

# Moira Andrews

Email: andrew87@purdue.edu

LinkedIn: moira-andrews

## EDUCATION

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### Purdue University

Bachelor of Science, Physics Honors

Minor: Astronomy

College of Science | Honors College

May 2022

GPA: 3.81/4.00

## RESEARCH AND WORK EXPERIENCE

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### Department of Physics & Astronomy, Purdue University

West Lafayette, IN

Research Assistant, Advisors: *Kyoung-Soo Lee and Maria Celeste Artale* [30 hr/week]

May 2022 – Present

- Computational analysis of protocluster merger trees using IllustrisTNG to constrain galaxy evolution
- Analyzed SUBLINK merger trees to study the evolution of LAEs in the most massive clusters identified at redshift 0
- Participated in 3 full observing runs as a member of the One-hundred-square-degree DECam Imaging in Narrowbands (ODIN) Collaboration
- Results to be presented to the community at the upcoming 241st AAS meeting in Seattle January 2023

### Department of Physics & Astronomy, Purdue University

West Lafayette, IN

Research Assistant, Advisor: *Dan Milisavljevic* [30 hr/week]

August 2022 – Present

- Analyzed and processed James Webb Space Telescope MIRI observations of supernova remnant Cassiopeia A
- Used JWST Jdavis and JDAT Notebooks to process MIRI MRS spectral cubes
- Wrote Jupyter Notebooks to perform continuum subtraction, cross channel extraction, and identified and measured emission lines

### Alignment of the central galaxies with the environment in simulations

Córdoba, Argentina

PI: *Facundo Rodriguez, Manuel Merchán* [5 hr/week]

June 2022 – Present

Affiliation: *Universidad Nacional de Córdoba (UNC). Observatorio Astronómico de Córdoba (OAC)*

- Calculated shape and angular momentum tensors for stellar and dark matter particles in IllustrisTNG
- Created tables of galaxy and particle data including the stellar mas, position, and computed galaxy formation time
- Coauthor on paper to be submitted to MNRAS December 2022

### Center for Astrophysics | Harvard and Smithsonian

Cambridge, MA

NSF REU Intern, Advisor: *Rainer Weinberger* [40 hr/week]

June 2021– August 2021

- Computational analysis using python of IllustrisTNG high redshift ( $z = 2$ ) quiescent galaxies, investigating the effect of mergers on galaxy quenching using stellar kinematics
- Aided in running weekly colloquiums and collaborating with other interns including ethics training
- Presented results at the public end of summer symposium

### Department of Physics & Astronomy, Purdue University

West Lafayette, IN

Undergraduate Research Assistant, Advisor: *Dan Milisavljevic* [10 hr/week]

February 2020 – Present

- Developed photometric subtraction method for data augmentation of supernova light curves
- Conducted aperture photometry of observations obtained with robotic telescope networks

### Collin's Aerospace

Windsor Locks, CT

Electrical & Electronic Engineering Intern, Manager: *Darren Woodman* [40 hr/week]

June 2020 – July 2020

- Student Engineering Project Program (SEPP): Data Caching, Archiving, and Transmission of High-Fidelity Data in the Event of Failure/Anomaly
- Studied radiation effects on devices in space environments, Identified radiation hardened flash memory devices and performed a trade study, Collaborated in the creation of state diagrams and VHDL designs to test the device for data failure.

### Optogration Inc.

Wilmington MA

Engineering Consultant, Manager: *Bill Clark* [12 hr/week]

July 2019 – January 2020

- Created a LabVIEW program to congregate IV, CV, and Responsivity tests of diodes using Keithley and Agilent instruments
- Integrated use of Teledyne Dalsa’s iNspec Express software for analysis and inspection of AP 200 microchips

## PUBLICATIONS

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1. Milisavljevic, et al., further authors incl. **Andrews** (2023), “*The JWST Survey of Supernova Remnant Cassiopeia: New Insights into its Progenitor System, Explosion Dynamics, and Dusk Formation*” [in prep to be submitted Jan 2023]
2. **Andrews**, Artale, et al. (2023), “*High-redshift protoclusters and their connection with Lyman- $\alpha$  emitters*” [in prep to be submitted Jan 2023]
3. Rodriguez, Merchán, et al., further authors incl. **Andrews** (2022), MNRAS, “*Alignment of the central galaxies with the environment in simulations*” [in prep to be submitted Dec 2022]
4. Weil, Milisavljevic, Rupert, **Andrews**, et al. (2021), Transient Name Server AstroNote, 182, “*REFITT classification of SN 2021nxx (ZTF21abcpjy)*”
5. Weil, Milisavljevic, **Andrews**, et al. (2021), Transient Name Server AstroNote, 30, “*REFITT classifications of optical transients using SOAR*”
6. Weil, Subrayan, Milisavljevic, **Andrews**, et al. (2020), Transient Name Server AstroNote, 266, “*REFITT Discovery and Classification of SN 2020zct (ZTF20acezhcf) using SOAR*”
7. Weil, Milisavljevic, **Andrews**, et al. (2020), Transient Name Server AstroNote, 243, “*REFITT classifications of optical transients using SOAR*”
8. Weil, Milisavljevic, **Andrews**, et al. (2020), Transient Name Server AstroNote, 242, “*REFITT classifications of optical transients using SOAR*”
9. Weil, Milisavljevic, **Andrews**, et al. (2020), Transient Name Server AstroNote, 232, “*REFITT classifications of optical transients using SOAR*”
10. Weil, Milisavljevic, **Andrews**, et al. (2020), Transient Name Server AstroNote, 227, “*REFITT Discovery and Classification of SN 2020zct (ZTF20acezhcf) using SOAR*”
11. Weil, Milisavljevic, **Andrews**, et al. (2020), Transient Name Server AstroNote, 225, “*REFITT classifications of optical transients using SOAR*”

## TALKS AND CONFERENCE PARTICIPATION

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### Poster Presentations:

- **241st American Astronomical Society Meeting**, Seattle, WA. “*ODIN: The cosmic history of Lyman Alpha Emitting galaxies in protoclusters in IllustrisTNG*”, January 2023

### Oral Presentations:

- **Purdue University: Special Seminar**, West Lafayette, IN. “*ODIN: The cosmic history of Lyman Alpha Emitting galaxies in protoclusters in IllustrisTNG*”, September 2022
- **Center for Astrophysics | Harvard & Smithsonian Research Experience for Undergraduates Symposium**, Cambridge, MA. [Remote] “*The Effects of Mergers on Stellar Kinematics of High-Redshift TNG Galaxies*”, August 2021
- **Flash Talk in Physics Presented by Purdue Women in Physics**, West Lafayette, IN. [Remote] “*The Importance of Data Augmentation: How All-Sky Surveys Can be Leveraged in Supernova Research*”, March 2021
- **Collins Aerospace Summer Engineering Project Program (SEPP) Fair**, Cedar Rapids, IA. [Remote] “*Data Caching, Archiving, and Transmission of High Fidelity Data in the Event of Failure/Anomaly*”, July 2020

### Attendance:

- **Spoken-WERRD 2022 Symposium**, [Remote], November 2022
- **Conference for Undergraduate Women in Physics at Western Michigan**, Kalamazoo, MI. [Remote], January 2020

## AWARDS AND HONORS

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- Roy and Sarah Johnson Purdue Bands and Orchestras Scholarship — \$2,000 August 2021
- Lijuan Wang Memorial Award — \$1,000 January 2021
- Physics Undergraduate Scholarship — \$1,000 August 2020
- Purdue University Dean's List Fall 2018 – Spring 2022
- Purdue University Semester Honors Fall 2018 – Spring 2022

## COMMUNITY INVOLVEMENT/OUTREACH

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**Locking Clocks in Strong Gravity**, *Galileo Unbound*, May 16, 2021  
<https://galileo-unbound.blog/2021/05/16/locking-clocks-in-strong-gravity/>

- Coauthored blog post with Prof. David D. Nolte on his public blog: *Galileo Unbound*
- Based off my final project for my upper division undergraduate mechanics course
- Investigated how harmonic oscillators will synchronize in general relativistic environments
- Found that the synchronization Kuramoto Transition would become novel phenomena of a "synchronization cascade"

**McCarthy Middle School STEM Fair** January, 2020

- Ran an astronomy booth with at local middle school
- Described images of planetary nebulae, supernova remnants, galaxies, and other objects taken by a local amateur astronomer
- Taught students about astronomical phenomena and observational techniques

## SKILLS

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- **Programming** – *General*: Python 2/3, L<sup>A</sup>T<sub>E</sub>X, Google Sheets/Docs, Microsoft Office  
*Astronomy Specific*: Astropy, James Webb Space Telescope Data Analysis Tool (JDAT), JWST visualization tools (Jdavis), IRAF, PyRAF, SAOImage DS9, IllustrisTNG simulation suite

## LEADERSHIP & ORGANIZATIONS

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**Women in Physics**, Purdue University August 2019 – May 2022  
*Leadership Team (August 2019 – April 2020)*

- Aided in restructuring and expanding the organization by introducing new activities and members
- Participates in club activities including the Research Blitz and social activities
- Promotes inclusivity and provides a safe space for female student body within the Department of Physics & Astronomy by coordinating with other Women in Physics members and faculty

**"All-American" Marching Band (AAMB)**, Purdue University August 2018 – May 2022  
*Tenor Saxophone Segment Leader (August 2021 – Present)*  
*Tenor Saxophone Assistant Segment Leader (August 2019 – March 2021)*

- Evaluated candidates during band camp to select membership for the AAMB saxophone section
- Taught marching fundamentals and instructed music sectionals during daily rehearsals
- Coordinated with faculty liaison and other student leaders to efficiently run rehearsals
- Organized section activities and extra practice time outside of rehearsal

## REFERENCES

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1. **Dan Milisavljevic**, *Assistant Professor of Physics and Astronomy* Purdue University
2. **Kyoung-Soo Lee**, *Associate Professor of Physics and Astronomy* Purdue University
3. **Maria Celeste Artale** *Department of Physics and Astronomy Research Associate* Purdue University
4. **David Nolte** *Edward M. Purcell Distinguished Professor of Physics* Purdue University
5. **Rainer Weinberger** *Canadian Institute for Theoretical Astrophysics Postdoctoral Fellow* University of Toronto