Catherine Zucker

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Last Updated January 2020

EDUCATION

Harvard University: PhD in Astronomy   Spring 2020
    Dissertation: *Charting our Uncharted Milky Way*
    Advisors: Alyssa Goodman & Douglas Finkbeiner

Harvard University: M.A. in Astronomy and Astrophysics   Fall 2017

University of Virginia: B.A. in Astronomy-Physics and History   Spring 2015

PROFESSIONAL APPOINTMENTS

Postdoctoral Fellow, Center for Astrophysics (Harvard)   Summer 2020 - Present

PUBLICATIONS

I have co-authored 20 publications (refereed/under review). This includes **8 first-author publications [with over 200 total citations]** and 2 second-author publications. My second-author publications include one *Nature* publication, and one undergraduate student-led publication for which I served as the primary science advisor. A full listing of my publications can be found on the ADS.

First Author/co-PI

1. **Zucker, C.**, Speagle, J., Schlafly, E., Green, G., Finkbeiner, D., Goodman, A., Alves, J. 2020. *A&A*. 633, A51. A Compendium of Distances to Molecular Clouds in the Star Formation Handbook.

2. **Zucker, C.**, Smith, R., Goodman, A. 2019. *ApJ*, 887, 186. Synthetic Large-Scale Galactic Filaments — on their Formation, Physical Properties, and Resemblance to Observations.

3. **Zucker, C.** & Speagle, J, Schlafly, E., Green, G., Finkbeiner, D., Goodman, A., Alves, J. 2019. *ApJ*, 879, 125. A Large Catalog of Accurate Distances to Local Molecular Clouds: The Gaia DR2 Edition.

4. **Zucker, C.**, Schlafly, E., Green, G., Speagle, J., Portillo, S., Finkbeiner, D., Goodman, A. 2018. *ApJ*, 869, 83. Mapping Distances across the Perseus Molecular Cloud Using CO Observations, Stellar Photometry, and Gaia DR2 Parallax Measurements.

5. **Zucker, C.** & Chen, H. H. 2018. *ApJ*, 864, 162. RadFil: A Python Package for Building and Fitting Radial Profiles for Interstellar Filaments.

6. **Zucker, C.**, Battersby, C., Goodman, A. 2018. *ApJ*, 864, 2. The Physical Properties of Large-scale Galactic Filaments.

7. **Zucker, C.**, Walker, L.M., Johnson, K., Gallagher, S., Alatalo, K., Tzanavaris, P. 2016. *ApJ*, 821, 113. Hierarchical Formation in Action: Characterizing Accelerated Galaxy Evolution in Compact Groups using Whole-Sky WISE Data.

8. **Zucker, C.**, Battersby, C., Goodman, A. 2015. *ApJ*, 815, 23. The Skeleton of the Milky Way.

Second Author

1. Das, K., **Zucker, C.**, Speagle, J., Goodman, A., Green, G., and Alves, J. *MNRAS*. 498, 4. Constraining the Distance to the North Polar Spur with Gaia DR2.

2. Alves, J., **Zucker, C.**, Goodman, A., Speagle, J., Meingast, S., Robitaille, T., Finkbeiner, D., Schlafly, E., Green, G. 2020. *Nature*, 578, 237. A Galactic-scale gas wave in the Solar Neighborhood.

Other Co-Authored Publications

1. Kong, S., Arce, H., Carpenter, J., [9 authors], **Zucker, C.**, [5 authors]. *ApJ*. Submitted. High-resolution CARMA Observations of Molecular Gas in the North America and Pelican Nebulae.

2. Green, G., Rix, H-W., Tschesche, L., Finkbeiner, D., **Zucker, C.**, Schlafly, E., Rybizki, J., and Speagle, J. 2020. *ApJ*. Submitted. Data-Driven Stellar Models.

3. Izquierdo, A., Smith, R., Glover, S., Klessen, R., Treß, R., Sormani, M., Clark, P., Duarte-Cabral, A., and **Zucker, C**. 2020. *MNRAS*. Accepted. The Cloud Factory II: Gravoturbulent Line-Widths of Resolved Molecular Clouds in a Galactic Potential.

4. Wang, Y., Beuther, H., Schneider, N., Meidt, S., Linz, H., Ragan, S., **Zucker, C**, Battersby, C., Soler, J., Schinnerer, E., Bigiel, F., Colombo, D. and Henning T. 2020. *A&A*, 641, A53. Dense Gas in a Giant Molecular Filament.

5. Smith, R. J., Tress, R., Sormani, C., Clover, S. Klessen, R., Clark, P., Izquierdo, A., Duarte-Cabral, A., **Zucker, C**. 2019. *MNRAS*, 492, 1594. The Cloud Factory I: Generating resolved filamentary molecular clouds from galactic-scale forces.

6. Green, G., Schlafly, E., **Zucker, C.**, Speagle, J., Finkbeiner, D. 2019. *MNRAS*, 887, 93. A 3D Dust Map Based on Gaia, Pan-STARRS 1 and 2MASS.

7. Fissel, L. & 39 co-authors, including **Zucker, C.** 2019. *ApJ*, 878, 110. Relative Alignment between the Magnetic Field and Molecular Gas Structure in the Vela C Giant Molecular Cloud Using Low- and High-density Tracers.

8. Monsch, K., Pineda, J., Liu, H.B., **Zucker, C.**, H., Chen, H., Pattle, K., Offner, S., Di Francesco, J., Ginsburg, A., Ercolano, B., Arce, H., Friesen, R., Kirk, H., Caselli, P., Goodman, A. 2018. *ApJ*, 861, 77. Dense Gas Kinematics and a Narrow Filament in the Orion A OMC1 Region using NH_3.

9. Lisenfeld, U., Alatalo, K., **Zucker, C.**, Appleton, P. N., Gallagher, S., Guillard, P., Johnson, K.. 2017. *A&A*, 607, A110. The Role of Molecular Gas in Galaxy Transition in Compact Groups.

10. Walker, L.M., Butterfield, N., Johnson, K., **Zucker, C.**, Gallagher, S., Konstantopoulos, I., Hornschemeier, A., Tzanavaris, P., Charlton, J. 2013. *ApJ*, 775,129. The Optical Green Valley vs Mid-IR Canyon in Compact Groups.

PRESENTATIONS

I have given a total of 29 talks, including **13 invited talks and colloquia**:

Invited

1.	**Tea Talk**, KIPAC Tea	November 2020
2.	**Seminar**, Ringberg Virtual Seminar Series	November 2020
3.	**Lunch Talk**, STScI Low Density Universe	October 2020
4.	**Colloquium**, University of Wisconsin-Madison	September 2020
5.	**Colloquium**, ITC Colloquium (Harvard CfA)	September 2020
6.	**Conference Talk**, AAS 236 Meeting-in-Meeting: *The ISM in the Era of Big Data*	June 2020
7.	**Colloquium**, AMNH (New York, New York)	December 2019
8.	**Conference Talk**, The self-organized star formation process (Orsay, France)	October 2019
9.	**Colloquium** (with J. Speagle), SAO REU Summer Colloquium (Harvard CfA)	June 2019
10.	**Invited Talk**, ITC Luncheon (Harvard CfA)	November 2018
11.	**Conference Talk**, The Milky Way in the Age of Gaia (Orsay, France)	October 2018

12. **Lunch Talk**, MIT Haystack — August, 2018
13. **Lunch Talk/Workshop**, Dunlap Institute (Toronto, Canada) — May 2017

Contributed

1. Lunch Seminar, Harvard Astrostatistics Group (Harvard University) — March 2020
2. Lunch Seminar, University of Washington (Seattle, Washington) — February 2020
3. Conference Talk, NE Regional Star Formation Meeting (U. Conn.) — January 2020
4. Conference Talk, Harvard-Heidelberg Meeting on Star Formation (Cambridge, MA) — November 2019
5. Conference Talk, Crete III – Through dark lanes to new stars (Heraklion, Crete) — September 2019
6. Conference Talk, New England Regional SF Meeting (UMass) — Januay 2019
7. Conference Talk, Harvard Heidelberg Meeting on Star Formation (MPIA) — December 2018
8. Conference Talk, Interstellar Filament Paradigm (Nagoya, Japan) — November 2018
9. Conference Talk, The Olympian Symposium (Paralia, Greece) — May 2018
10. Workshop Session Lead, AAS Splinter Session (Washington, DC) — January 2018
11. Conference Talk, Sun, Stars, and Galaxies (U. Manchester, UK) — October 2017
12. Lunch Talk, Harvard Astrostats Day (Harvard CfA) — September 2017
13. Conference Talk, Galactic Star Formation with Survey (MPIA) — July 2017
14. Conference Talk, New England Region SF Meeting — January 2016
15. Conference Talk, Filamentary Structure in Molecular Clouds (Charlottesville, VA) — October 2014
16. Intern Talk, SAO Astronomy Intern Symposium (Harvard CfA) — August 2014

SELECTED AWARDS/HONORS

- Protostars & Planets VII Chapter Lead (The Solar Neighborhood in the Age of Gaia) — Fall 2020
  Competitively selected to lead a review chapter and accompanying review talk
  at the upcoming Protostars and Planets VII meeting
- Fireman Fellow — Spring 2020
  Department's highest honor, awarded by the Harvard Astronomy Faculty
  to a single graduating PhD student on the basis of his or her doctoral work
- Harvard-Horizons 2020 Scholar — Spring 2020
  Top eight graduate students selected across Harvard to receive
  professional development training, culminating in public "TED-style" talk
- Harvard Astronomy Departmental Teaching Award — Spring 2018
- Certificate of Distinction in Teaching, Harvard University — Fall 2017, Spring 2019
- La Serena School for Data Science Full Scholarship — Summer 2017
- NSF Graduate Research Fellowship Award — Fall 2016-Spring 2020
- Merrill Graduate Fellowship, Harvard University — Fall 2015-Spring 2017
- Peirce Fellowship, Harvard Astronomy — Fall 2015-Fall 2018
  Fellowship for top three admitted Harvard Astronomy applicants
- UVA Undergraduate Physics Research Symposium, 1st Place — Fall 2014
- Vyssotsky Prize, University of Virginia — Spring 2014
  Awarded to one outstanding third year astrophysics major

- Double Hoo Research Award, University of Virginia … Spring 2014
  Supports joint research between undergraduate and PhD students
- Intermediate Honors, University of Virginia … Fall 2013
- Virginia Space Grant Consortium Research Fellowship … Summer 2013–Spring 2014
- Kate Cabell Claiborne Cox Scholarship, University of Virginia … Spring 2013
  Awarded to one outstanding third year history major
- Harrison Research Award, University of Virginia … Summer 2013–Spring 2014
- Echols Scholarship Fund Grant, University of Virginia … Summer 2012
- Small Research and Travel Grant, University of Virginia … Summer 2012
- Wolfe Undergraduate Docent Award, University of Virginia … Spring 2012
- Echols Scholar, University of Virginia … Fall 2011–Fall 2015

TEACHING, MENTORING, & OUTREACH

Teaching

I have served as a teaching fellow for an undergraduate and a graduate course. Both times, I received the Bok Certificate of Distinction in Teaching, based on high student evaluations. I also received the Harvard Astronomy departmental award for teaching excellence.

- Physics & Chemistry of the ISM, Harvard University. … Spring 2019
- Galactic & Extragalactic Astronomy, Harvard University. … Fall 2017

Mentoring

I have served as a primary science advisor for five undergraduate students:

- Diana Khimey (Harvard University) … Winter 2020 - Present
  How Young Stars Leave Home
- Shlomo Cahlon (Harvard University). Senior Thesis Research. … Fall 2020 - Present
  A Uniform Catalog of Local Clouds Based on 3D Dust Mapping
- Alan Tu (Harvard University). PRISE Research. … Summer 2020 - Present
  Characterizing the 3D Motion of a Galactic-scale Gas Wave
- Kaustav Das (IIT Kanpur). … Summer 2019 - Fall 2020
  Constraining the Distance to the North Polar Spur with Gaia DR2
  Published in *MNRAS*.
- Laura Chapman (Harvard University). … Summer 2018
  A Statistics Plugin for the glue Visualization Environment.
  Code available on pypi.

Education and Public Outreach

- Subject Matter Expert, NASA *Cosmic Data Stories* Grant … Fall 2020 - Present
  Public understanding of data science via interactive research stories
- WorldWide Telescope Ambassador … Fall 2015 - Present
- Public Talk, Gloucester Area Astronomy Club … Summer 2019
- Astronomy Rewind, Volunteer Lead … Fall 2018
- Public Talk, New Hampshire Astronomical Society … Spring 2018
- Cambridge Explores the Universe Volunteer … Spring 2016, 2017, 2018, 2019

- *Dark Skies, Bright Kids Planetarium Lead* — March 2012–May 2015
- Harrison Institute for American History Docent — September 2011–May 2015

PROFESSIONAL ACTIVITIES

- Referee for *ApJ*, *A&A*, *MNRAS*, and *AJ* — Fall 2018 - Present
- Harvard Data Science Review, Emerging Scholars Board — Spring 2020 - Present
- SOC, Harvard-Heidelberg Star Formation Meetings — Fall 2019, Winter 2020
- CfA Star Formation Journal Club Series Co-Organizer — Spring 2018 - Present
- Core member, `glue` visualization software team — Spring 2017 - Present
- American Astronomical Society member — Fall 2015 - Present

PRESS

Hundreds of news stories covering the discovery of a *Galactic-scale Gas Wave in the Solar Neighborhood*. For full details, see our official [website](). Some interview highlights include:

- Appeared live on NPR's [Science Friday]() — January 2020
- Interview with [The Associated Press]() — January 2020
- Interview with the [Harvard Gazette]() — January 2020
- Interview with [Popular Science]() — January 2020