Dillon Brout

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Appointments

Assistant Professor, Departments of Astronomy and Physics, Boston University 2023-
Postdoctoral Fellow, Department of Astronomy, Harvard University 2023
NASA Einstein Fellow, Harvard & Smithsonian Astrophysical Observatory, 2020-2022
NASA Einstein Fellow, University of Pennsylvania, 2019-2020

Education

Ph.D., Physics and Astronomy, University of Pennsylvania, 2019
M.S., Physics and Astronomy, University of Pennsylvania, 2015
B.S., Physics and Astronomy, Johns Hopkins University, 2013

Awards and Fellowships

2024 Hariri Institute Junior Faculty Fellowship
2023 AAS Fred Kavli Prize *(main recipient Daniel Scolnic)*
Awarded for Pantheon+SH0ES Results
2019-2022 NASA Einstein Fellow
2016 Fermilab Universities Research Fellowship
2012 Provost Undergraduate Research Award
2009-2013 JHU Double Degree Abrams Scholar (w/ Jazz Saxophone @ Peabody)

Publication Summary

113 refereed journal articles, >22,000 citations (NASA ADS); h-index: 55
ADS link: https://ui.adsabs.harvard.edu/public-libraries/yud-a9iARz6UFPHFriHhKw

Teaching

AS109 Cosmology for Non-Science Majors, BU, Undergraduate, Fall 2025
AS851 Graduate Literature Seminar II, BU, Undergraduate, Spring 2024
AS850 Graduate Literature Seminar I, BU, Undergraduate, Fall 2024
AS203 Principles of Astronomy II, BU, Undergraduate, Spring 2024
AS109 Cosmology for Non-Science Majors, BU, Undergraduate, Fall 2023
Introduction to Data Science and Machine Learning Bootcamp, UPenn, Summer 2019,
Graduate students in Arts & Sciences, Developed material & lead instructor
Python Fundamentals for Research in Physics & Astronomy, UPenn,
Undergraduate & Graduate, 2017-2019
ML for March Madness Guest Lecturer, Duke, Undergraduate 2017, 2018, 2019, 2024

5 Selected Papers (INSPIRES LINK). Full list at end of CV.

1. *"The Pantheon+ Analysis: Cosmological Constraints"*
   Brout, et al. 2022 **(977 citations)**

2. *"The Dark Energy Survey Supernova Program: Cosmological Analysis and Systematic Uncertainties"*
   Vincenzi, **Brout***, et al. 2024 **(76 citations)** [*Co-Corresponding Author]

3. *"It's Dust: Solving the Mysteries of the Intrinsic Scatter and Host-galaxy Dependence of Standardized Type Ia Supernova Brightnesses"*
   Brout & Scolnic 2021 **(170 citations)**

4. *"A Comprehensive Measurement of the Local Value of the Hubble Constant with 1km/s/Mpc Uncertainty from the Hubble Space Telescope and the SH0ES Team"*
   Riess, Yuan, Macri, Scolnic, ***Brout** et al. 2022 **(1,900 citations)** [*Supernova-Lead]

5. "Uniting the Observed Dynamical Dark Energy Preference with the Discrepancies in Ω_m and H_0 Across Cosmological Probes", arXiv:2412.04430
   Tang*, **Brout**, et al. 2024 **(19 citations)** [*Tang is Brout's PhD student at BU]

Professional and Departmental Activities

NASA Roman Space Telescope Supernova Project Infrastructure Team (2024-)
BU Astronomy Graduate Admissions Committee (2024/2025)
Rubin in Boston Workshop Organization (Spring 2025)
BU Cosmology Faculty Search Committee (2024)
Referee for:
The Astrophysical Journal, The Astrophysical Journal Letters, Monthly Notices of the Royal Astronomical Society, Physical Review Letters
Proposal reviewer/TAC for:
NSF NOIRLab (2022-2024), Hubble Space Telescope TAC (2024), HST Bridges (2024), DOE Cosmic Frontier (2025).
Co-Editor and Co-Author of Springer Series Book : The Hubble Constant Tension 2024
https://link.springer.com/book/10.1007/978-981-99-0177-7
Conference Organizer - "The Impact of Dust on Future Cosmological Probes"
25 attendees, 3 days, @ Harvard Smithsonian CfA 2022
Organizing Committee - "The Freedom Trail of Code: Boston Astrophysics x Machine Learning Hackathon", 70+ attendees, 3 days, @ MIT IAIFI, 2024

Collaboration Leadership

LSST DESC Time Domain Cosmology Working Group Co-Convener 2023 -
DESI Time Domain & Low Redshift Cosmology Working Group Co-Chair 2022 - 2024
DES Supernova 5-Year Cosmology Analysis Co-Coordinator 2021 - 2024
SH0ES Hubble Constant Analysis SN Ia Lead 2020 - 2023
Pantheon+ Collaboration Co-Founder/Lead 2020 - 2023

Student and Postdoctoral Research Advisees (*funded by Brout at BU)

*Nora Sherman - Postdoc, BU 2024 -
*Xianzhe Tang (TZ) - Graduate Student, BU 2024 -
*Rujuta Purohit - Graduate Student, BU 2024 -
*Eli Marlin - Undergraduate Student, BU 2024 -
*Tiphany Thai Duc - Undergraduate Student, BU 2024 -
*Mackenzie Elliot - Undergraduate Student, BU 2024 -
Bailey Martin - Co-Advise Graduate Student, ANU 2022 -
Cole Meldorf - Co-Advise Graduate Student, UPenn 2020 - 2023
Patrick Armstrong - Co-Advise Graduate Student, ANU 2019 - 2024
Brodie Popovic - Co-Advise Graduate Student, Duke 2018 - 2023
Sasha Brownsberger - Co-Advise Graduate Student, Harvard 2020-2022
Noor Amer - Undergraduate Student, Umea Univ. 2020 - 2023

Grants and Proposals Awarded

Funded co-I NASA Roman Project Infrastructure Team 2024 ($345,525)
Co-PI : Templeton Foundation Grant 2023-2025 ($810,529)
PI : DEBASS, NOAO Blanco/DECam telescope time - 10 Nights, 2024-2025
PI : DEBASS, NOAO Blanco/DECam telescope time - 9 Nights, 2023-2024
PI : DEBASS, NOAO Blanco/DECam telescope time - 30 Nights, 2020-2023
2019-2022 NASA Einstein Fellowship ($258,000)

Selected Public Appearances

Quanta Magazine Video - Breakthroughs in Physics 2024
Science Friday Podcast (Pulizter Prize) - 05/17/2024
Google Keynote - 2019

Selected Invited Lectures and Colloquia

Invited Talk - LSST First Images Unveiling -Harvard, Cambridge MA 2025
Keynote Speaker - Tensions in Cosmology - Corfu Greece, 2025
Invited Talk - DES Collaboration Meeting -UPenn, Philadelphia PA 2025
Invited Talk - Roman Cartography- Space Telescope Institute, Baltimore MD 2025
Colloquium - Johns Hopkins University - Baltimore MD 2025
Invite only Workshop- ISSI, Bern Switzerland 2025
Invited Talk and Panelist - International Solvay Institute, Brussels BE 2025
Colloquium - MIT Astronomy, Boston, MA, 2024
SLAC Summer Science Institute Lecture, Stanford University, Palo Alto CA 2024
Colloquium - ICTP-SAIFR, *Sao Paulo, Brazil, 2024*
Opening Talk of the 15th International Workshop on Identification of Dark Matter, *L'Aquila, IT, 2024*
Invited Talk - Recontres de Moriond, Cosmology, *La Thuile IT, 2024*
Colloquium - Center for Astrophysics, Harvard & Smithsonian, *Cambridge MA, 2024*

Fermilab Joint Experimental-Theoretical Physics Seminar, *Batavia, Illinois, 2023*
Cosmoverse, *Lisbon, Portugal, 2023*
Invited Talk - Progress on Old and New Themes in Cosmology, *Avignon, France, 2023*
Dark Energy Science Collaboration, *Remote, 2023*
Colloquium - Boston University, *Boston, MA, 2023*
Colloquium - SLAC, *Palo Alto, CA, 2023*
KIPAC Tea Talk - Stanford, *Palo Alto, CA, 2023*
Colloquium - Northeastern University, *Boston, MA, 2023*
CosmoVerse, *Remote, 2022*
Colloquium, University of Michigan Physics, *Ann Arbor, MI, 2022*
Boom! Conference, *UI Champaign Urbana, 2022*
DES-ZTF Workshop, *Stockholm, Sweden, 2022*
DES Workshop, *Madrid, Spain, 2022*
Colloquium - ICTP-SAIFR, *Sao Paulo, Brazil, 2022*
CfA ITC Luncheon, *Cambridge, MA, 2022*
KIPAC Tea Talk - *Stanford, Palo Alto, CA, 2022*
Colloquium - *SLAC, Palo Alto, CA, 2022*
Colloquium - *University of Helsinki, Finland, 2022*
Cosmology Talks with Shaun Hotchkiss, *Youtube, 2021*
Colloquium - University of Hawaii, *Honolulu, HI, 2021*
AAS LSST Special Session, *Remote, 2021*
Colloquium - Stockholm University, *Remote, 2020*
Colloquium - Brandeis Univ., *Waltham, MA, 2020*
KICP SCAM Workshop UChicago, *Chicago, IL, 2019*
KITP Tensions between the Early and the Late Universe, *Santa Barbara, CA, 2019*
CMU/Pitt Physics Seminar, *Pittsburgh, PA, 2019*
Colloquium - Universite Clermont-Auvergne, *FR, 2019*
Colloquium - Service de Physique Théorique, ULB, *Brussels, Belgium, 2019*
Colloquium - American Museum of Natural History, *New York, NY, 2019*
Invited Talk - Johns Hopkins/STSci, *Baltimore, MD, 2019*
South American Workshop on Cosmology in the LSST Era, *Sao Paulo, Brazil, 2018*
DECam Community Science Workshop (2 Talks), *Tucson, AZ, 2018*
Fermilab Joint Experimental-Theoretical Physics Seminar, *Batavia, IL, 2018*

Selected High-Impact Publications:

1. **Brout, D**., et al. *"The Pantheon+ Analysis: Cosmological Constraints",* 2022, ApJ, 938,2,110

    - IOP 2024 Top Cited Paper Award winner (977 Citations).

    - Pantheon+ Awarded AAS Fred Kavli Prize.

2. Vincenzi, M., **Brout, D.,** et al. *"The Dark Energy Survey Supernova Program: Cosmological Analysis and Systematic Uncertainties",* 2024, ApJL, 975, 1, 86.

    - Brout was the DES SN Analysis Co-Lead.

3. DES Collaboration et al. *"The Dark Energy Survey: Cosmology Results with 1500 New High-redshift Type Ia Supernovae Using the Full 5 yr Data Set",* 2024, ApJL, 973, 1, L14.

    - **Brout** was the DES SN Analysis Co-Lead.,

4. Sanchez, B., **Brout, D**., et al. *"The Dark Energy Survey Supernova Program: Light Curves and 5Yr Data Release",* 2024, ApJ, 975, 1, 5.

    - **Brout** advised Sanchez on all aspects of the analysis.

5. Riess, A., Yuan, W., Macri, L., Scolnic, D., **Brout, D.**, et al. *"A Comprehensive Measurement of the Local Value of the Hubble Constant with 1 km/s/Mpc Uncertainty from the Hubble Space Telescope and the SH0ES Team',* 2022, ApJL, 934, 1, L7

    - **Brout** led the analysis of SNe on the 2nd and 3rd rungs of the distance ladder.

6. **Brout, D.** & Riess, A. *"The Impact of Dust on Cepheid and Type Ia Supernova Distances",* 2023, arXiv:2311.08253, Book Chapter

7. **Brout**, Hinton, & Scolnic, *"Binning is Sinning; Supernova Edition",* 2021, ApJL, 912, L26.

8. Scolnic, D., **Brout, D.,** et al. *"The Pantheon+ Analysis: Light-Curve Data Release",* 2022, ApJ, 938, 2, 113

9. **Brout, D.,** et al. *"The Pantheon+ Analysis: SuperCal-Fragilistic Cross Calibration, Retrained SALT2 Light Curve Model, and Calibration Systematic Uncertainty",* 2022, ApJ, 938, 2, 111

10. **Brout, D.** & Scolnic, D., *"It's Dust: Solving the Mysteries of Intrinsic Scatter and Host-galaxy Dependence of Standardized Type Ia Supernova Brightnesses",* 2021, ApJ, 909, 26.

11. DES Collaboration et al., *"First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Constraints on Cosmological Parameters",* 2019, 872, L30.

    - Alphabetical author list and no corresponding author. **Brout** was the single largest contributor to the paper. **Brout** produced all results, tables, plots and majority of text.

12. Hinton, S. & **Brout, D.,** *"Pippin: A pipeline for supernova cosmology",* 2020, JOSS, 5, 2122.

13. Tang, X., **Brout, D.** *"Uniting the Observed Dynamical Dark Energy Preference with the Discrepancies in Ωm and H0 Across Cosmological Probes",* 2024, arXiv:2412.04430

    - Tang is **Brout's** PhD student at Boston University.

Remaining Lead Author Publications:

14. Martin, B., Lidman, C., **Brout, D.,** et al. *"[Oii] as an effective indicator of the dependence between the standardized luminosities of Type Ia supernovae and the properties of their host galaxies"* 2024, MNRAS, 533, 3, 2640–2655.
15. Armstrong, P. and Qu, H. and **Brout, D.,** et al. *"Probing the consistency of cosmological contours for supernova cosmology",* 2023, PASA, 40, e038, doi:10.1017/pasa.2023.40

    - **Brout** advised graduate students Armstrong and Qu on all aspects of the analysis.

16. Hounsell, Scolnic, **Brout**, et al. *"Roman CCS White Paper: Measuring Type Ia Supernovae Discovered in the Roman High Latitude Time Domain Survey",* 2023, arXiv:2307.02670
17. Popovic, B., **Brout, D.,** et al., *"The Pantheon+ Analysis: Forward-Modeling the Dust and Intrinsic Colour Distributions of Type Ia Supernovae, and Quantifying their Impact on Cosmological Inferences*", 2023, ApJ, 945, 1, 84

    - Brout advised graduate student Popovic on all aspects of the analysis.

18. Brownsberger, S., **Brout, D.,** et al. *"The Pantheon+ Analysis: Dependence of Cosmological Constraints on Photometric-Zeropoint Uncertainties of Supernova Surveys",* 2022, ApJ, 944, 2, 188.

    - **Brout** advised graduate student Brownsberger on all aspects of the analysis.

19. Meldorf, C., Palmese, A., **Brout, D.,** et al. *"The Dark Energy Survey Supernova Program results: Type Ia Supernova brightness correlates with host galaxy dust",* 2022, MNRAS, 518, 2, 1985–2004.

    - **Brout** Co-Advised undergraduate student Meldorf on all aspects of paper and co-wrote.

20. Popovic, B., **Brout, D**., et al., *"Improved Treatment of Host-Galaxy Correlations in Cosmological Analyses With Type Ia Supernovae",* 2021, ApJ, 913, 49.

    - **Brout** advised graduate student Popovic on all aspects of the analysis.

21. Dhawan, S., **Brout, D.**, et al. *"Cosmological Model Insensitivity of Local H0 from the Cepheid Distance Ladder",* 2020, ApJ, 894, 54.
22. **Brout, D.,** et al., *"First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Analysis, Systematic Uncertainties, and Validation",* 2019, ApJ, 874, 150.
23. **Brout, D.,** et al., *"First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Photometric Pipeline and Light Curve Data Release",* 2019, ApJ, 874, 106.
24. Kessler, R., **Brout, D.,** et al., *"First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Simulations to Correct Supernova Distance Biases",* 2019, MNRAS, 485, 1171.
25. Guidorzi, G., Marguitti, R., **Brout, D.,** et al., *"Improved Constraints on H0 from a Combined Analysis of Gravitational-wave and Electromagnetic Emission from GW170817 ",* 2017, ApJ, 851, no.2, L36.

Full pubs list: https://ui.adsabs.harvard.edu/public-libraries/yud-a9iARz6UFPHFriHhKw