

# Drummond B. Fielding

## Curriculum Vitae

Flatiron Research Fellow

Center for Computational Astrophysics, Flatiron Institute,  
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## Education

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

## Professional Appointments

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Assistant Professor, Cornell University, Department of Astronomy	2024-
Visiting Assistant Professor, Cornell University, Department of Astronomy	2023-2024
Flatiron Research Fellow, CCA	2018-present
Visiting Scholar, Indian Institute of Science	2016
Graduate Researcher, U.C., Berkeley	2012-2018

## Honors and awards

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Flatiron Fellowship	2018-2024
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

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galactic winds	stellar feedback	fluid dynamics
circumgalactic medium	galaxy formation	plasma physics
cosmic ray transport	MHD turbulence	machine learning

## Grants

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*Resolving Cosmic Ray Transport by pushing the Frontier of MHD Turbulence*, INCITE, PI, 2024  
—900,000 Node hours on *Frontier* the world's first exascale supercomputer.

*Galactic Winds Unveiled: Leveraging Cloud Simulations with Radiative Transfer to Constrain Feedback*, Legacy HST-AR, STScI, Co-PI, 2024-2026  
—3 years of funding for a graduate student and one month of summer funding per year

*Resolving Turbulent Multiphase Gas Dynamics*, EURO HPC, co-PI, 2023 —900,000 Node hours on *Lumi-G*.

*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

## Publications — ADS search — ORCID

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refereed: 45 — first author: 8 — citations: 1633 — h-index: 24 (2023-11-09)

### First Author

- 8 Fielding, D. B.; Ripperda, B.; Philippov, A. A., *Plasmoid Instability in the Multiphase Interstellar Medium*, ApJ, **949**, 2023 (arXiv:2211.06434) [8 citations]
- 7 Fielding, D. B.; Bryan, G. L., *The Structure of Multiphase Galactic Winds*, ApJ, **924**, 82, 2022 (arXiv:2108.05355) [62 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) [45 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) [95 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) [113 citations]
- 3 Fielding, D. B.; Quataert, E.; Martizzi, D.; Faucher-Giguère, C., *How supernovae launch galactic winds?*, MNRAS, **470**, 2017 (arXiv:1704.01579) [72 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) [132 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) [80 citations]

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

- 16 Stern, J.; Fielding, D. B.; Hafen, Z.; Su, K. et al., *Accretion onto disk galaxies via hot and rotating CGM inflows*, 2023 (arXiv:2306.00092) [6 citations]
- 15 Kempster, P.; Fielding, D. B.; Quataert, E.; Galishnikova, A. K. et al., *Cosmic ray transport in large-amplitude turbulence with small-scale field reversals*, MNRAS, **525**, 4985, 2023 (arXiv:2304.12335) [8 citations]
- 14 Smith, M. C.; Fielding, D. B.; Bryan, G. L.; Kim, C. et al., *Arkenstone I: A Novel method for robustly capturing high specific energy outflows in cosmological simulations*, MNRAS, 2023 (arXiv:2301.07116) [6 citations]
- 13 \*Tan, B.; Fielding, D. B., *Cloud Atlas: Navigating the Multiphase Landscape of Tempestuous Galactic Winds*, 2023 (arXiv:2305.14424) [6 citations]
- 12 \*Pandya, V.; Fielding, D. B.; Bryan, G. L.; Carr, C. et al., *A Unified Model for the Coevolution of Galaxies and Their Circumgalactic Medium: The Relative Roles of Turbulence and Atomic Cooling Physics*, ApJ, **956**, 118, 2023 (arXiv:2211.09755) [8 citations]
- 11 \*Abruzzo, M. W.; Fielding, D. B.; Bryan, G. L., *TuRMoiL of Survival: A Unified Survival Criterion for Cloud-Wind Interactions*, 2023 (arXiv:2307.03228)
- 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*, ApJ, **950**, 91, 2023 (arXiv:2211.01395) [3 citations]
- 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) [9 citations]
- 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) [18 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) [7 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) [63 citations]
- 5 Stachenfeld, K.; Fielding, D. B.; Kochkov, D.; Cranmer, M. et al., *Learned Coarse Models for Efficient Turbulence*

*Simulation*, 2021 (arXiv:2112.15275) [27 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) [67 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) [44 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) [59 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) [94 citations]

#### Co-author

- 21 Su, K. et al. (incl. **DBF**), *Unraveling Jet Quenching Criteria Across  $L^*$  Galaxies and Massive Cluster Ellipticals*, 2023 (arXiv:2310.17692)
- 20 Coil, A. L. et al. (incl. **DBF**), *Ionized Gas Extended Over 40 kpc in an Odd Radio Circle Host Galaxy*, 2023 (arXiv:2310.15162)
- 19 Steinwandel, U. P. et al. (incl. **DBF**), *The structure and composition of multiphase galactic winds in a Large Magellanic Cloud mass simulated galaxy*, 2022 (arXiv:2212.03898) [10 citations]
- 18 McPherson, D. K. et al. (incl. **DBF**), *DUVET survey: mapping outflows in the metal-poor starburst Mrk 1486*, MNRAS, **525**, 6170, 2023 (arXiv:2308.06918)
- 17 Roy, M.; Su, K.; Tonnesen, S.; **Fielding, D. B.** et al., *Seeding the CGM: How satellites populate the cold phase of milky way halos*, MNRAS, 2023 (arXiv:2310.04404)
- 16 Carr, C.; Bryan, G. L.; **Fielding, D. B.**; Pandya, V. et al., *Regulation of Star Formation by a Hot Circumgalactic Medium*, ApJ, **949**, 21, 2023 (arXiv:2211.05115) [6 citations]
- 15 Reichardt Chu, B. et al. (incl. **DBF**), *DUVET: Spatially Resolved Observations of Star Formation Regulation via Galactic Outflows in a Starbursting Disk Galaxy*, ApJ, **941**, 163, 2022 (arXiv:2211.02063) [3 citations]
- 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) [14 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) [47 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) [25 citations]
- 11 Stern, J. et al. (incl. **DBF**), *Neutral CGM as damped Ly  $\alpha$  absorbers at high redshift*, MNRAS, **507**, 2869, 2021 (arXiv:2105.06489) [16 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) [77 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) [30 citations]
- 8 Burkhart, B. et al. (incl. **DBF**), *The Catalogue for Astrophysical Turbulence Simulations (CATS)*, ApJ, **905**, 14, 2020 (arXiv:2010.11227) [13 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) [28 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) [69 citations]
- 5 Lochhaas, C. et al. (incl. **DBF**), *Properties of the simulated circumgalactic medium*, MNRAS, **493**, 1461, 2020 (arXiv:1908.00021) [29 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) [46 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) [40 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) [82 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) [63 citations]

## Student advising

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[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 + CCA predoctoral fellow

## Public outreach

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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

## Professional services & teaching

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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

## Selected recent invited presentations

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Invited Review, *New simulations for new problems in galaxy formation*, conference, Paris (12/2023)  
Invited Talk, Salpeter Workshop on the Interstellar Medium, Cornell (12/2023)  
Seminar, Computational Research in Boston and Beyond (CRIBB), MIT (12/2023)  
Colloquium, Johns Hopkins University, Physics and Astronomy Department (11/2023)  
Colloquium, Columbia University, Astronomy Department (10/2023)  
Invited talk, *Interfaces and Mixing in Fluids, Plasmas, and Materials*, conference, KITP (9/2023)  
Colloquium, Michigan State University, Physics and Astronomy Department (10/2023)  
Invited Review, *MIST2023: Cosmic turbulence and Magnetic fields: physics of baryonic matter across time and scales*, conference (9/2023)  
Invited talk, CGM@ND, conference (9/2023)  
Invited talk, *New Views on Feedback & the Baryon Cycle in Galaxies*, conference (8/2023)  
Invited talk, *Modeling multiphase astrophysical systems*, conference (5/2023)  
Invited talk, *Jim's Fest/Athena++*, conference (5/2023)  
Colloquium, Yale University, Astronomy Department (2/2023)  
Colloquium, Cornell University, Astronomy Department (1/2023)  
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)