Aliaksandra (Sasha) Levina

alevina@haverford.edu,
(720) 496 - 3502

Research Interests

Gravitational waves, black holes, and neutron stars; my work has focused on modeling wind mass-transfer in binary evolution and the analysis of X-ray pulsar emission.

Education

Haverford College, Haverford, PA B.S. Expected May 2023
Major: Astrophysics
Concentration: Scientific Computing
GPA: 3.849/4.000, Major GPA: 3.870/4.000

Relevant Coursework

Computational Physics, Gravitational Waves, Observational Astronomy, Multi-Wavelength Astronomy, Extragalactic Data Science, Classical Mechanics, Electromagnetism, Statistical Mechanics, Quantum Mechanics, Waves and Optics, Quantum Physics Laboratory, Differential Equations, Linear Algebra, Multivariable Calculus

Research Experience

Modeling Wind Roche-Lobe Overflow in Binary Evolution June 2022 - Present
Northwestern University, Evanston, IL
CIERA REU
Advisors: Dr. Vicky Kalogera, Dr. Meng Sun, Dr. Zoheyr Doctor

- Implemented a new physical mechanism for wind mass-transfer into the stellar evolution simulation code MESA (Modules for Experiments in Stellar Astrophysics) and the detailed binary population synthesis code POSYDON (POpulation SYnthesis with Detailed binary-evolution simulatiONs)
- Simulated and analyzed binary system evolution using MESA
- Used the Quest High-Performance Computing Cluster to run population synthesis simulations using POSYDON
- The work will culminate in a senior thesis, and a paper to be submitted in early 2023

Analyzing Crab Pulsar X-ray Emission June 2020 - Present
Haverford College, Haverford, PA
Advisor: Dr. Andrea Lommen

- Developed code in Python and used a high-performance Linux computing cluster to analyze data and construct plots using observational data
- Developed a script that efficiently calculates pulse phases for pulsar timing data
- Contributed code to the NANOGrav pulsar timing analysis software PINT
- Used NICERSoft, HEASoft, and PINT to download and process data
- Used Bayesian statistics to fit models to observational data
- Utilized large quantities of pulsar timing data from NICER (Neutron star Interior Composition ExploreR)
- The work will culminate in a paper to be submitted by end of the Spring 2023 semester

Publications

In progress: Levina, S., Sun, M., Kalogera, V., Doctor, Z., Akira-Rocha, K., "Applying Wind Roche-Lobe Overflow in Binary Evolution Using MESA and POSYDON." AAS Journals.

Awards and Grants

NSF Research Experiences for Undergraduates 2022
Northwestern CIERA REU

Poster Presentations

"Applying Wind Roche-Lobe Overflow in Binary Evolution Using MESA and POSYDON"

- 241st Meeting of the American Astronomical Society, January 2023
- Summer research symposium, Haverford College, September 2022
- CIERA REU poster session, Northwestern University, August 2022

"Pulse-to-Pulse Intensity Modulation of the Crab Pulsar Using NICER"

- NANOGrav 2022 Fall Meeting, University of Wisconsin-Milwaukee, October 2022

"Pulse-to-Pulse Intensity Modulation of Three X-Ray Pulsars Using NICER Data"

- NANOGrav 2021 Fall Meeting, Vanderbilt University, October 2021
- Summer research symposium, Haverford College, September 2021
- 237th Meeting of the American Astronomical Society, January 2021
- NANOGrav 2020 Fall Meeting, October 2020
- Summer research symposium, Haverford College, September 2020

Skills

- Programming Languages: Python, Fortran, MatLab, HTML, CSS
- Operating systems: Windows OS, Linux
- Software: LaTeX, GitHub, Mathematica
- Other: High-Performance Computing Clusters

Professional Memberships

NANOGrav, Junior Member
American Astronomical Society
American Physical Society
Society of Physics Students and Sigma Pi Sigma Physics Honor Society