HELENA RICHIE

PROFILE

I am a senior undergraduate student at the University of Pittsburgh double majoring in Physics & Astronomy and Mathematics. My research interests include observational astronomy and exoplanet detection. I am the lead undergraduate of STEPUP, an observational astronomy group that conducts observations at the Allegheny Observatory to detect exoplanets.

CONTACT

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EDUCATION

University of Pittsburgh
Expected Graduation: April 2020
B.S. in Physics & Astronomy (Graduate School Prep Track, Honors Degree);
B.S. in Mathematics

RESEARCH

2018 - Present

Measuring the Cosmological Evolution of Heavy Elements in the Universe
Mentors: *Professor Sandhya Rao and Professor David Turnshek*
Our goal is to compile a database of existing measurements of the metallicities of absorption systems with large neutral hydrogen column density quasar spectra. With this, we will perform an analysis to determine if the calculated cosmic mean neutral-gas-phase metallicity of the Universe suffers from a systematic error due to observation of a biased sample of absorption-line systems.

2016 - Present

Survey of Transiting Extrasolar Planets at the University of Pittsburgh (STEPUP)
Position: *Lead Undergraduate*
Mentor: *Professor Michael Wood-Vasey*
Website: ***pitt.edu/~stepup/index.html***
STEPUP is an undergraduate research group lead by Helena Richie with the goal of confirming new exoplanets using transit photometry. STEPUP uses the 16" Keeler telescope at the Allegheny Observatory in Pittsburgh to conduct observations of exoplanet transits and processes/analyzes transit data with their custom pipeline, STEPUP Image Analysis, written by Helena Richie. Currently, STEPUP is focusing on contributing data to the Transiting Extrasolar Survey Satellite (TESS) collaboration as members of the TESS Follow-up Observing Program.

RESEARCH (CONT'D)

2016 - Present

STEPUP Image Analysis (SIA)
Mentors: *Professor Michael Wood-Vasey and Professor David Turnshek*
Project GitHub: ***https://github.com/helenarichie/STEPUP_image_analysis_II***
SIA is an image analysis pipeline that was developed in 2017 to extract light curves from STEPUP's photometric data using differential photometry. SIA has since been expanded for general use at the Allegheny Observatory. SIA functions in three main steps, which include instrumental signature removal, astrometric calibration, and differential aperture photometry to produce light curves and other data on the observed system. Example output files, a user manual, and more information can be found on SIA's GitHub.

PUBLICATIONS

2019

Disk Instabilities Caused the 2018 Outburst of AG Draconis (submitted)
Journal: The Journal of the American Association of Variable Star Observers (JAAVSO)
Authors: Helena M. Richie, W. M. Wood-Vasey, Lou Coban
arXiv: ***https://arxiv.org/abs/1912.01681***

PRESENTATIONS

2020

Conference for Undergraduate Women in Physics 2020
Talk; Carnegie Mellon University, PA
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis and Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"

2020

235th Meeting of the American Astronomical Society
Poster; Honolulu, HI
Authors: Helena M. Richie, W. M. Wood-Vasey, Lou Coban, Brandon Cane, Marissa DeFallo, Peter Dye, Maura Shapiro
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis and Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"

2019

The 2019 Quadrennial Physics Congress (PhysCon)
Poster; Providence, RI
Authors: Helena M. Richie, W. M. Wood-Vasey, Lou Coban, Brandon Cane, Marissa DeFallo, Peter Dye, Maura Shapiro
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis and Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"

2019

Duquesne 2019 Undergraduate Research Symposium
Poster; Duquesne University, PA
Authors: Helena M. Richie, Sandhya Rao, David Turnshek
"Measuring the Cosmological Evolution of Heavy Elements in the Universe"

2019

Emerging Researchers in Exoplanet Science V
Poster; Cornell University, NY
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis and Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"

PRESENTATIONS (CONT'D)

2019 ***Department of Physics & Astronomy Undergraduate Poster Session***
Poster; University of Pittsburgh, PA
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis and Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"

2018 ***Conference for Undergraduate Women in Physics 2019***
Poster; The College of New Jersey, NJ
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"

2018 ***Duquesne 2018 Undergraduate Research Symposium***
Poster; Duquesne University, PA
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: Extended Observation of 2018 Outburst of Symbiotic Binary AG Draconis"

2018 ***Emerging Researchers in Exoplanet Science IV***
Poster; The Pennsylvania State University, PA
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: Extended Observation of 2018 Outburst of Symbiotic Binary AG Draconis"

2017 ***American Association of Physics Teachers Northeast Meeting***
Poster; Syracuse University, NY
Authors: Helena M. Richie, W. M. Wood-Vasey
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis"

GRANTS AND AWARDS

2019 NASA Pennsylvania Space Grant Consortium Fall 2019 Award for Outstanding Undergraduate Research Poster

2019 NASA Pennsylvania Space Grant Consortium Summer 2019

2019 NASA Pennsylvania Space Grant Consortium Spring 2019

2018 NASA Pennsylvania Space Grant Consortium Summer 2018

2017 NASA Pennsylvania Space Grant Consortium Fall 2017

2017 AAPT Northeastern Meeting Outstanding Research Poster Award

EXTRA-CURRICULAR ACTIVIES

2016 - Present **Pitt Women's Volleyball Club**
Member
Fundraising Chair
Membership requires semesterly tryouts, attendance of two practices per week, and attendance of 3-5 tournaments a semester.
Selected to attend the National Collegiate Volleyball Federation national tournament in Kansas City, MO (2017), St. Louis, MO (2018), Denver, CO (2019), and Kansas City, MO (2020).

2016 - Present **Society of Physics Students**
Member
Membership consists of attending weekly meetings that consist of student networking events, giving oral research presentations, and participating in mentorship programs.
Selected to attend the Society of Physics Students 2016 Quadrennial Physics Congress (PhysCon) in San Francisco, CA
Selected to attend the Society of Physics Students 2019 Quadrennial Physics Congress (PhysCon) in Providence, RI

OUTREACH

2019 **Mentor for Pitt Society of Physics Students Mentoring sUpporting, and cOnnecting studeNts (MUON)**
Mentoring program that connects new students in Pitt's Physics & Astronomy Department with upperclassmen majors who are responsible for sharing information and advice about their experiences in physics, allowing them to more successfully navigate their undergraduate physics careers.

2018 **Adopt-A-Physicist**
Program through the AIP, APS, and AAPT where physics students and professionals are assigned to groups of high school students and use group forums to share information and answer questions about careers in physics.

2016 - Present **Norwin Senior High School's Science Alumni Day**
Yearly event where Norwin High School alumni return to give presentations to students interested in STEM about their studies and work/research in STEM fields.

SKILLS

Programming **Python**; **LaTeX**

Tools & Software **Git**; **Mathematica**