

**Emily M. Silich**  
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## **Education**

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### **California Institute of Technology (Caltech)**

Astrophysics, PhD (expected 2026)   Astrophysics, MS (2023)

*NSF Graduate Research Fellow*

2023 - 2026

*SAO Predoctoral Fellow*

2024 - 2025

*Wallace L. W. Sargent Graduate Fellow*

2021 - 2022

### **University of Iowa**

Astronomy, BS   Physics, BS   Mathematics, minor

2017 - 2021

*with University Honors, High Distinction, Honors in Astronomy, Phi Beta Kappa*

## **Research**

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### **Interests:**

Galaxy clusters (584), Intracluster medium (858), X-ray astronomy (1810), Hydrodynamical simulations (767), Sunyaev-Zeldovich effect (1654), Circumgalactic medium (1897)

### **Experience:**

#### **Graduate Research Assistant**

2021 - *pres.*

Division of Physics, Mathematics and Astronomy, Caltech

#### **Predoctoral Fellow**

2024 - 2025

Center for Astrophysics | Harvard & Smithsonian

#### **Undergraduate Research Assistant**

2017 - 2021

Department of Physics & Astronomy, University of Iowa

#### **Research Intern**

Summer 2020

X-ray Astrophysics Laboratory, NASA Goddard Space Flight Center

#### **Student Researcher**

Winter 2019

Canada-Norway Student Sounding Rocket Program (CaNoRock)

## **Peer-reviewed publications**

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1. **E.M. Silich**, J. Sayers, P.F. Hopkins, et al., “*Exploring a cosmic ray inverse-Compton origin to the SZ-to-X-ray pressure deficit in the cool core cluster ZwCl 3146*”, 2025, submitted to The Astrophysical Journal.
2. **E.M. Silich**, J. ZuHone, E. Bellomi, et al., “*X-ray emission signatures of galactic feedback in the hot circumgalactic medium: predictions from cosmological hydrodynamical simulations*”, 2025, accepted for publication in The Astrophysical Journal.
3. **E.M. Silich**, E. Bellomi, J. Sayers, et al., “*ICM-SHOX. Paper II: Galaxy cluster sample overview*”, 2024, Proc. of the mm Universe 2023 conference, EPJ Web of conferences, EDP Sciences.

4. **E.M. Silich**, E. Bellomi, J. Sayers, et al., “*ICM-SHOX. Paper I: Methodology overview and discovery of a gas-dark matter velocity decoupling in the MACS J0018.5+1626 merger*”, 2024, The Astrophysical Journal, 968, 74.
5. **E.M. Silich**, K. Jahoda, L. Angelini, et al., “*A Search for the 3.5 keV Line from the Milky Way’s Dark Matter Halo with HaloSat*”, 2021, The Astrophysical Journal, 916, 2.
6. **E.M. Silich**, P. Kaaret, A. Zajczyk, et al., “*Global X-Ray Properties of the Vela and Puppis A Supernova Remnants*”, 2020, The Astronomical Journal, 160, 1.
7. P.F. Hopkins, E. Quataert, S.B. Ponnada, & **E.M. Silich**, “*Cosmic Rays Masquerading as Hot CGM Gas: An Inverse-Compton Origin for Diffuse X-ray Emission in the Circumgalactic Medium*”, 2025, The Open Journal of Astrophysics, 8, 78.
8. A. Zajczyk, P. Kaaret, D. LaRocca, et al. (including **E.M. Silich**), “*On-ground calibration of the HaloSat science instrument*”, 2020, J. Astron. Telesc. Instrum. Syst. 6(4), 044005.
9. P. Kaaret, A. Zajczyk, D.M. LaRocca, et al. (including **E.M. Silich**), “*HaloSat - A CubeSat to Study the Hot Galactic Halo*”, 2019, The Astrophysical Journal, 884, 2.
10. P.F. Hopkins, E. Quataert, **E.M. Silich**, et al., “*Cosmic Rays Masquerading as Cool Cores: An Inverse-Compton Origin for Cool Core Cluster Emission*”, 2025, submitted to The Open Journal of Astrophysics.
11. S.B. Ponnada, P.F. Hopkins, Y.S. Lu, et al. (including **E.M. Silich**), “*Strong Evidence for Cosmic Ray-Supported  $\sim L_*$  Galaxy Halos via X-ray & tSZ Constraints*”, 2025, submitted to The Astrophysical Journal Letters.
12. B.J. Vaughan, J. Sayers, L. Spencer, et al. (including **E.M. Silich**), “*Measuring the Temperature of Extremely Hot Shock-Heated Gas in the Major Merger MACS J0717.5+3745 With Relativistic Corrections to the Sunyaev-Zel’dovich Effect*”, 2025, submitted to The Astrophysical Journal.

## Press Releases

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1. “*Dark Matter Flies Ahead of Normal Matter in Mega Galaxy Cluster Collision*”, Caltech PR, July 2024. Read [here](#).

## Teaching

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Ay 105: Optical Astronomy Instrumentation Lab	Graduate TA, Spring 2023
Ay 122c: High Energy Astronomical Measurements	Graduate TA, Winter 2023
Ay 127: Astrophysical Cosmology	Graduate TA, Fall 2022
PHYS 1611: Introductory Physics I	Undergraduate TA, Spring 2020
PHYS 1512: College Physics II	Undergraduate TA, Spring 2020

## Fellowships & Awards (selected)

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1. Smithsonian Astrophysical Observatory (SAO) Predoctoral Fellow	2024 - 2025
2. Garmire Scholar, France A Cordova Graduate Student Fund (Caltech)	2023
3. NSF Graduate Research Fellowship (GRFP)	2023 - 2026
4. Wallace L. W. Sargent Graduate Fellowship (Caltech)	2021 - 2022

5.	Chambliss Astronomy Achievement Student Awards - Honorable Mention	2021
6.	University of Iowa Dare to Discover	2021
7.	Barry Goldwater Scholar	2020
8.	James A. Van Allen Award (UI)	2020
9.	John Mather Nobel Scholar (NASA/GSFC)	2020
10.	Western Dubuque High School Young Accomplished Alumni	2020
11.	APS Division of Astrophysics (DAP) Travel Grant	2020
12.	Manuel Paul & Abraham Chinitz Liberal Arts & Sciences Scholarship (UI)	2019 - 2021
13.	Myrtle K. Maier Scholarship (UI)	2019 - 2020
14.	ICRU Academic Year Research Fellowship	2019 - 2020
15.	NASA Iowa Space Grant Consortium Research Fellowship	2018 - 2020
16.	Rhodes Dunlap Award for Excellence in the First/Second Year (UI)	2018 - 2020
17.	ICRU Academic Year Research Fellowship	2018 - 2019
18.	Charles A. Wert Summer Research Fund (UI)	2019
19.	UI Department of Physics & Astronomy Poster Prize	2018, 2019
20.	ICRU Summer Research Fellowship	2018
<i>+4 others</i>		

## Academic Presentations (selected)

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### Talks:

1. *Extragalactic Journal Club*, Michigan State University & University of Michigan, Virtual. October 2025.
2. *mm Universe*, Kavli Institute for Cosmological Physics, University of Chicago. Chicago, IL. June 2025.
3. *Observational Cosmology Seminar*, Caltech. Pasadena, CA. November 2024, October 2023, & February 2023.
4. *Astronomy Lunch Seminar*. University of Massachusetts. Amherst, MA. October 2024.
5. *Galaxy Clusters & Radio Relics II*. Center for Astrophysics | Harvard & Smithsonian. Cambridge, MA. September 2024.
6. *Multiphase Madness: Resolving the CGM in Theory and Observations*. Center for Astrophysics | Harvard & Smithsonian. Cambridge, MA. August 2024.
7. *7<sup>th</sup> ICM Theory & Computation Workshop*. Ann Arbor, MI. June 2024.
8. *Galaxy Cluster Discussion Group Meeting*, Center for Astrophysics | Harvard & Smithsonian. Cambridge, MA. February 2024 & November 2022.
9. *High Energy Astrophysics Seminar*, Center for Astrophysics | Harvard & Smithsonian. Cambridge, MA. February 2024.
10. *Merging Cluster Workshop*, Yonsei University. Seoul, KR. December 2023.
11. *Observing the Universe at Millimetre Wavelengths (mm Universe)*, Laboratory of Subatomic Physics & Cosmology (LPSC). Grenoble, FR. June 2023.
12. *240th American Astronomical Society (AAS) Meeting*, Pasadena, CA. June 2022.

13. *Department of Physics & Astronomy Colloquium*, University of Iowa. Virtual. April 2021 & October 2020.
14. *Conference for Undergraduate Women in Physical Sciences*, University of Nebraska. Lincoln, NE. November 2019.
15. *Astrophysics & Space Physics Seminar*, University of Iowa. Iowa City, IA. October 2019.  
+5 others

### **Posters:**

1. *STScI Galaxy Clusters 2022: Challenging Our Cosmological Perspectives*, Virtual. April 2022.
2. *237th American Astronomical Society (AAS) Meeting*, Virtual. January 2021.
3. *American Physical Society (APS) April Meeting*, Virtual. April 2020.
4. *APS CUWiP*, University of Minnesota. Minneapolis, MN. January 2020.
5. *Conference for Undergraduate Women in Physical Sciences*, University of Nebraska. Lincoln, NE. October 2018.

+3 others

## **Observing**

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### **Awarded PI telescope proposals:**

1. “*Revealing the nature of the putative equatorial shock in the MACS J0018.5+1626 galaxy cluster merger with ALMA*”, 31 hrs, *ALMA* Cycle 12, ranked Priority C.
2. “*Separating dark matter and hot gas velocities in a unique merging cluster: first comparison of X-rays and the kSZ effect*”, 300 ks, *XRISM* AO-1, ranked Priority C.

### **Observing time:**

1. Keck Observatory, *DEIMOS*: 7.5 nights
2. Keck Observatory, *LRIS*: 4 nights

## **Mentoring**

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|--|-------------|
| 3 high school students from Gabrielino High School<br><i>Visualization of galaxy cluster merger simulations with volume rendering techniques</i> | Summer 2025 |
| 3 high school students from Gabrielino High School<br><i>Visualization of galaxy cluster merger simulations with volume rendering techniques</i> | Summer 2024 |
| 2 high school students from Gabrielino High School<br><i>Data reduction of cluster-member optical spectroscopy from Keck/DEIMOS</i>              | Summer 2023 |

## **Public Outreach**

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### **Lectures & speaking engagements:**

1. Astronomy on Tap – Death Valley, “*Galaxy Clusters Collide: The Most Energetic Events since the Big Bang*”, DVNP, CA. February 2025.

2. Caltech Stargazing Lectures, “*Galaxy Clusters Collide: The Most Energetic Events since the Big Bang*”, Pasadena, CA. August 2023. Watch here.
3. Death Valley Dark Sky Festival, “*Ask an Astrophysicist*” Q&A panelist, DVNP, CA. March 2023.

### **Science writing (and “Science writing”):**

1. Altadena Poetry Review (digital anthology), “*Asymmetry*”. 2025. Read here.
2. Telegraph Herald, “*Cuts in federal funding for science would have long-term impacts*”. 2025.
3. Altadena Poetry Review (print anthology), “*Illustrations of Astrograd School*”. 2024. Nominated for the Pushcart Prize in Poetry.
4. Altadena Poetry Review (print anthology), “*An Experiment in Poetic Physics*”. 2024.
5. Astrobites, “*A Search for Dark Matter with HaloSat*”, 2021. Read here

### **Volunteering:**

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| 1. Astronomy on Tap – Los Angeles                 | Telescope operator, 2022 - <i>pres.</i>      |
| 2. Caltech Stargazing Lectures & Public Observing | Telescope operator, 2022 - <i>pres.</i>      |
| 3. Gabrielino High School physics classrooms      | Lab assistant & speaker, 2021 - <i>pres.</i> |
| 4. Death Valley Dark Sky Festival                 | Telescope operator, 2022 - <i>pres.</i>      |
| 5. Scouting America Troop 0175 (Epworth, IA)      | Guest speaker, 2025                          |
| 6. Girl Scouts Troop 6371 (Monrovia, CA)          | Guest speaker, 2023                          |
| 7. Iowa Center for Research by Undergraduates     | Research ambassador, 2020 - 2021             |
| 8. Society of Physics Students, UIowa             | Vice president & secretary, 2017 - 2021      |
| 9. Van Allen Observatory Public Observing         | Telescope operator, 2017 - 2021              |
| 10. Drexler Middle School FIRST Lego League       | Team mentor, 2018                            |