

# Catherine Zucker

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Last Updated January 2020

## EDUCATION

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- 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

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

## PUBLICATIONS

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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<sub>3</sub>](#).
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

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

### Invited

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

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|---|--------------|
| 12. <b>Lunch Talk</b> , MIT Haystack                                | August, 2018 |
| 13. <b>Lunch Talk/Workshop</b> , Dunlap Institute (Toronto, Canada) | May 2017     |

## Contributed

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| 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)                          | January 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

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| • <b>Protostars &amp; Planets VII</b> Chapter Lead (The Solar Neighborhood in the Age of Gaia)<br><i>Competitively selected to lead a review chapter and accompanying review talk at the upcoming Protostars and Planets VII meeting</i> | Fall 2020              |
| • <b>Fireman Fellow</b><br><i>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</i>   | Spring 2020            |
| • <b>Harvard-Horizons 2020 Scholar</b><br><i>Top eight graduate students selected across Harvard to receive professional development training, culminating in public "TED-style" talk</i>  | Spring 2020            |
| • 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<br><i>Fellowship for top three admitted Harvard Astronomy applicants</i>  | Fall 2015-Fall 2018    |
| • UVA Undergraduate Physics Research Symposium, 1st Place  | Fall 2014              |
| • Vyssotsky Prize, University of Virginia<br><i>Awarded to one outstanding third year astrophysics major</i>   | Spring 2014            |

- 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

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### 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 the primary science advisor for four 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

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- 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

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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