

# JENNIE PAINE

(571) 247-4351  $\diamond$  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, Virginia 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 Ogrian, 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 Virginia Tech during Fall 2015 and Spring 2016.

- 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. 2019, under review with ApJ
- [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 Obscured 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

### 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**  
Instructed recitations for freshman level Introductory Astronomy course.

Fall 2013 - Spring 2015

## SERVICE AND OUTREACH

---

### Service:

Graduate Admissions Committee member, CU Boulder	Dec. 2019 - present
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
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.