Polina Petrov

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Education

Vanderbilt University | Nashville, TN   Aug 2021 - Present
Ph.D. in Astrophysics; Advisor: Stephen R. Taylor

Carnegie Mellon University | Pittsburgh, PA   2021
B.S. in Physics, Astrophysics Concentration

Honors & Awards

Graduate

Vanderbilt Graduate School Travel Grant	2024
NASA FINESST Grant	2023 - Present
University Graduate Fellow, Russell G. Hamilton Scholar	2021 - Present

Undergraduate

Mellon College of Science Honors	2021
University Honors	2021
NSF Physics REU	2020

Publications

P. Petrov, S. R. Taylor, M. Charisi. C.P. Ma, "*Identifying Host Galaxies of Supermassive Black Hole Binaries Found by Pulsar Timing Arrays*", ApJ, 976, 129 (2024)

10.3847/1538-4357/ad7b14

P. Petrov, L. P. Singer, M. W. Coughlin, [and 7 others], "*Data-driven expectations for electro-magnetic counterpart searches based on LIGO/Virgo public alerts*", ApJ, 924, 54 (2022)

10.3847/1538-4357/ac366d

Research

Vanderbilt University, Dept of Physics and Astronomy   2021 - Present
Graduate Research, advised by Prof. Stephen R. Taylor

Simulating gravitational wave discoveries of individual supermassive black hole binaries in pulsar timing array data and estimating system parameters using MCMC methods. Developing a framework to quantify and rank host galaxies contained within the GW localization volume, thereby making electromagnetic follow-up more manageable and accelerating multi-messenger discoveries.

Carnegie Mellon University, Dept of Physics   2020 - 2021
Undergraduate Research Assistant to Prof. Tiziana DiMatteo

Compared the frequency-strain evolution of massive black hole binary (MBHB) mergers from the Illustris and IllustrisTNG simulations against the Laser Interferometer Space Antenna (LISA) sensitivity curve to determine the time span during which these systems are detectable. Investigated the effect that MBHB system parameters have on detection time span with LISA.

Global Relay of Observatories Watching Transients Happen (GROWTH)   2020 - 2021
Undergraduate research with Dr. Leo Singer and Prof. Michael Coughlin

Continued Summer 2020 research by simulating detection probabilities of electromagnetic counterparts to gravitational wave sources for future LIGO, Virgo, and KAGRA observing runs O4 and O5. Specifically focused on implications for electromagnetic follow-ups with the Zwicky Transient Facility (ZTF). Results published in ApJ (see previous section).

University of Minnesota, Dept of Physics and Astronomy Summer 2020
REU Internship, advised by Prof. Michael Coughlin

Optimized the search for electromagnetic observations of gravitational wave sources in collaboration with the GROWTH team. Used ZTF's scheduling software, kilonova light curve simulations, and gravitational wave localization sky maps to compare kilonova detection probabilities of binary neutron star mergers to that of neutron star-black hole mergers.

University of Pittsburgh, Dept of Physics and Astronomy Summer 2019
Undergraduate Research Assistant to Prof. Carles Badenes

Used sky survey catalogs to study stellar multiplicity statistics. Examined for red giant stars the relationship between maximum shifts in radial velocity and excess ultraviolet and optical radiation expected in the presence of a companion star. Compared survey data to broadband spectral energy distributions of APOGEE-2 sources fitted using the MIST models and Kurucz stellar atmosphere models.

Presentations

"Identifying Host Galaxies of Supermassive Black Hole Binaries Found by PTAs"

Oral presentation, The Era of Binary Supermassive Black Holes Meeting | Aspen, CO	Feb 2025
Oral presentation, Astronomy Dept Lunch Talk | University of California, Berkeley	Dec 2024
Oral presentation, IPTA Collaboration Meeting | Sexten, Italy	June 2024

"Optimizing Host Galaxy Identification of Individual Supermassive Black Hole Binaries"

Oral presentation, NANOGrav Spring Meeting | Zoom (virtual)	Mar 2024
Oral presentation, AAS January Meeting | New Orleans, LA	Jan 2024
Oral presentation, NANOGrav Fall Meeting | University of British Columbia	Oct 2023

"Mapping the Host Galaxies of Nanohertz Gravitational Wave Sources"

Oral presentation, IPTA Collaboration Meeting | Zoom (virtual)	June 2023
Oral presentation, APS April Meeting | Minneapolis, MN	Apr 2023
Oral presentation, NANOGrav Fall Meeting | University of Wisconsin-Milwaukee	Oct 2022
Poster presentation, GMT Meeting: Black Holes at All Scales | Sedona, AZ	Sept 2022
Oral presentation, VIPER Summer School on PTA GW Astrophysics | Nashville, TN	July 2022

Teaching

Graduate Teaching Assistant | Vanderbilt University

ASTR 1010L: Introductory Nighttime Astronomy Laboratory	2021 - 2023
ASTR 1020L: Introductory Daytime Astronomy Laboratory	Fall 2022

Mentoring & Outreach

NANOGrav Student Workshop Organizing Committee | Ann Arbor, MI	Oct 2024
VIPER Summer School tutorial leader | Vanderbilt University	July 2024
Research mentor to undergraduate student Celine Mang | Vanderbilt University	Spring 2024
Astronomy on Tap organizer | Nashville, TN	2023 - Present
2022 Physics Concepts mentor | Carnegie Mellon University	2018
Buhl Planetarium volunteer | Pittsburgh, PA	2016 - 2018

Professional & Academic Affiliations

NANOGrav Full Member	2024 - Present
NANOGrav Associate Member	2021 - 2024
Sigma Pi Sigma Honor Society	2021 - Present
American Astronomical Society (AAS)	2017 - Present
American Physical Society (APS)	2017 - Present