

ANNA LORRAINE ROSEN, PH.D.

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Institute for Theory and Computation, Center for Astrophysics | Harvard & Smithsonian, Cambridge MA 02138

EDUCATION

Ph.D., Astronomy & Astrophysics, University of California, Santa Cruz 2017
Advisors: Mark Krumholz, Enrico Ramirez-Ruiz
M.S., Astronomy & Astrophysics, University of California, Santa Cruz 2012
B.A., Physics & Astrophysics, University of California, Berkeley 2009
Cumulative GPA: 3.81/4.0 , Major GPA: 3.82/4.0, Honors: Fall 2007-2009, General Distinction
Community College Transfer Student, Los Angeles Pierce College 2007
Cumulative GPA: 3.95/4.0 , Major GPA: 4.0/4.0
Dean's Honors: 2003-2007, President's Honor: 2004-2007

AWARDS AND RESEARCH POSITIONS

Institute for Theory and Computation (ITC) Post-doctoral Fellowship, Harvard University 2020-2022
NASA Einstein Post-doctoral Fellowship, Harvard University 2017-2020
NASA Hubble Post-doctoral Fellowship (declined) 2017
Rodger Doxsey Dissertation Prize (American Astronomical Society) 2017
ARCS Foundation Fellowship 2016
American Association of University Women (AAUW) American Dissertation Year Fellowship 2016
Excellence in Mentoring Award (UC Santa Cruz Astronomy & Astrophysics Department) 2015
American Astronomical Society International Travel Grant 2014, 2016, 2017
National Science Foundation Graduate Research Fellowship Program 2011
Daniel Edward Wark Memorial Scholarship (UC Berkeley Astrophysics Department) 2009
NASA Motivating Undergraduates in Science and Technology Scholarship 2007
Alexander Frolich Award for excellence of achievement in Physics 2007
NASA JPL Undergraduate Scholars Award for excellence of achievement in Physics 2007
Thomas McCutcheon Award for excellence of achievement in Mathematics 2006

SUCCESSFUL PROPOSALS

Total of grants obtained as Principal Investigator: \$174,825

1. Co-I, Chandra Observation, Cycle 21 (awarded 100 ks) 2019
Title: *A Superstar Cluster is Born: Probing the X-ray Emission of H72.97-69.39 in LMC-N79*
2. PI, Chandra Theory, Cycle 16 2014
Title: *To Leak or Not to Leak: Where are the Missing X-ray Photons from Massive Star Clusters?*
3. PI, Hubble Archival, Cycle 21 2013
Title: *Simulating the Birth of Massive Star Clusters: Is Destruction Inevitable?*

TECHNICAL SKILLS

Computer Languages	C++, Fortran, IDL, Python, R, MPI
Simulation Codes	ORION2, GIZMO
Analysis Codes	<i>yt</i> , RADMC-3D, GLUE

ADVISING EXPERIENCE

Graduate Students:

- Grace Olivier (grad student at OSU), 2020*
Evolution of Stellar Feedback in H II Regions
- Michael Foley (grad student at Harvard), 2018-2019*
Bubbles around Intermediate and High-mass Stars due to Wind Feedback
- Hope Chen (grad student at Harvard), 2018-2019
Effects of an Embedded B-Star Wind in Ophiuchus

Undergraduate Students:

- Mikayla Wilson (physics & astronomy undergrad at TCU), Banneker Intern at Harvard 2020
Tracing the Evolution of Molecular Outflows in Massive Star Formation
- Monica Gallegos-Garcia (now astro grad at Northwestern), Banneker Intern at Harvard 2018-2020*
Winds in Star Clusters Drive Kolmogorov Turbulence
- Courtney Bishop (physics undergrad at College of William & Mary), SAO NSF REU program 2018
Comparing Molecular Line Tracers in Outflows Generated by Massive Star Formation
- Evan Carter (physics undergrad at UCSC, then astro masters student at Wesleyan), 2014-2016
Synthetic Observations of Low-Mass Star Formation: Implications for Current SED-Fitting Methods

High School Students:

- Shreya Karri 2019
Census of Stellar Feedback in the Milky Way

* Denotes students whose project or contribution led to or will soon lead to a refereed publication

SERVICE EXPERIENCE

- NASA JWST Cycle 1 Panelist 2021
- Member, Harvard Astronomy Diversity, Equity, and Inclusion (DEI) Committee 2021-Present
- Member, CfA Inclusion, Diversity, and Equity in Astronomy (CfA-IDEA) Committee 2020-2021
- Referee for A&A, ApJ, MNRAS, & RAA
- CfA Galaxies & Cosmology Seminar Organizer 2019-2021
- NASA Theory Astrophysics Program Panelist 1 year
- NASA Earth and Space Science Fellowship (NESSF) Reviewer 2019
- Organizer, Equity & Inclusion Journal Club, Harvard-Smithsonian CfA 2018-2019
- Proposal Reviewer for the Czech Science Foundation 2018
- ITC Post-doctoral Fellowship Committee Member, Harvard-Smithsonian CfA 1 year
- SOC/LOC Member for Harvard-Heidelberg Star Formation meeting, 2017, 2019 (Chair)
Harvard-Smithsonian CfA
- Organizer, Diverse Topics in Astronomy Lecture Series, Lamat REU Program, UCSC 2015, 2016
- Organizer, Space Telescope Proposal Writing Workshop, 2015
UCSC Astronomy & Astrophysics Department
- Member of the LAMAT Research Internship Admissions Committee 2014
- Undergraduate Student Mentor, UCSC Women in Physics Group 2013-2017
- Graduate Student Mentor, UCSC Astronomy & Astrophysics Department 2012-2013, 2016-2017
- Astronomy Graduate Student Representative, UCSC Graduate Student Association 2012-2013
- Organizer, Applying to the NSF GRFP Workshop, 2012-2016
UCSC Astronomy & Astrophysics Department

TEACHING EXPERIENCE

- Co-Instructor, Python Programming Bootcamp, Lamat Program, UCSC 2015
- Activity Designer/Facilitator, Institute for Science & Engineering Educators 2011
Professional Development Program (PDP), Hartnell College

Teaching Assistant, “Astronomy 2: Overview of the Universe”, UCSC 2010
Grader, “Astronomy C161: Relativistic Astrophysics & Cosmology”, UC Berkeley 2010
Undergraduate Student Instructor, “Astronomy C10: Introduction to Astronomy”, UC Berkeley 2009

PROFESSIONAL DEVELOPMENT

Diversity & Inclusion Certificate Program, UCSC Office for Diversity, Equity, and Inclusion 2017
Institute for Science & Engineering Educators, PDP for Inquiry-based Education, UCSC 2011
Astronomy 300: Instruction Techniques in General Astronomy (course), UC Berkeley 2009

REFEREED PUBLICATIONS (8 1ST-AUTHORED PUBLICATIONS)

1. “The Effects of Magnetic Fields and Outflow Feedback on the Shape and Evolution of the Density PDF in , Turbulent Star-Forming Clouds”
Appel, S.M., Burkhart, B., Semenov, V.A., Federrath, C., **Rosen, A.L.**, submitted to *The Astrophysical Journal*, [NASA ADS](#)
2. “ORION2: A magnetohydrodynamics code for star formation”
Li, P.S., Cunningham, A.J., Gaches, B.L., Klein, R.I., Krumholz, M.R., Lee, A.T., McKee, C.F., Offner, S.S.R., **Rosen, A.L.**, Skinner, M.A., submitted to *Journal of Open Source Software*
3. “Blowing Bubbles around Intermediate-Mass Stars: Feedback from Main-sequence Winds is not Enough”
Rosen, A.L., Offner, S.S.R., Foley, M.M., Lopez, L.A., submitted to *The Astrophysical Journal*, [NASA ADS](#)
4. “Dust in the Wind with Resonant Drag Instabilities: I. The Dynamics of Dust-Driven Outflows in GMCs and H II Regions”
Hopkins, P.F., **Rosen, A.L.**, Squire, J., Panopoulou, G.V., Soliman, N.H., Seligman, D., Steinwandel, U.P., submitted to *Monthly Notices of the Royal Astronomical Society*, [NASA ADS](#)
5. “Observations of the Ag(3x1) Phase on Ge(111)”
Mullet, C.H., **Rosen, A.L.**, Chiang, S.; *Journal of Vacuum Science & Technology A*, 39, Issue 5
6. “Evolution of Stellar Feedback in H II Regions”
Olivier, G.M., Lopez, L.A., **Rosen, A. L.**, Nayak, O., Reiter, M., Krumholz, M. R., Bolatto, A.D., *Astrophysical Journal*, 908, 68, [NASA ADS](#)
7. “Continuity of Accretion from Clumps to Class 0 High-Mass Protostars”
Avison, A., Fuller, G.A., N. Peretto, N., Duarte-Cabral, A., **Rosen, A.L.**, Traficante, A., Pineda, J.E., Güsten, R., & Cunningham, N., 2020, *Astronomy & Astrophysics*, 645, A142, [NASA ADS](#)
8. “Winds in Star Clusters Drive Kolmogorov Turbulence”
Gallegos-Garcia, M., Burkhart, B., **Rosen, A.L.**, Naiman, J.P., Ramirez-Ruiz, E., 2020, *Astrophysical Journal Letters*, 899, 30, [NASA ADS](#)
9. “The Role of Outflows, Radiation Pressure, and Magnetic Fields in Massive Star Formation”
Rosen, A. L., Krumholz, M. R., 2020, *Astronomical Journal*, 160, 78, [NASA ADS](#)
10. “Zooming in on Individual Star Formation: Low- and High-mass Stars”
Rosen, A.L., Offner, S.S.R., Sadavoy, S.I., Bhandare, A., Vázquez-Semadeni, Ginsburg, A., 2020, *Space Science Reviews*, 216, 62, [NASA ADS](#)
11. “Formation and Evolution of Disks Around Young Stellar Objects”
Zhao, B, Tomida, K, Hennebelle, P., Tobin, J.J., Maury, A., Hirota, T., Sánchez-Monge, Á., Kuiper, R., **Rosen, A.**, Bhandare, A., Padovani, M., Lee, Y., 2020, *Space Science Reviews*, 216, 43, [NASA ADS](#)
12. “Circumbinary Disks: Accretion and Torque as a Function of Mass Ratio and Disk”
Duffell, P.C., D’Orazio, D., Derdzinski, A., Haiman, Z., MacFayden, A., **Rosen, A.L.**, & Zrake, J., 2020, *Astrophysical Journal*, 901, 25, [NASA ADS](#)
13. “Massive Star Formation via the Collapse of Subvirial and Virialized Turbulent Massive Cores”
Rosen, A.L., Li, P.S., Zhang, Q., Burkhart, B., 2019, *Astrophysical Journal*, 887, 108, [NASA ADS](#)

14. “`unyt`: Handle, manipulate, and convert data with units in Python”
Goldbaum, N.J., ZuHone, J.A., Turk, M.J., Kowalik, K., & **Rosen, A.L.**, 2018, *Journal of Open Source Software*, 3, 28, 809; [NASA ADS](#)
15. “Hybrid Adaptive Ray-Moment Method (HARM²): A Highly Parallel Method for Radiation Hydrodynamics on Adaptive Grids”
Rosen, A. L., Krumholz, M. R., Oishi, J.S., Lee, A.T., & Klein, R.I., 2017, *Journal of Computational Physics*, 330, 924; [NASA ADS](#)
16. “An Unstable Truth: How Massive Stars get their Mass”
Rosen, A. L., Krumholz, M. R., McKee, C.F., & Klein, R.I., 2016, *Monthly Notices of the Royal Astronomical Society*, 463, 2553; [NASA ADS](#)
17. “Gone with the Wind: Where is the Missing Stellar Wind Energy from Massive Star Clusters?”
Rosen, A. L., Lopez, L.A., Krumholz, M. R., & Ramirez-Ruiz, E.; 2014, *Monthly Notices of the Royal Astronomical Society*, 442, 2701; [NASA ADS](#)
18. “What Sets the Initial Rotation Rates of Massive Stars?”
Rosen, A. L., Krumholz, M. R., & Ramirez-Ruiz, E.; 2012, *Astrophysical Journal*, 748, 97; [NASA ADS](#)

SELECTED SCIENTIFIC PRESENTATIONS

Given **31** invited talks and **31** contributed talks to date, including

1. Invited Colloquium; Center for Astrophysics — Harvard & Smithsonian; NSF REU Colloquium; Cambridge, MA *2021*
2. Invited Colloquium; Caltech Astronomy Colloquium; Pasadena, CA *2021*
3. Invited Colloquium; Royal Observatory of Edinburgh; Edinburgh, Scotland *2021* Boulder, CO
4. Invited Colloquium; Rice University Physics & Astronomy Colloquium; Houston, TX *2021*
5. Invited Colloquium; University of Chicago Astronomy & Astrophysics Colloquium; Chicago, IL *2021*
6. Invited Review, Radiation Hydrodynamics: Implementation and Application; Royal Astronomical Society; London, UK *2020*
7. Invited Review, International Space Science Institute (ISSI), Star Formation Workshop; Bern, Switzerland *2019*
8. Invited Colloquium, University of Florida Astronomy Department; Gainesville, FL *2018*
9. Invited Review, Stars Birth & Death: GMT Community Science Meeting; Honolulu, HI *2018*
10. Invited Colloquium, University of Massachusetts Amherst Astronomy Department; Amherst, MA *2017*

PUBLIC OUTREACH

- | | |
|--|---------------------|
| Science Matter Expert, NASA Community College Network (pilot program) | <i>2021-Present</i> |
| Panelist, “Meet a Scientist” Panel for Women’s History Month, Marin Community College | <i>2021</i> |
| Panelist, “Writing an Effective Proposal” presented to Harvard Graduate Students | <i>2020</i> |
| Interviewee, “How to Make Stars on a (super)Computer,”
Astrochats Interview hosted by MicroObservatory, Link to YouTube video | <i>2020</i> |
| Speaker, “How to Make Massive Stars on a (super)Computer,”
Astronomy on Tap Boston Event | <i>2020</i> |
| Presenter, “Visualizing Numerical Simulations with <i>yt</i> ”
Center for Astrophysics Harvard & Smithsonian <i>Demofest</i> | <i>2019</i> |

Speaker, “How to Make Stars on a (super)Computer,”
 Women in Science and Engineering (WiSE) Science on Tap Event *2017*

Speaker, “An Unstable Truth: How Massive Stars get their Mass,”
 AAUW Monterey Peninsula Chapter Meeting *2017*

Speaker, “How to Write an Effective Abstract,” Lamat REU Program, UCSC *2016*

Organizer and Panelist, “Astronomy Grad Student and Post-doc Panel,”
 Lamat REU Program, UCSC *2016*

Speaker, “Then and Now: From North Hills Prep to a Ph.D. in Astrophysics,”
 North Hills Prep School *2016*

Astronomy Outreach Activity, Expanding Your Horizons Workshop for Young Girls,
 Hartnell College *2015*

Speaker, “How to Make Stars on a (super)Computer,” *2015*
 UCSC, Monterey Astronomy Club, Scotts Valley High School

Speaker, “Computational Astrophysics”, Stanford Pre-collegiate Summer Courses, Stanford *2015*

Speaker, “Star Formation and Stellar Feedback”, Lamat Research Experience *2015, 2016*
 for Undergraduates (REU) Program, UCSC

Speaker, “Reading Scientific Literature,” Lamat REU Program, UCSC *2015*

Graduate Student Panelist, Advancement Via Individual Determination (AVID) Program,
 Soquel High School *2015*

Women in Science & Engineering (WiSE) Astronomy Education Outreach Presentation,
 Seaside High School *2014*

Panelist, STEM Diversity Professional Development Workshop Series, UCSC *2014*

Author, www.astrobites.org, [Link to my articles](#) *2011-2013*

WiSE Education Outreach Presentation, Santa Cruz High School *2011*

Panelist, Girls Scouts “Girls Go Tech” Event, NASA Ames, Moffatt Field, CA *2011*