JENNIE PAINE

(571) 247-4351 ⋄ jennie.paine@colorado.edu
jenniepaine.github.io

EDUCATION

University of Colorado, Boulder, CO
M.S., Astrophysics — Dec. 2018
Ph.D. Candidate, Astrophysics — 2018 - present

Virginia Tech, Blacksburg, VA
B.S., *summa cum laude*, Physics — May 2016
Minors: Astronomy and Mathematics
GPA: 3.92/4.00

AWARDS AND HONORS

- NSF Graduate Research Fellowship — 2018 - present
- High Pass distinction on Master's Exam, CU Boulder — Sept. 2018
- Chambliss Astronomy Achievement honorable mention, AAS — June 2018
- Ray Mace Smith Graduate Fellow, CU Boulder — May 2018
- Sigma Xi Honor Society — May 2018
- Sigma Pi Sigma Physics Honor Society — April 2015
- Robert C. Richardson, Virginia Tech Physics — April 2015
- Wan-Zia Scholarship, Virgina Tech Physics — April 2014
- Frank Leigh Robeson Scholarship, Virginia Tech Physics — April 2013
- Dean's List, Virginia Tech — all semesters

RESEARCH EXPERIENCE

Graduate Research, University of Colorado — Jan. 2017 - Present
Advisor: Prof. Jeremy Darling

- Currently studying the **kinematics of stellar masers as probes of gravity in the Galactic Center**. Calculating 3D velocities and accelerations of masers using VLA and ALMA observations spanning more than two decades.
- Proposed to measure **secular extragalactic parallax using Gaia proper motions** with the aim of finding a new constraint on the Hubble constant, for which I was awarded the NSF GRFP. Made the first limit of the secular extragalactic parallax signal and developed methods to improve the measurement using future observations from Gaia.
- Real-time cosmology using extragalactic proper motions from *Gaia*. **Created a catalog of over 500,000 active galactic nuclei in the first Gaia data release and simulated measurements of proper motion signals** including the Galactocentric acceleration, anisotropic cosmic expansion, and primordial gravitational waves.

NSF REU, Harvard-Smithsonian Center for Astrophysics — June - Aug. 2015
Advisors: Dr. Georgiana Ogrean, Dr. Paul Nulsen

- Investigated the influence of uncertainties in X-ray background subtraction on thermodynamic properties of galaxy cluster outskirts using Chandra ACIS data. Continued the research project for credit at Virgina Tech during Fall 2015 and Spring 2016.

Undergraduate Research, Virginia Tech Jan. 2014 - May 2016
Advisors: Prof. Duncan Farrah, Dr. Sara Petty,

- Continuation of REU project characterizing systematic uncertainties in X-ray background subtraction using larger set of observations.
- Reduction and analysis of Herschel-PACS photometry data for high redshift Hyperluminous Infrared Galaxies.
- Independent study research project studying multi-wavelength properties of galaxies in deep fields.

PUBLICATIONS

Refereed publications:

[1] *Secular Extragalactic Parallax: Measurement Methods and Predictions for Gaia.* **Paine, J.**, Darling, J., Graziani, R., & Courtois, H. 2020, ApJ, 890, 146

[2] *The Gaia-WISE Extragalactic Astrometric Catalog.* **Paine, J.**, Darling, J., & Truebenbach, A. 2018, ApJS, 236, 2

[3] *Astrometric Limits on the Stochastic Gravitational Wave Background.* Darling, J., Truebenbach, A., & **Paine, J.** 2018, ApJS, 861, 113

[4] *Extragalactic Proper Motions: Gravitational Waves and Cosmology.* Darling, J. Truebenbach, A., & **Paine, J.** 2018, refereed ngVLA Science Book chapter

[5] *The Geometry of the Infrared and X-Ray Obscurer in a Dusty Hyperluminous Quasar.* Farrah, D. et al. [including **Paine, J.**] 2016, ApJ, 831, 76

Non-refereed publications:

[1] *Extragalactic Proper Motions: Gravitational Waves and Cosmology.* Darling, J. Truebenbach, A., & **Paine, J.** 2019, Astro2020 Decadal Survey

TALKS AND PRESENTATIONS

- *Secular Extragalactic Parallax: Measurement Methods and Predictions for Gaia.* Poster presentation, AAS Winter 2020 Meeting
- *Applications of Gaia Extragalactic Proper Motions: Secular Parallax, Galactocentric Acceleration, and the Isotropy of Cosmic Expansion.* Comprehensive Exam talk, CU Boulder, 2018
- *Secular Extragalactic Parallax and Geometric Distances with Gaia Proper Motions.* Poster presentation, AAS Summer 2018 Meeting
- *Systematic Uncertainties in Characterizing Cluster Outskirts: The Case of Abell 133.* Poster presentation, AAS Winter 2016 Meeting
- *HST rest-frame optical characteristics of WISE-selected galaxies at z>1.7.* Poster presentation, AAS Winter 2015 Meeting

TEACHING AND ADVISING

Research Advising
Co-advised CU Boulder undergraduate student Gus Santaella Fall 2019

Instructor of Record, University of Colorado Summer 2020
Taught ASTR 1000, The Solar System. Developed class materials for remote instruction and designed a unit on scientific literacy for non-STEM majors.

ISEE Professional Development Program Mar. - July 2019
Several month-long program on inclusive education and professional development training.
Co-designed and taught an inquiry activity on buoyancy in nature for incoming freshmen at CU Boulder.

Teaching Assistant, University of Colorado Boulder Fall 2016
Instructed labs for Introductory Astronomy course.

Undergraduate Teaching Assistant, Virginia Tech Fall 2013 - Spring 2015
Instructed recitations for freshman level Introductory Astronomy course.

SERVICE AND OUTREACH

Service:

Graduate Admissions Committee member, CU Boulder Dec. 2019 - Feb. 2020
Graduate Curriculum and Concerns Committee member, CU Boulder Aug. 2017 - Aug. 2019
Faculty Hiring Committee memeber, CU Boulder Jan. - Mar. 2019
Comprehensive Exam Committee member, CU Boulder Aug. 2018 - May 2019

Outreach:

Taught unit on ancient astronomy to Gifted and Talented elementary students April 2019
Astronomy Day at Sommers-Bauch Observatory volunteer April 2019 Public Observing Host at Sommers-Bausch Observatory 2016 - Present
Organized "sidewalk astronomy" observing events at Virginia Tech 2012 - 2015

Mentoring:

Graduate Peer Mentor, CU Boulder Aug. 2017 - May 2018
CU-STARs Administrator: mentored undergraduate students Aug. 2017 - May 2018

OBSERVING EXPERIENCE

Successful proposals:

3D Positions, Velocities, and Accelerations of SiO Masers in the Inner Parsec, Paine, J. & Darling, J., ALMA, Priority grade A, 0.9 hours, **Principal Investigator**

Co-I on one other successful ALMA proposal, one VLA proposal, and one GBT proposal.