Drummond B. Fielding

Curriculum Vitae

Flatiron Research Fellow
Center for Computational Astrophysics, Flatiron Institute,
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Education

PhD 2018, MA 2014, Astrophysics, University of California, Berkeley. *Advisor: Eliot Quataert*
BS, BA 2012, Physics, Mathematics, Johns Hopkins University.

Professional Appointments

Flatiron Research Fellow (5 year appointment), CCA	2018-present
Visiting Scholar, Indian Institute of Science	2016
Graduate Researcher, U.C., Berkeley	2012-2018

Honors and awards

Flatiron Fellowship	2018–2023
Outstanding Graduate Student Instructor Award	2014
NSF Graduate Research Fellowship	2014–2017
Berkeley Graduate Fellowship	2012–2014
Donald E. Kerr Award for Outstanding Physics Undergraduate	2012
The Phi Beta Kappa Society	2012

Research interests

galaxy formation	galactic winds & feedback	plasma physics
MHD turbulence	circumgalactic medium	machine learning
fluid dynamics	star formation	high performance computing

Grants

DUVET: Mapping Outflows and the Inner CGM in Starbursting Disks, KCWI, Co-I, 2020
Visiting scholar grant to work Indian Institute of Science with Prof. Prateek Sharma, APS-IUSSTF, 2016
Towards an Understanding of the Origin of OVI in the Circumgalactic Medium, HST ARG, Co-I, 2017
The Physics of Supernova Feedback: Global 3D Simulations of Galactic Disks, NSF XSEDE, Co-I, 2016-2018
Conduction, Convection, and Thermal Instability in Hot Halos, NSF XSEDE, Co-I, 2016-2017

Student advising

Iryna Butsky — Graduate Student — University of Washington + CCA predoctoral fellow
Viraj Pandya — Graduate Student — UC Santa Cruz + CCA predoctoral fellow
Matthew Abruzzo — Graduate Student — Columbia
Anthony Chow — Graduate Student — Columbia

Zirui Chen — Undergraduate Student — Columbia
Brent Tan — Graduate Student — UC Santa Barbara + CCA predoctoral fellow
Minami Roy — Graduate Student — Raman Research Institute + CCA predoctoral fellow
Mitali Damle — Graduate Student — University of Potsdam + virtual CCA predoctoral fellow

Professional services & teaching

Simons-National Society of Black Physicists Scholars Program summer mentor
Founder and organizer of the *New York Area Fluid Dynamics Meeting*, a cross-disciplinary monthly meeting of local fluid dynamicists, 2020
Flatiron Pre-Doctoral Program graduate student mentor, 2019–
Graduate Student Instructor: Astronomy C12 'The Planets'(UC Berkeley)
Graduate Student Instructor: Astronomy 7A (UC Berkeley)
Referee: MNRAS, ApJ, ApJL
NSF proposal evaluation panelist, 2020

Public outreach

Founder and leader of *The Astro Club*. Monthly meetings 2020–present. Democracy Prep Charter Middle School, Harlem, NY.
Astronomy career day, Democracy Prep Charter Middle School, Harlem, NY 2019
Taught a month-long series of astronomy classes to 2nd and 3rd grade students. 2017. North Oakland Community Charter School, Oakland, CA
Undergrad mentor UC Berkeley Astronomy, 2016-2017
UC Berkeley Astronomy Department Public Liaison, 2015
East Bay Astronomical Society Public Lecture, 2014, Chabot Space and Science Center
The Berkeley Compass Project Summer Evening Instructor, 2013

Selected recent presentations

Astrophysics Seminar, UIUC (11/2022)
Joint Astrophysics Colloquium, Pitt-CMU (10/2022)
Invited talk, *What Matter(s) Around Galaxies*, conference (9/2022)
Invited talk, *Ringberg Computational Galaxy Formation 2022*, conference (4/2022)
Invited talk, *Wolfe Symposium*, conference (3/2022)
Theoretical AstroPhysics Including Relativity & Cosmology seminar, Caltech (12/2021)
Astronomy Department seminar, The Racah Institute of Physics, Hebrew University of Jerusalem (12/2021)
Invited Talk, *Baltimore Wind Workshop*, Johns Hopkins University (8/2021)
Astrophysics Colloquium, UCSD-SDSU (4/2021)
Keynote speaker, KITP workshop *Fundamentals of Gaseous Halos* (1/2021)
Invited talk, KITP conference *On the Origin, Nature, and Mixing of Multiphase Gas in Astrophysics* (10/2020)
Gaggle Seminar, Carnegie Institution for Science (8/2020)
Invited talk, CLEARNESS conference IAP (6/2020)
CGI Colloquium, U.C. Santa Cruz (4/2020)
Contributed Talk, Universality of Turbulence Conference, Flatiron Institute, NY (12/2019)
SFIR Seminar, Princeton University (11/2019)

Astro Seminar, NYU CCPP, New York NY (10/2019)
Invited Talk, CGM conference, Berlin Germany (10/2019)
Lunch Talk, CCA, New York NY (10/2019)
Contributed Talk, Feedback conference, Spetses Greece (6/2019)
Invited seminar, Turbulence workshop, Aspen Center for Physics (6/2019)
Contributed Talk, CGM/IGM conference, Spineto Italy (6/2019)
Invited Talk, *athena++* conference, Las Vegas NV (3/2019)
Invited Talk, CGM conference, Northwestern, Chicago IL (8/2018)
Invited Talk, CGM/DLA conference, Big Sur CA (3/2018)
TAPIR Seminar, Caltech, Pasadena CA (11/2017)
Astronomy Colloquium, Raman Research Institute (12/2016)
Astronomy Department Colloquium, Indian Institute of Science (10/2016)

Publications — *ADS search* — *ORCID*

refereed: 28 — first author: 8 — citations: 1136 — h-index: 20 (*2022-11-15*)

First Author

8 **Fielding, D. B.**; Ripperda, B.; Philippov, A. A., *Plasmoid Instability in the Multiphase Interstellar Medium*, 2022 (arXiv:2211.06434)

7 **Fielding, D. B.**; Bryan, G. L., *The Structure of Multiphase Galactic Winds*, ApJ, **924**, 82, 2022 (arXiv:2108.05355) [24 citations]

6 **Fielding, D. B.**; Tonnesen, S.; DeFelippis, D.; Li, M. *et al.*, *First Results from SMAUG: Uncovering the Origin of the Multiphase Circumgalactic Medium with a Comparative Analysis of Idealized and Cosmological Simulations*, ApJ, **903**, 32, 2020 (arXiv:2006.16316) [30 citations]

5 **Fielding, D. B.**; Ostriker, E. C.; Bryan, G. L.; Jermyn, A. S., *Multiphase Gas and the Fractal Nature of Radiative Turbulent Mixing Layers*, ApJ, **894**, 2020 (arXiv:2003.08390) [65 citations]

4 **Fielding, D. B.**; Quataert, E.; Martizzi, D., *Clustered supernovae drive powerful galactic winds after superbubble breakout*, MNRAS, **481**, 3325, 2018 (arXiv:1807.08758) [87 citations]

3 **Fielding, D. B.**; Quataert, E.; Martizzi, D.; Faucher-Giguère, C., *How supernovae launch galactic winds*, MNRAS, **470**, 2017 (arXiv:1704.01579) [61 citations]

2 **Fielding, D. B.**; Quataert, E.; McCourt, M.; Thompson, T. A., *The impact of star formation feedback on the circumgalactic medium*, MNRAS, **466**, 3810, 2017 (arXiv:1606.06734) [111 citations]

1 **Fielding, D. B.**; McKee, C. F.; Socrates, A.; Cunningham, A. J. *et al.*, *The turbulent origin of spin-orbit misalignment in planetary systems*, MNRAS, **450**, 3306, 2015 (arXiv:1409.5148) [73 citations]

Second Author (*=primary mentor for student led project)

10 *Chen, Z.; **Fielding, D. B.**; Bryan, G. L., *The Anatomy of a Turbulent Radiative Mixing Layer: Insights from an Analytic Model with Turbulent Conduction and Viscosity*, 2022 (arXiv:2211.01395)

9 *Abruzzo, M. W.; **Fielding, D. B.**; Bryan, G. L., *Taming the TuRMoiL: The Temperature Dependence of Turbulence in Cloud-Wind Interactions*, 2022 (arXiv:2210.15679)

8 Orr, M. E.; **Fielding, D. B.**; Hayward, C. C.; Burkhart, B., *Bursting Bubbles: Feedback from Clustered Supernovae and the Trade-off Between Turbulence and Outflows*, ApJ, **932**, 88, 2022 (arXiv:2109.14656) [7 citations]

7 Orr, M. E.; **Fielding, D. B.**; Hayward, C. C.; Burkhart, B., *Bursting Bubbles: Clustered Supernova Feedback in Local and High-redshift Galaxies*, ApJ, **924**, 2022 (arXiv:2109.14626) [3 citations]

6 *Pandya, V.; **Fielding, D. B.**; Anglés-Alcázar, D.; Somerville, R. S. *et al.*, *Characterizing mass, momentum, energy, and metal outflow rates of multiphase galactic winds in the FIRE-2 cosmological simulations*, MNRAS, **508**, 2979,

2021 (arXiv:2103.06891) [26 citations]

5 Stachenfeld, K.; **Fielding, D. B.**; Kochkov, D.; Cranmer, M. *et al.*, *Learned Coarse Models for Efficient Turbulence Simulation*, 2021 (arXiv:2112.15275) [8 citations]

4 *Butsky, I. S.; **Fielding, D. B.**; Hayward, C. C.; Hummels, C. B. *et al.*, *The Impact of Cosmic Rays on Thermal Instability in the Circumgalactic Medium*, ApJ, **903**, 77, 2020 (arXiv:2008.04915) [45 citations]

3 Stern, J.; **Fielding, D. B.**; Faucher-Giguère, C.; Quataert, E., *The maximum accretion rate of hot gas in dark matter haloes*, MNRAS, **492**, 6042, 2020 (arXiv:1909.07402) [27 citations]

2 Stern, J.; **Fielding, D. B.**; Faucher-Giguère, C.; Quataert, E., *Cooling flow solutions for the circumgalactic medium*, MNRAS, **488**, 2549, 2019 (arXiv:1906.07737) [42 citations]

1 Martizzi, D.; **Fielding, D. B.**; Faucher-Giguère, C.; Quataert, E., *Supernova feedback in a local vertically stratified medium: interstellar turbulence and galactic winds*, MNRAS, **459**, 2311, 2016 (arXiv:1601.03399) [83 citations]

Co-author

16 Carr, C.; Bryan, G. L.; **Fielding, D. B.**; Pandya, V. *et al.*, *Regulation of Star Formation by a Hot Circumgalactic Medium*, 2022 (arXiv:2211.05115)

15 Reichardt Chu, B. *et al.* (incl. **DBF**), *DUVET: Spatially Resolved Observations of Star Formation Regulation via Galactic Outflows in a Starbursting Disk Galaxy*, 2022 (arXiv:2211.02063)

14 Butsky, I. S.; Werk, J. K.; Tchernyshyov, K.; **Fielding, D. B.** *et al.*, *The Impact of Cosmic Rays on the Kinematics of the Circumgalactic Medium*, ApJ, **935**, 69, 2022 (arXiv:2106.14889) [7 citations]

13 Hafen, Z. *et al.* (incl. **DBF**), *Hot-mode accretion and the physics of thin-disc galaxy formation*, MNRAS, **514**, 5056, 2022 (arXiv:2201.07235) [14 citations]

12 Abruzzo, M. W.; Bryan, G. L.; **Fielding, D. B.**, *A Simple Model for Mixing and Cooling in Cloud-Wind Interactions*, ApJ, **925**, 199, 2022 (arXiv:2101.10344) [14 citations]

11 Stern, J. *et al.* (incl. **DBF**), *Neutral CGM as damped Ly α absorbers at high redshift*, MNRAS, **507**, 2869, 2021 (arXiv:2105.06489) [8 citations]

10 Stern, J.; Faucher-Giguère, C.; **Fielding, D. B.**; Quataert, E. *et al.*, *Virialization of the Inner CGM in the FIRE Simulations and Implications for Galaxy Disks, Star Formation, and Feedback*, ApJ, **911**, 88, 2021 (arXiv:2006.13976) [43 citations]

9 Pandya, V. *et al.* (incl. **DBF**), *First Results from SMAUG: The Need for Preventative Stellar Feedback and Improved Baryon Cycling in Semianalytic Models of Galaxy Formation*, ApJ, **905**, 4, 2020 (arXiv:2006.16317) [22 citations]

8 Burkhart, B. *et al.* (incl. **DBF**), *The Catalogue for Astrophysical Turbulence Simulations (CATS)*, ApJ, **905**, 14, 2020 (arXiv:2010.11227) [8 citations]

7 Kim, C.; Ostriker, E. C.; **Fielding, D. B.**; Smith, M. C. *et al.*, *A Framework for Multiphase Galactic Wind Launching Using TIGRESS*, ApJ, **903**, 2020 (arXiv:2010.09090) [16 citations]

6 Kim, C. *et al.* (incl. **DBF**), *First Results from SMAUG: Characterization of Multiphase Galactic Outflows from a Suite of Local Star-forming Galactic Disk Simulations*, ApJ, **900**, 61, 2020 (arXiv:2006.16315) [48 citations]

5 Lochhaas, C. *et al.* (incl. **DBF**), *Properties of the simulated circumgalactic medium*, MNRAS, **493**, 1461, 2020 (arXiv:1908.00021) [24 citations]

4 Martizzi, D.; Quataert, E.; Faucher-Giguère, C.; **Fielding, D. B.**, *Simulations of jet heating in galaxy clusters: successes and challenges*, MNRAS, **483**, 2465, 2019 (arXiv:1805.06461) [36 citations]

3 Stern, J. *et al.* (incl. **DBF**), *Does Circumgalactic O VI Trace Low-pressure Gas Beyond the Accretion Shock? Clues from H I and Low-ion Absorption, Line Kinematics, and Dust Extinction*, ApJ, **865**, 91, 2018 (arXiv:1803.05446) [37 citations]

2 Offner, S. S. R. *et al.* (incl. **DBF**), *The Turbulent Origin of Outflow and Spin Misalignment in Multiple Star Systems*, ApJ, **827**, 2016 (arXiv:1606.08445) [68 citations]

1 Schlieder, J. E. *et al.* (incl. **DBF**), *The Na 8200 Å Doublet as an Age Indicator in Low-mass Stars*, AJ, **143**, 114, 2012 (arXiv:1202.4191) [60 citations]

Submitted & In Prep.

- **Fielding, D. B.**; Chen, Z.; Bryan, G. L., *The Anatomy of a Turbulent Radiative Mixing Layer: Essential properties of 3D Simulations* [on arXiv by 15 Dec 2022]
- Smith, M.; **Fielding, D. B.**; Bryan, G. L.; Kim, C.G.; Ostriker, E.; Somerville, R., *Arkenstone I* [on arXiv by 30 Nov 2022]
- Pandya, V.; **Fielding, D. B.**; Bryan, G. L.; Carr, C.; Somerville, R., *A unified model for the co-evolution of galaxies and their circumgalactic medium: the relative roles of turbulence and atomic cooling physics*[Submitted to ApJ—on arXiv by 18 Nov 2022]
- *Tan, B.; **Fielding, D. B.**; *The Fate of Cold Clouds in Realistic Galactic Winds*[on arXiv by 15 Dec 2022]
- *Chow, A.; **Fielding, D. B.**; Bryan, G. L., *Modeling Non-homogeneous Cold Cloud Population in Multiphase Galactic Winds*[on arXiv by 1 Dec 2022]
- Stern, J.; **Fielding, D. B.**; Naor, N., *On the structure of hot, rotating, turbulent CGM and how they feed disk galaxies*[on arXiv by 15 Dec 2022]
- Damle, M., Tonnesen, S., **Fielding, D. B.**; Sparre, M., *How satellites influence the cold CGM around TNG50 galaxies*[on arXiv by 15 Dec 2022]
- Roy, M., Su, K.Y., Tonnesen, S., **Fielding, D. B.**, *Seeding the CGM; How Satellites Populate the Cold Phase of Milky Way Halos*[on arXiv by 15 Dec 2022]
- Coil, A. L. *et al.* (incl. **DBF**), *Detection of Spatially Extended Ionized Gas in an Odd Radio Circle*[Submitted to Nature—on arXiv 15 Dec 2022]