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Appointments

Assistant Professor, Rutgers, the State University of New Jersey, 2019-present
Associate Research Scientist, Flatiron Institute Center for Computational Astrophysics, 2018-present
Institute for Theory and Computation (ITC) Postdoctoral Fellow, Harvard, 2017-2018
NASA Einstein Postdoctoral Fellow, Harvard, 2014-2017

Education

Ph.D. Astronomy, University of Wisconsin-Madison, 2014
M.A. Astronomy, University of Wisconsin-Madison, 2010
M.S. Physics, University of Wisconsin-Madison, 2010
B.S. Physics & Mathematics (minor: Latin), University of Louisville, 2008, *Magna Cum Laude*

Awards and Honors

2019 American Astronomical Society, Annie Jump Cannon Award
2019 Full Member Sigma Xi
2017 Astronomical Society of the Pacific, Robert J. Trumpler Award
2016 APS Division of Astrophysics, Ph.D. Thesis Award Finalist
2011 UW Madison Jansky Fellowship for Outstanding Research
2011 NASA Space Science Student Ambassador
2009 National Science Foundation Graduate Research Fellowship (Astrophysics)
2008 Donald M. Bennett Award for Outstanding Scholastic Achievement in Physics
2008 American Astronomical Society, Chambliss Award, Honorable Mention
2006 Bullitt Award in Astrophysics
2004 University of Louisville Presidential Scholarship (Full Tuition)

Refereed Journal Publications

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1. **Burkhart, B.**, Falceta-Gonçalves D., Kowal G., & Lazarian A., 2009, “*Density Studies in MHD Interstellar Turbulence: Statistical Moments, Correlations and Bispectrum*”, ApJ, 692, 250, arXiv:0811.0822
2. **Burkhart, B.**, Stanimirović S., Lazarian A., & Kowal G., 2010, “*Characterizing Magnetohydrodynamic Turbulence in the Small Magellanic Cloud*”, ApJ, 708, 1204, arXiv:0911.3652
3. ++Tofflemire, B., **Burkhart, B.**, & Lazarian, A., 2011, “*Interstellar Sonic and Alfvénic Mach Numbers and the Tsallis Distribution*”, ApJ, 736, 60, arXiv:1103.3299¹
4. Gaensler, B., Haverkorn, M., **Burkhart, B.**, Newton-McGee, K. J., Ekers, R. D., Lazarian, A., McClure-Griffiths, N. M., Robishaw, T., Dickey, J. M., & Green, A. J., 2011, “*Low Mach Number Turbulence in Interstellar Gas Revealed by Radio Polarization Gradients*”, Nature, 478, 214, arXiv:1110.2896
5. **Burkhart, B.**, Lazarian A., & Gaensler B., 2012, “*Properties of Interstellar Turbulence from Gradients of Linear Polarization Maps*”, ApJ, 749, arXiv:1111.3544
6. **Burkhart, B.** & Lazarian A., “*The Column Density Variance-Sonic Mach Number Relation*”, 2012, ApJL, 755, 19, arXiv:1205.3792
7. Saul, D., Peek, J., Grcevich, J., Putman, M. E., Douglas, K. A., Korpela, E. J., Stanimirović, S., Heiles, C., Gibson, S., Lee, M., Begum, A., Brown, A. R. H., **Burkhart, B.**, Hamden, E., Pingel, N., & Tonnesen, S., 2012, “*The GALFA-HI Ultra-Compact Cloud Catalog*”, ApJ, 758, 44, arXiv:1208.4103.
8. **Burkhart, B.**, Lazarian, A., Goodman, A., & Rosolowsky, E., 2013, “*Hierarchical Structure of Magnetohydrodynamic Turbulence in Position-Position-Velocity Space*”, ApJ, 770, 141, arXiv:1206.4703
9. **Burkhart, B.**, Ossenkopf, V., Lazarian, A., & Stutzki, J., 2013, “*The Effects of Radiative Transfer on the PDFs of Molecular MHD Turbulence*”, ApJ, 771, 122, arXiv:1304.3131
10. **Burkhart, B.**, Lazarian, A., Ossenkopf V., & Stutzki J., 2013, “*The Turbulence Power Spectrum in Optically Thick Interstellar Clouds*”, ApJ, 771, 123, arXiv:1305.3619
11. Meyer, C., Balsara, D., **Burkhart, B.**, & Lazarian, A., 2013, “*Observational Diagnostics for Two-Fluid Turbulence in Molecular Clouds As Suggested by Simulations*”, MNRAS, 439, 219, arXiv:1307.3527
12. ++Correia, C., **Burkhart, B.**, Lazarian, A., Ossenkopf, V., Stutzki, J., Kainulainen J., Kowal, G., & de Medeiros, J. R., 2013, “*Opacity Broadening of CO Linewidths and its Effects on the Variance-Sonic Mach Number Relation*”, ApJL, 785, 1, arXiv:1402.6702
13. Pingel, N., Stanimirovic, S., Peek, J. E. G., Lee, M.-Y., Lazarian, A., **Burkhart, B.**, Babler, B., Begum, A., Douglas, K. A., Heiles, C., Gibson, S., Grcevich, J., Korpela, E., Lawrence, A., Murray, C., Peek, J. E. G., Putman, M., E., & Saul, D., 2013, “*Characterizing the Turbulent Properties of MBM16*”, ApJ, 779, 36, arXiv:1310.7244
14. ++Iacobelli, M., **Burkhart, B.**, Haverkorn, M., Lazarian, A., Carretti, E., Staveley-Smith, L., Gaensler, B. M., Bernardi, G., Kesteven, M. J., & Poppi, S., 2014, “*Galactic Interstellar Turbulence Across the Southern Sky Seen Through Spatial Gradients of the Polarization Vector*”, A&A, 566, 5, arXiv:1404.6077
15. **Burkhart, B.**, Lazarian A., Leão, I., & de Medeiros, J. R., 2014, “*Measuring the Alfvénic Nature of the Interstellar Medium: Velocity Anisotropy Revisited*”, ApJ, 790, 130, arXiv:1408.4858
16. **Burkhart, B.**, Lazarian A., Meyer, C., & Balsara, D., 2015, “*Alfvénic Turbulence Beyond the Ambipolar Diffusion Scale*”, ApJ, 805, 118, arXiv:1412.3452
17. **Burkhart, B.**, Collins, D., & Lazarian, A., 2015, “*Observational Diagnostics of Self-Gravitating MHD Turbulence in Giant Molecular Clouds*”, ApJ, 808, 48, arXiv:1505.03855
18. Chepurnov, A., **Burkhart, B.**, & Lazarian, A., 2015, “*The Turbulence Velocity Power of Neutral Hydrogen in the Small Magellanic Cloud*”, ApJ, 810, 33, arXiv:1506.03448

¹++ denotes an undergraduate or graduate student primarily mentored by B. B.

19. ++Herron, C., **Burkhart, B.**, Lazarian, A., Gaensler, B., & McClure-Griffiths, N., 2015, “*Radio Synchrotron Fluctuation Statistics as a Probe of Magnetized Interstellar Turbulence*”, ApJ, 822, 13, arXiv:1603.02751
20. **Burkhart, B.**, Lee, M. Y., Murray, C., & Stanimirovic, S., 2015, “*The Lognormal PDF of the Perseus Molecular Cloud: A Comparison of HI and Dust*”, ApJL, 811, 28, arXiv:1509.02889
21. **Burkhart, B.** & Lazarian, A., 2016, “*Phase Coherence of Interstellar MHD Turbulence*”, ApJ, 827, 26, arXiv:1511.03660
22. ++Correia, C., Lazarian, A., **Burkhart, B.**, Pogosyan, D., & de Medeiros, J. R., 2016, “*Principal Component Analysis of Turbulence in Optically Thick Gas*”, ApJ, 818, 118, arXiv: 1511.03712
23. Krumholz, M. & **Burkhart, B.**, 2016, “*Is Turbulence in the Interstellar Medium Driven by Feedback or Gravity? An Observational Test*”, MNRAS, 458, 1671, arXiv:1512.03439
24. **Burkhart, B.** & Loeb, A., 2016, “*Predicted Sizes of Pressure-Supported HI Clouds in the Outskirts of the Virgo Cluster*”, ApJL, 834, 7, arXiv:1604.01767
25. Imara, N. & **Burkhart, B.**, 2016, “*Examining the Atomic Hydrogen Associated with Molecular Clouds*”, 2016, ApJ, 829, 2, arXiv:1609.04817
26. **Burkhart, B.**, Stalpes, K., & Collins, D., 2017, “*At the Razor’s Edge of Collapse: the PDF Transitional Column Density in Molecular Clouds*”, ApJL, 834, 1, arXiv:1609.04409
27. ++Gurvich, A., **Burkhart, B.**, & Bird, S., 2017, “*The Column Density Distribution of the Low-Redshift Lyman- α Forest in Illustris*”, ApJ, 835, 175, arXiv:1608.03293
28. Hoang, T., Lazarian, A., **Burkhart, B.**, & Loeb, A., 2017, “*The Interaction of Relativistic Spacecrafts with the Interstellar Medium*”, ApJ, 837, 5, arXiv:1608.05284
29. Herron, C., Federrath, C., Gaensler, B., McClure-Griffiths, N., & **Burkhart, B.**, 2017, “*Probes of turbulent driving mechanisms in molecular clouds from fluctuations in synchrotron intensity*”, MNRAS, 466, 2272, arXiv:1612.05672
30. Hull, C., Mocz, P., **Burkhart, B.**, Goodman, A., Girart, J. M., Cortés, P. C., Hernquist, L., Li, Z.-Y., Lai, S.-P., & Springel, V., 2017, “*Unveiling the Role of Magnetic Fields at the Smallest Scales of Star Formation*”, ApJ, 842, 9, ArXiv:1706.03806
31. ++Bialy, S., **Burkhart, B.**, & Sternberg, A., 2017, “*HI-to-H₂ Photodissociation Transition in Cold Turbulent Interstellar Gas*”, ApJ, 843, 92, arXiv:1703.08549
32. Mocz, P., **Burkhart, B.**, Hernquist, L., & Springel, V., 2017, “*Moving Mesh Simulations of Star Forming Cores in Magneto-Gravo-Turbulence*”, ApJ, 838, 40, arXiv:1702.06133
33. **Burkhart, B.** & Loeb, A., 2017, “*The Detectability of Radio Auroral Emission of Proxima B*”, ApJL, 849, 10, arXiv:1706.07038
34. ++Pingel, N., Lee, M. Y., **Burkhart, B.**, & Stanimirović, S., 2018, “*The Multiphase Spatial Power Spectrum of the Perseus Molecular Cloud*”, ApJ, 856, 136, arXiv:1802.10092
35. Krumholz, M., **Burkhart, B.**, Forbes, J., & Crocker, R., “*A Unified Model for Galactic Discs: Star Formation, Turbulence Driving, and Mass Transport*”, 2018, MNRAS, 477, 2716, arXiv:1706.00106
36. ++Herron, C., **Burkhart, B.**, Gaensler, B., Lewis, G. F., & McClure-Griffiths, N., 2018, “*Advanced Diagnostics for the Study of Linearly Polarized Emission II: Application to Diffuse Interstellar Radio Synchrotron Emission*”, ApJ, 855, 29, arXiv:1802.05403
37. ++Chen, H., **Burkhart, B.**, & Goodman, A., 2018, “*The Anatomy of the Column Density PDF*”, ApJ, 859, 162, arXiv:1707.09356
38. Portillo, S., Slepian, Z., **Burkhart, B.**, Kahraman, S., & Finkbeiner, D., 2018, “*Developing the 3-Point Correlation Function as a Novel Probe of Physical Conditions in the Interstellar Medium*”, ApJ, 862, 119, arXiv:1711.09907
39. **Burkhart, B.**, 2018, “*The Star Formation Rate in the Gravoturbulent Interstellar Medium*”, ApJ, 863, 118, arXiv:1801.05428

40. Mocz, P. & **Burkhart, B.**, 2018, “*Star formation from Dense Shocked Regions in Supersonic Isothermal MHD Turbulence*”, MNRAS, 480, 3916, arXiv:1805.11105
41. Casanova, D., Lazarian, A., & **Burkhart, B.**, 2019, “*The Velocity Centroid Gradient for an Absorbing Media*”, MNRAS, 483, 1287, arXiv:1703.03035
42. Koch, E., Rosolowsky, E., Boyden, R., **Burkhart, B.**, Ginsburg, A., Loeppky, J., & Offner, S., 2019, “*TurbuStat: Turbulence Statistics in Python*”, AJ, 158, 1, arXiv:1904.10484
43. Rosen, A., Li, P.S., Zhang, Q., & **Burkhart, B.**, 2019, “*Massive Star Formation via the Collapse Subvirial and Virialized Turbulent Massive Cores*”, ApJ, 887, 108, arXiv:1902.10153
44. Basu, A., Schwarz, D., Kloeckner, H., von Hausegger, S., Kramer, M., Wieching, G., & **Burkhart, B.**, 2019, “*CMB foreground measurements through broad-band radio spectro-polarimetry: prospects of the SKA-MPG telescope*”, MNRAS, 488, 161, arXiv:1906.04788
45. Chiou, Y., Naoz, S., **Burkhart, B.**, Marinacci, F., & Vogelsberger, M., 2019, “*The Supersonic Project: Shining Light on SIGOs - a New Formation Channel for Globular Clusters*”, ApJ, 878, 23, arXiv:1904.08941
46. Peek, J. & **Burkhart, B.**, 2019, “*Do androids dream of magnetic fields? Using Neural Networks to Interpret the Turbulent Interstellar Medium*”, ApJ, 882, 12, arXiv:1905.00918
47. Mocz, P. & **Burkhart, B.**, 2019, “*A Markov model for non-lognormal density distributions in isothermal turbulence*”, ApJ, 884, 35, arXiv:1908.00544
48. Bialy, S., Neufeld, D., Wolfire, M., Sternberg, A., & **Burkhart, B.**, 2019, “*Ion Abundances in a Turbulent Medium – ArH^+ , OH^+ , H_2O^+* ”, ApJ, 885, 109, arXiv:1909.12305
49. **Burkhart, B.** & Mocz, P., 2019, “*The Dense Gas Fraction and the Star Formation Law*”, ApJ, 879, 129, arXiv:1805.11104
50. Bialy, S. & **Burkhart, B.**, 2020, “*The Effects of The Turbulence Driving Scale on Density Fluctuations*”, ApJL, 894, 2, arXiv:1909.12305
51. ++Gallegos-Garcia, M., **Burkhart, B.**, Rosen, A., Jill N., & Ramirez-Ruiz, A., 2020, “*Winds in Star Clusters Drive Subsonic Turbulence*”, ApJ, 899, 30, arXiv:2006.14626
52. Raymond, J.C., Chilingarian, W.P., Sankrit, R., Slavin, J., & **Burkhart, B.**, 2020, “*Turbulence and Energetic Particles in Radiative Shock Waves in the Cygnus Loop I: Shock Properties*”, ApJ, 894, 108, arXiv:2004.09567
53. Heyer, M., Solar, J., & **Burkhart, B.**, 2020, “*MHD turbulence in the Taurus molecular cloud*”, MNRAS, 496, 454, arXiv:2006.10775
54. Pandya, V., Somerville, R., Angles-Alcazar, D., Hayward, C., Bryan, G., Fielding, D., Forbes, J., **Burkhart, B.**, Genel, S., Hernquist, L., Kim, C., Tonnesen, S., & Starkenburg, T., “*First results from SMAUG: The need for preventative stellar feedback and improved baryon cycling in semi-analytic models of galaxy formation*”, 2020, ApJ, submitted, arXiv:2006.16317
55. Yuan, Y., Krumholz, M., & **Burkhart, B.**, 2020, “*Understanding Biases in Measurements of Molecular Cloud Kinematics Using Line Emission*”, MNRAS, 498, 2440, arXiv:2007.13488
56. Chiou, Y., Naoz, S., **Burkhart, B.**, Marinacci, F., & Vogelsberger, M., 2020, “*The Supersonic Project: To cool or not to cool Supersonically Induced Gas Objects (SIGOs)?*”, ApJ, submitted, arXiv:2008.02808
57. Raymond, J., Slavin, J., Blair, W., Chilingarian, I., **Burkhart, B.**, & Sankrit, R., 2020, “*Development of Turbulence in a Radiative Shock Wave in the Cygnus Loop*”, ApJ, in press.
58. **Burkhart, B.**, et al., 2020, “*The Catalogue for Astrophysical Turbulence Simulations*”, ApJ, in press, arXiv:
59. Smith, M., Bryan, G., Somerville, R., Hu, C., Teyssier, R., **Burkhart, B.**, & Hernquist, L., 2020, “*Efficient early stellar feedback can suppress galactic outflows by reducing supernova clustering*”, MNRAS, submitted, arXiv:2009.11309

60. Villaescusa-Navarro¹, F., Daniel Angles-Alcazar, D., Genel, S., Spergel, D., Somerville, R., Romeel, D., Pillepich, A., Hernquist, L., Nelson, D., Torrey, P., Narayanan, D., Li, Y., Philcox, O., La Torre, V., Delgado, A., Ho, S., Hassan, S., **Burkhart, B.**, Wadekar, D., Battaglia, N., & Contardo, G., 2020, “*The CAMELS Project: Cosmology and Astrophysics with Machine Learning Simulations*”, ApJ, submitted, arXiv:2010.00619
61. **Burkhart, B.**, 2020, “*Diagnosing the Magnetized Turbulent Interstellar Medium of Galaxies*”, a review in the *Publications of the Astronomical Society of the Pacific*, submitted.

Recent Invited Talks (Selected)

2020 - Remote or postponed due to COVID19.

EPoS 2020 The Early Phase of Star Formation - Insights from Dynamics, Ringberg, Germany, July

Turbulent Star Formation, AAS Plenary Talk, Madison, WI, May

Computational Galaxy Formation 2020, Ringberg, Germany, April

Where the Star Formation Ends, Leiden, Netherlands, March

Magnetic Fields in the Universe VI, Vietnam, February

2019

Confronting simulations with observations from pc to Mpc scale, Hunter Valley, Australia, November

LOFAR MKSP Annual Meeting, Bochum, Germany, September

SO-Star, Paris, France, September

Joint IAS/Princeton Colloquium, Princeton, March

Life and Death of Star Forming Galaxies, Perth, Australia, March

2018

Cosmic Dust and Magnetism Conference, Daejeon, Korea, November

The Milky Way in the Age of Gaia, Paris, France, October

Stellar and Interstellar Environments: Shocking Structures in and around Astrospheres and their Relevance for Cosmic Ray Transport, Bochum, Germany, September

Magnetic Fields or Turbulence: Which is the critical factor for the formation of stars and planetary disks?, Taipei, Taiwan, February

Center for Astrophysics Colloquium, Harvard CfA, February

Teaching

2020 Fall, *Honors Seminar: The Past, Present, and Future of Prediction*, Rutgers

2019 Fall, *Physics 610: Interstellar Matter*, Rutgers

2016 Spring, Guest Teaching *Ast 253, Plasma Astrophysics*, Harvard University

2014 Spring Teaching Assistant *Ast 104, Exploration of the Solar System*, UW Madison

2008 Spring Teaching Assistant, *Physics 224*, University of Louisville

2006-2008 Supplemental Instructor of Physics (6 semesters), University of Louisville

Student Supervision

2020-current, Supervising Michael O'Brien, Flatiron Intern
2019-current, Supervising Brandon Shane, Rutgers Undergrad. Student
2019-current, Supervising Diane Salim, Rutgers Grad. Student
2018-current, Supervising Sabrina Appel, Rutgers Grad. Student
2017-2019 Co-supervised Harvard Banneker & Aztlán Student; resulted in Gallegos et al. (2020)
2016 Supervised Senior Thesis (Missy McIntosh), Harvard University
2015 Co-supervised Research Science Institute (MIT) Student and Harvard graduate student; resulted in Portillo et al. (2018)
2015 Supervised Harvard REU student; resulted in Gurvich, Burkhart & Bird (2017)
2014, Supervised UW Madison/Univ. Sydney student; resulted in Herron et al. (2015)
2012-2014 Supervised student at UFRN (Natal, Brazil); resulted in Correia et al. (2013, 2015)
2012 Supervised two UW Madison REU students
2010 Supervised UW Madison REU student; resulted in Tofflemire, Burkhart & Lazarian (2011)

Grants

2020-2023, "*Shining Light on Supersonically Induced Gas Objects (SIGOs)*", NASA ATP, \$314,000
2021-2024, "*Collaborative Research: Stars from the Clouds - Turbulence, Magnetic Fields and the Dynamics of Star Cluster Formation*", NSF AAG, \$299,643

Conferences Organized

2020 SOC Chair, *The Interstellar Medium of Galaxies in the Era of Big Data*, AAS Mini-meeting, Summer 2020, Madison, WI
2019 SOC Chair, *Universality: Turbulence Across Vast Scales*, CCA, New York, NY
2019 SOC Chair, *Big Apple Magnetic Fields*, CCA, New York, NY
2017 SOC Chair, *Harvard-Heidelberg Star Formation Workshop*, Cambridge, MA
2017 SOC, *Magnetic Fields in the Universe VI*, Natal, Brazil, December
2016 SOC Chair, *Star formation, magnetic fields, and diffuse matter in the Galaxy: A conference honoring the contributions of Richard Crutcher & Carl Heiles*, Madison, WI
2015 SOC, *Harvard-Heidelberg Star Formation Workshop*, Cambridge, MA
2011, 2012, 2013, 2014 Conference Co-Organizer for the *Midwest Magnetic Fields*, Madison, WI
2011 Conference Co-Organizer for *ISM and Magnetic Fields Workshop*, Natal, Brazil

Service and Outreach (selected)

2020-current Faculty Adviser for the Rutgers Astronomical Society
2020 *Founder of CATS: Catalogue for Astrophysical Turbulence Simulations*, mhd turbulence.com
2019 Rutgers Astro Seminar/Colloquium Organizer
2019 *Advancing Theoretical Astrophysics Summer School*, teaching/organizing.
2019 *CCA Plasma Astrophysics Summer School*, teaching.
2017 Harvard Observatory Nights Public Talk: *First Probe to the Stars*
2016-2019 NRAO Science Review Panel
2015, 2016 CfA Seminar & ITC Colloquium Co-Chair
2013, 2014 *5 Minute Astronomy*, Host of Podcast on iTunes, Featured on iTunes *New and Noteworthy*

2012-2014 *Radio Astronomy*, Host of weekly radio show WORT 89.9FM, Madison, WI

2012-current Referee for: *Astrophysical Journal*, *Astrophysical Journal Letters*, *Astronomy & Astrophysics*, *Monthly Notices of the Royal Astronomical Society*, *Nature*, *Nature Astronomy*