HELENA RICHIE

PROFILE

I am a fourth-year undergraduate student at the University of Pittsburgh double majoring in Physics & Astronomy and Mathematics. I have several years of experience in research in Pitt's Physics & Astronomy department. My research interests include observational astronomy and exoplanet detection.

CONTACT

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EDUCATION

2016 - Present

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

RESEARCH

2016 - Present

Survey of Transiting Extrasolar Planets at the University of Pittsburgh (STEPUP)
Position: *Lead Undergraduate*
Mentor: *Professor Michael Wood-Vasey*
STEPUP is an undergraduate research group lead by Helena Richie with the goal of discovering new exoplanets using transit photometry. STEPUP uses the 16" Keeler telescope based out of the Allegheny Observatory in Pittsburgh, PA 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 its efforts on contributing data to the Transiting Extrasolar Survey Satellite (TESS) collaboration as members of the TESS Follow-up Observing Program.

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 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 correction, plate-solving, and differential aperture photometry to give light curves and other data on the observed system. More info can be found on SIA's GitHub.

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 background quasars distributed throughout the universe. 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 observations of a biased sample of absorption-line systems.

PRESENTATIONS

2017 ***American Association of Physics Teachers Northeast Meeting***
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Image Analysis"
Poster; Syracuse University, NY

2018 ***Emerging Researchers in Exoplanet Science IV***
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: Extended Observation of 2018 Outburst of Symbiotic Binary AG Draconis"
Poster; The Pennsylvania State University, PA

2018 ***Duquesne 2018 Undergraduate Research Symposium***
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: Extended Observation of 2018 Outburst of Symbiotic Binary AG Draconis"
Poster; Duquesne University, PA

2019 ***Conference for Undergraduate Women in Physics 2019***
"The Survey of Transiting Extrasolar Planets at the University of Pittsburgh: STEPUP Contributions to NASA's Transiting Exoplanet Survey Satellite (TESS) Mission"
Poster; The College of New Jersey, NJ

2019 ***Department of Physics & Astronomy Undergraduate Poster Session***
"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"
Poster; University of Pittsburgh, PA

2019 ***Emerging Researchers in Exoplanet Science V***
"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"
Poster; Cornell University, NY

2019 ***Duquesne 2019 Undergraduate Research Symposium***
"Measuring the Cosmological Evolution of Heavy Elements in the Universe"
Poster; Duquesne University, PA

2019 ***The 2019 Quadrennial Physics Congress (PhysCon)***
"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"
Poster; Providence, RI

PRESENTATIONS (CONT'D)

2019 ***The 2019 Quadrennial Physics Congress (PhysCon)***
"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"
Poster; Providence, RI

2019 ***235th Meeting of the American Astronomical Society***
"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"
Poster; Honolulu, HI

PUBLICATIONS

2019 *The 2018 Dwarf Nova Outburst of AG Draconis (in prep)*
Journal: The Journal of the American Association of Variable Star Observers (JAAVSO)
Abstract: With an extensive observational history, symbiotic binary AG Draconis has relatively well-established outburst behavior. Usually, the system undergoes a 9-15~yr period of quiescence with a constant average energy emitted, during which the system's orbital period of ~550 d can be seen at shorter wavelengths (particularly in the U-band) as well as a shorter period of ~355 d (thought to be due to shell pulsations of the hot component). After a quiescent period, the marker of an active period is usually a major (cool) outburst of up to V=8.4 mag, followed by a series of minor (hot) outbursts repeating at a period of approximately 1 y. However, in 2016 April after a 9-year period of quiescence AG Dra exhibited unusual behavior: it began an active phase with a minor outburst followed by two more minor outbursts repeating at an interval of ~1 y. We present R-band observations of AG Dra's 2018 April minor outburst and an analysis of the outburst mechanism as well as reports on the system's activity levels following the time of its next expected outburst.
arXiv: coming soon

GRANTS AND AWARDS

2017 AAPT Northeastern Meeting Outstanding Research Poster Award

2017 NASA Pennsylvania Space Grant Consortium Fall 2017

2018 NASA Pennsylvania Space Grant Consortium Summer 2018

2018 NASA Pennsylvania Space Grant Consortium Summer 2018

2019 NASA Pennsylvania Space Grant Consortium Spring 2019

2019 NASA Pennsylvania Space Grant Consortium Summer 2019

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

EXTRA-CURRICULAR ACTIVIES

2016 - Present **Pitt Women's Volleyball Club**
Member
Fundraising Chair
Membership requires semesterly tryouts 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

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

2018 **Adopt-A-Physicist**
Program 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.

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.

PROGRAMMING LANGUAGES

Python