

# ANNA LORRAINE ROSEN

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

## EDUCATION

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**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

## AWARDS AND RESEARCH POSITIONS

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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

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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

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

## ADVISING EXPERIENCE

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### Graduate Students:

- 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, now Postdoc at UT Austin), 2018-2019\*  
*Effects of an Embedded B-Star Wind in Ophiuchus*

### Undergraduate Students:

- Mikayla Wilson, physics and astronomy undergrad at TCU, Banneker Intern at Harvard, *2020-present*  
*Tracing the Evolution of Molecular Outflows in Massive Star Formation*
- Monica Gallegos-Garcia (Banneker Intern at Harvard, now astro grad at Northwestern), 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 led to or will soon lead to a refereed publication

## SERVICE EXPERIENCE

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- CfA Inclusion, Diversity, and Equity in Astronomy (CfA-IDEA) Committee Member 2020-Present  
Referee for A&A, ApJ, MNRAS, & RAA
- CfA Galaxies & Cosmology Seminar Organizer 2019-Present
- 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

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- 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

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Diversity & Inclusion Certificate Program, UCSC Office for Diversity, Equity, and Inclusion	2017
Institute for Science & Engineering Educators, PDP for Inquiry-based Education, UCSC	2011

## REFEREED PUBLICATIONS (7 1<sup>ST</sup>-AUTHORED PUBLICATIONS)

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1. “Evolution of Stellar Feedback in H II Regions”  
Olivier, G.M., Lopez, **Rosen, A. L.**, Nayak, O., Reiter, M., Krumholz, M. R., Bolatto, A.D., submitted to *Astrophysical Journal*, [NASA ADS](#)
2. “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, submitted to *Astronomy & Astrophysics*
3. “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](#)
4. “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](#)
5. “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](#)
6. “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](#)
7. “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](#)
8. “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](#)
9. “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](#)
10. “Hybrid Adaptive Ray-Moment Method (HARM<sup>2</sup>): 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](#)
11. “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](#)
12. “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](#)
13. “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 (22 INVITED)

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Given **23** invited talks and **31** contributed talks to date, including

1. Invited Review, Radiation Hydrodynamics: Implementation and Application;  
Royal Astronomical Society; London, UK 2020
2. Invited Talk, Astronomy Seminar, Rutgers University Physics & Astronomy Department;  
Piscataway, NJ 2019
3. Invited Review, International Space Science Institute (ISSI),  
Star Formation Workshop; Bern, Switzerland 2019
4. Invited Talk, Gas Fueling of Galaxy Structures Across Cosmic Time, Astro 3D Workshop;  
Barossa Valley, South Australia 2018
5. Invited Colloquium, University of Florida Astronomy Department; Gainesville, FL 2018
6. Invited Review, Stars Birth & Death: GMT Community Science Meeting; Honolulu, HI 2018
7. Invited Talk, Astrophysical Shocks Meeting, AIP Potsdam; Potsdam, Germany 2018
8. Invited Talk, Astronomy Seminar, University of Connecticut; Storrs, CT 2017
9. Invited Colloquium, University of Massachusetts Amherst Astronomy Department;  
Amherst, MA 2017

## PUBLIC OUTREACH

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- Interviewee, “How to Make Stars on a (super)Computer,” 2020  
Astrochats Interview hosted by MicroObservatory, [Link to YouTube video](#)
- Speaker, “How to Make Massive Stars on a (super)Computer,”  
Astronomy on Tap Boston Event 2020
- Presenter, “Visualizing Numerical Simulations with *yt*”  
Center for Astrophysics | Harvard & Smithsonian *Demofest* 2019
- 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, 2014  
Seaside High School
- Panelist, STEM Diversity Professional Development Workshop Series, UCSC 2014
- Author, [www.astrobites.org](http://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