P**, 2012, *ApJ*, 746, L26:1–5 (14 citations)
8. *Convection and differential rotation properties of G and K stars computed with the ASH code*
Matt, S P, Do Cao, O, **Brown, B P**, & Brun, A S, 2011, *Astronomische Nachrichten*, 332, 897–906
(36 citations)
7. *Buoyant magnetic loops in a global dynamo simulation of a young sun*
Nelson, N J, **Brown, B P**, Brun, A S, Miesch, M S, & Toomre, J, 2011, *ApJ*, 739, L38:1–5
(42 citations)
6. *Magnetic cycles in a convective dynamo simulation of a young solar-type star*
Brown, B P, Miesch, M S, Browning, M K, Brun, A S, & Toomre, J, 2011, *ApJ*, 731, 69:1–19
(164 citations)
5. *Numerical simulation of laminar plasma dynamos in a cylindrical von Kármán flow*
Khalzov, I V, **Brown, B P**, Ebrahimi, F, Schnack, D D, & Forest, C B, 2011, *Physics of Plasmas*, 18(3), 032110:1–9 (9 citations)
4. *Persistent magnetic wreaths in a rapidly rotating sun*
Brown, B P, Browning, M K, Brun, A S, Miesch, M S, & Toomre, J, 2010, *ApJ*, 711, 424–438
(186 citations)
3. *Exploring the P_{cyc} vs. P_{rot} relation with flux transport dynamo models of solar-like stars*
Jouve, L, **Brown, B P**, & Brun, A S, 2010, *A&A*, 509, A32:1–11 (67 citations)
2. *Rapidly rotating suns and active nests of convection*
Brown, B P, Browning, M K, Brun, A S, Miesch, M S, & Toomre, J, 2008, *ApJ*, 689, 1354–1372
(125 citations)
1. *Rapid rotation, active nests of convection and global-scale flows in solar-like stars*
Brown, B P, Browning, M K, Brun, A S, Miesch, M S, & Toomre, J, 2007, *Astron. Nachr.*, 328, 1002–1005

Conference proceedings

16. *Combined surface and volumetric occlusion shading*, Schott, M, Martin, T, Grosset, A, Brownlee, C, Holtt, T, **Brown, B P**, Smith, S, & Hansen, C, 2012, *Pacific Visualization Symposium (PacificVis), 2012 IEEE*, IEEE, pp. 169–176 (**9 citations**)
15. *New Era in 3-D Modeling of Convection and Magnetic Dynamos in Stellar Envelopes and Cores*, Toomre, J, Augustson, K C, **Brown, B P**, Browning, M K, Brun, A S, Featherstone, N A, & Miesch, M S, 2012, in Shibahashi, H, Takata, M, & Lynas-Gray, A E (eds), *Progress in Solar/Stellar Physics with Helio- and Asteroseismology*, Vol. 462 of *Astronomical Society of the Pacific Conference Series*, pp. 331–344
14. *Stellar magnetism*, Brownlee, C, **Brown, B P**, Clyne, J, Touati, C, Gaither, K, & Hansen, C, 2011, *Proceedings of the 2011 companion on High Performance Computing Networking, Storage and Analysis Companion*, ACM, pp. 151–152
13. *Global-scale Magnetism (and Cycles) in Dynamo Simulations of Stellar Convection Zones*, **Brown, B P**, Browning, M K, Brun, A S, Miesch, M S, & Toomre, J, 2011, in Johns-Krull, C, Browning, M K, & West, A A (eds), *16th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun*, Vol. 448 of *Astronomical Society of the Pacific Conference Series*, pp. 277–284
12. *Global magnetic cycles in rapidly rotating younger suns*, Nelson, N J, **Brown, B P**, Browning, M K, Brun, A S, Miesch, M S, & Toomre, J, 2011, *IAU Symposium*, Vol. 273 of *IAU Symposium*, pp. 272–275
11. *Magnetic Cycles and Meridional Circulation in Global Models of Solar Convection*, Miesch, M S, **Brown, B P**, Browning, M K, Brun, A S, & Toomre, J, 2011, in Brummell, N H, Brun, A S, Miesch, M S, & Ponty, Y (eds), *IAU Symposium*, Vol. 271 of *IAU Symposium*, pp. 261–269
10. *Global-scale wreath-building dynamos in stellar convection zones*, **Brown, B P**, Browning, M K, Brun, A S, Miesch, M S, & Toomre, J, 2011, in Brummell, N H, Brun, A S, Miesch, M S, & Ponty, Y (eds), *IAU Symposium*, Vol. 271 of *IAU Symposium*, pp. 78–85
9. *Laboratory dynamo experiments*, Nornberg, M D, Forest, C B, **Brown, B P**, Zweibel, E G, Wallace, J B, Clark, M, Spence, E J, Taylor, N Z, Kaplan, E J, & Rahbarnia, K, 2011, *2010 NASA Laboratory Astrophysics Workshop*, pp. C47:1–4
8. *Global-scale simulations of stellar convection and their observational predictions*, **Brown, B P**, 2011, in Creech-Eakman, M et al. (eds), *Resolving the future of astronomy with long-baseline interferometry*, *Astronomical Society of the Pacific Conference Series*, in press, pp. 1–9 [arXiv:1106.6075](https://arxiv.org/abs/1106.6075)
7. *Dynamos in stellar convection zones: of wreaths and cycles*, **Brown, B P**, 2010, in Appourchaux, T. et al. (eds), *GONG 2010/SOHO 24: A new era of seismology of the Sun and solar-like stars*, *J. Phys. Conf. Series*, pp. 1–10
6. *Three-dimensional simulations of solar and stellar dynamos: The influence of a tachocline*, Miesch, M S, Browning, M K, Brun, A S, Toomre, J, & **Brown, B P**, 2009, in M Dikpati, T Arentoft, I González Hernández, C Lindsey & F Hill (ed.), *GONG 2008/SOHO 21: Solar-stellar dynamos as revealed by helio- and asteroseismology*, Vol. 416 of *Astronomical Society of the Pacific Conference Series*, pp. 443–452
5. *Dynamo action and wreaths of magnetism in a younger sun*, **Brown, B P**, Browning, M K, Brun, A S, Miesch, M S & Toomre, J, 2009, in M Dikpati, T Arentoft, I González Hernández, C Lindsey & F Hill (ed.), *GONG 2008/SOHO 21: Solar-stellar dynamos as revealed by helio- and asteroseismology*, Vol. 416 of *Astronomical Society of the Pacific Conference Series*, pp. 369–374
4. *Strong dynamo action in rapidly rotating suns*, **Brown, B P**, Browning, M K, Brun, A S, Miesch, M S, Nelson, N J & Toomre, J, 2007, *American Institute of Physics Conference Series*, Vol. 948, pp. 271–278 (**37 citations**)

3. *Variations of solar subsurface weather in the vicinity of active regions*, **Brown, B P**, Haber, D A, Hindman, B W & Toomre, J, 2004, in D Danesy (ed.), *GONG 2004/SOHO 14: Helio- and asteroseismology: towards a golden future*, Vol. 559 of *ESA Special Publication*, pp. 345–348
2. *Differential rotation when the Sun spun faster*, **Brown, B P**, Browning, M K, Brun, A S & Toomre, J, 2004, in D Danesy (ed.), *GONG 2004/SOHO 14: Helio- and asteroseismology: towards a golden future*, Vol. 559 of *ESA Special Publication*, pp. 341–344
1. *Patterns of vorticity on the solar surface*, **Brown, B P** & Snodgrass, H B, 2003, in H Sawaya-Lacoste (ed.), *GONG+ 2002/SOHO 12: Local and global helioseismology: the present and future*, Vol. 517 of *ESA Special Publication*, pp. 109–113

Whitepapers

5. *Perspectives on Reproducibility and Sustainability of Open-Source Scientific Software from Seven Years of the Dedalus Project*, Oishi, J S, **Brown, B P**, Burns, K J, Lecoanet, D, & Vasil, G M, 2018, *ArXiv e-prints 1801.08200*, pp. 1–6
4. *An experimental plasma dynamo program for investigations of fundamental processes in heliophysics*, **Brown, B**, Forest, C, Nornberg, M, Zweibel, E, Cattaneo, F & Cowley, S, 2010, *Helio2010: A Decadal Strategy for Solar and Space Physics*, pp. 1–6
3. *The importance of polar observations in understanding the solar dynamo*, Miesch, M, Rempel, M, Kosovichev, A, Sekii, T, Hara, H, Yokoyama, T, Brun, S, Tarbell, T, Appourchaux, T, **Brown, B P** & Toomre, J, 2010, *Helio2010: A Decadal Strategy for Solar and Space Physics*, pp. 1–7
2. *The solar magnetic dynamo and its role in the formation and evolution of the Sun, in the habitability of its planets, and in space weather around Earth*, Schrijver, K, Carpenter, K, Karovska, M, Ayres, T, Basri, G, **Brown, B**, Christensen-Dalsgaard, J, Dupree, A, Guinan, E, Jardine, M, Miesch, M, Pevtsov, A, Rempel, M, Scherrer, P, Solanki, S, Strassmeier, K & Walter, F, 2010, *Helio2010: A Decadal Strategy for Solar and Space Physics*, pp. 1–8
1. *Dynamos and magnetic fields of the Sun and other cool stars, and their role in the formation and evolution of stars and in the habitability of planets*, Schrijver, K, Carpenter, K, Karovska, M, Ayres, T, Basri, G, **Brown, B**, Christensen-Dalsgaard, J, Dupree, A, Guinan, E, Jardine, M, Miesch, M, Pevtsov, A, Rempel, M, Scherrer, P, Solanki, S, Strassmeier, K & Walter, F, 2009, *astro2010: The Astronomy and Astrophysics Decadal Survey*, pp. 262:1–8

Invited scientific talks & Chaired sessions

Chaired sessions

- Nov 2017, **Chaired session**, *D3: Astrophysical Fluid Dynamics, American Physical Society Division of Fluid Dynamics Meeting*, Denver, CO
- Nov 2016, **Chaired session**, *R10: Convection and Buoyancy Driven Flows: Planetary & Exoplanetary Dynamics, American Physical Society Division of Fluid Dynamics Meeting*, Portland, OR
- Jan 2013, **Chaired session**, *Star Evolution and Ages, American Astronomical Society Winter Meeting*, Long Beach, CA
- Jun 2012, **Chaired session**, *Star Clusters and the Milky Way, American Astronomical Society Summer Meeting*, Anchorage, AK
- Nov 2011, **Chaired session**, *Dynamo Mini Conference, American Physical Society: Division of Plasma Physics*, Salt Lake City, UT

Public Talks

- Nov 2017, *Public Talk*: “Studying convection in stars like our Sun”, NASA Booth, *Supercomputing 2017*, Denver, CO
- May 2013, *Public Talk*: “Exploring our magnetic sun: convection and the solar dynamo”, UW Space Place, Madison, WI
- Sep 2012, *Public talk*: “Exploring our magnetic Sun: convection and the solar dynamo”, UW Space Place, Madison, WI
- Nov 2007, *Public talk*: “Global dynamo action in a younger sun,” NCAR & NASA booths *Supercomputing 2007*, Reno, NV

Panels and Special Sessions

- Jan 2019, **Invited Speaker, Special Session**, *The Dedalus project: open source science in astrophysics with examples in convection and stellar dynamos, American Astronomical Society Winter Meeting*, Seattle, WA
- Aug 2018, **Invited panelist**, “Advances in Computational Astrophysics and the Solar-Stellar-Planetary Connection,” *Cool Stars 20*, Boston, MA

Colloquia

- Oct 2016, **Colloquium**: “Deep solar convection: fundamental problems and progress”, High Altitude Observatory, Boulder, CO
- May 2015, **Colloquium**: “Dragons in the deep: dynamics and implications for the solar dynamo”, Institute for Astronomy, Kula, HI
- May 2015, **Colloquium**: “Magnetism in global solar and stellar dynamos”, Institute for Astronomy, Honolulu, HI
- Apr 2013, **Colloquium**: “Cyclic wreath-building dynamos in the Sun and sun-like stars”, University of Colorado, Boulder, CO
- Feb 2013, **Colloquium**: “Wreath-building stellar dynamos: how stars like our Sun get their spots?”, Columbia University, New York, NY

Dec 2011, **Colloquium**: “Convective dynamos: how stars like the Sun get their spots”, University of Washington, Seattle, WA

Mar 2010, **Colloquium**: “Cyclic wreath-building dynamos in simulations of solar-type stars,” South West Research Institute, Boulder, CO

May 2009, **Colloquium**: “Dynamo action and wreaths of magnetism in rapidly rotating suns,” High Altitude Observatory, Boulder, CO

Dec 2008, **Colloquium**: “Dynamos and magnetism in rapidly rotating suns,” University of Wisconsin, Madison, WI

Invited Talks

Sep 2018, “Overshoot in low-Mach number stellar convection”, *Geophysical Turbulence Program*, Boulder, CO

Feb 2018, “Compressibility effects in convection”, *Natural Convection*, Princeton Center for Theoretical Sciences, Princeton, NJ

Nov 2017, “Convective overshoot in the interiors of solar-type stars”, *American Physical Society Division of Fluid Dynamics Meeting*, Denver, CO

Sep 2017, “Convective overshoot at the solar tachocline”, *Compressible Convection Conference*, Lyon, France

Aug 2017, “Convective overshoot at the solar tachocline”, *American Astronomical Society Solar Physics Division Meeting*, Portland, OR

Nov 2016, “Convective overshoot at stiffly stable interfaces”, *American Physical Society Division of Fluid Dynamics Meeting*, Portland, OR

Aug 2016, “Convective overshoot: is there any under solar conditions”, *Geophysical Turbulence Program*, Boulder, CO

Oct 2014, “Photospheric dynamics: Dragons in the deep”, DKIST Science Working Group, Maui, HI

Oct 2012, “Convective dynamos: field generation on the lower main-sequence”, *Second Bcool meeting*, Goettingen, Germany

Nov 2011, “Convective dynamos in solar-type stars,” *American Physical Society: Division of Plasma Physics Meeting*, Salt Lake City, UT

Oct 2011, “Convection in main-sequence stars,” *The Impact of Asteroseismology across Stellar Astrophysics*, KITP, Santa Barbara, CA

Oct 2011, “Wreath-building dynamos in solar-type stars: is this how stars like the Sun get their spots?”, Solar, Stellar and Planetary Sciences seminar, CfA, Boston, MA

Sep 2011, “Modelling Sun-like stars: cyclic convective dynamos,” *2011 SORCE Science meeting*, Sedona, AZ

Sep 2011, “Global-scale simulations of stellar convection and their observational predictions,” *The Future of Astronomy*, CIERA, Evanston, IL

Jun, 2011, “Global-scale magnetic fields from dynamo simulations of stellar convection,” *StarPol: Stellar Polarimetry from birth to death*, Madison, WI

May 2011, “Convection and differential rotation in solar-type stars,” *Differential Rotation in Stars*, Princeton, NJ

Apr 2011, “Simulations of global-scale dynamo action in the Sun and other stars,” *American Physical Society: April Meeting*, Orange, CA

Jul 2010, **Review talk**: “Dynamos in stellar convection zones: of wreaths and cycles,” *GONG 2010/SOHO 24: A new era of seismology of the Sun and solar-like stars*, Aix-en-provence, France

Apr 2010, “Mechanisms at work in global-scale wreath-building stellar dynamos,”
Special Topic Workshop on Imbalanced MHD, Madison, WI

Feb 2010, “Simulations of the global dynamo in stars like the Sun,” Plasma physics seminar,
University of Wisconsin, Madison, WI

Jan 2010, “Solar rotation II: from the Sun to the stars,” Lecture at CMPD/CMSO Winter School,
UCLA, Los Angeles, CA

Dec 2009, “Convective flows in plasma experiments,” *Flow Driven Instabilities and Turbulence in High Beta Plasmas and Kick-off meeting for the Madison Plasma Dynamo Experiment*, Madison, WI

Jan 2009, “Wreaths of magnetism and other surprises in rapidly rotating suns,” Geophysics seminar, UCLA, Los Angeles, CA

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