

Catherine Petretti

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RESEARCH INTERESTS

- Cosmic inflation theory for various inflationary models
- Forecast analysis for upcoming CMB missions to probe inflation
- The search for primordial gravitational waves in the CMB

EDUCATION

Harvard University Cambridge, MA
Ph.D. Student, Astronomy Aug 2022 – Present
Mentors: Dr. Xingang Chen

Villanova University Villanova, PA
B.S. Astronomy & Astrophysics Aug 2018 – May 2022
Minors: Physics, Mathematics, Classics
Summa Cum Laude – GPA: 3.97/4.0

HONORS AND AWARDS

Graduate Prize Fellowship, Harvard University	2022
Phi Beta Kappa Honor Society, Villanova University	2022
Jason A. Cardelli Memorial Award, Villanova University	2022
Edward F. Jenkins OSA Medallion, Villanova University	2022
Sigma Pi Sigma Physics Honor Society, Villanova University	2022
NEROC Symposium Award, Haystack Observatory	2022
Edward F. Jenkins, OSA Scholarship, Villanova University	2021
Barry Goldwater Scholarship	2021
National Hispanic Scholarship	2020
NSF REU, Haystack Observatory	2020
Undergraduate Research Fellowship, Villanova University	2019
Match Research Program, Villanova University	2019

RESEARCH EXPERIENCE

Searching for Inflation with LiteBIRD 2023 –
Advisor: Dr. Xingang Chen, Harvard University
Executed a forecast analysis of upcoming CMB measurements from Lite-BIRD to detect and distinguish between models of cosmic inflation.

Next Generation VLA Stellar Imaging 2021, 2023
Advisors: Dr. Kazunori Akiyama & Dr. Lynn D. Matthews,
Haystack Observatory
Generated synthetic observations of evolved stellar photospheres for the Next Generation VLA. Assessed performance for different revisions of the array configuration and different imaging methods.

Determining the Orbital Period of GRO J1655-040 2019 – 2023

Advisor: Dr. Joey Neilsen, Villanova University

Performed a lightcurve analysis from infrared data of the black hole X-ray binary GRO J1655–40 to determine the orbital period and search for a period derivative.

Analyzing Short-Term Variability in Cygnus X-1 2021

Advisor: Dr. Edward Guinan, Villanova University

Performed a lightcurve analysis from TESS data of the black hole X-ray binary Cygnus X-1 to analyze non-periodic brightness variations.

Observing Black Holes with the EHT 2020

Advisors: Dr. Vincent Fish & Dr. Kazunori Akiyama,
Haystack Observatory

Generated synthetic observations of the supermassive black hole M87* to demonstrate imaging benefits of adding space telescopes to the Event Horizon Telescope (EHT) array.

PUBLICATIONS

Petretti, C., & Guinan, E., 2021 *Analysis of High-Precision TESS Photometry of the Black-Hole X-Ray Binary Cygnus X-1: Evidence of Intrinsic Variability of the Luminous Blue Supergiant Component*, RNAAS, 5, 11 (2021), doi:[10.3847/2515-5172/ac3830](https://doi.org/10.3847/2515-5172/ac3830)

Petretti, C., Akiyama, K., & Matthews L. D., 2021 *Next Generation Very Large Array: Evaluation of the Revision D Array Configuration for Stellar Imaging*, ngVLA Memo No. 95, arXiv:[2110.01625](https://arxiv.org/abs/2110.01625)

PRESENTATIONS

Unlocking the Hidden Potential of the CMB: A Forecast Analysis for LiteBIRD Measurements to Distinguish between Inflationary Models Jun 2023

Tri-Institute Summer School on Elementary Particles. Perimeter Institute for Theoretical Physics. Poster.

Next Generation Very Large Array: Evaluation of the Revision D Array Configuration for Stellar Imaging Jun 2022

AAS 240th Meeting. Pascadena, CA. Poster.

Next Generation Very Large Array: Evaluation of the Revision D Array Configuration for Stellar Imaging Mar 2022

6th Annual NEROC Symposium. Haystack Observatory. Talk.

Next Generation Very Large Array: Evaluation of the Revision D Array Configuration for Stellar Imaging Nov 2021

Student Research Symposium. Villanova University. Poster

	Mapping a Black Hole Wind: Determining the Orbital Period and Wind Geometry in GRO J1655–40 President’s Advisory Council Meeting. Villanova University. Invited Talk.	Apr 2021
	Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI APS Conference for Undergraduate Women in Physics. Virtual. Talk.	Jan 2021
	Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI AAS 237th Meeting. Virtual. Talk.	Jan 2021
	Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI REU/UROP Research Symposium. Haystack Observatory. Talk.	Aug 2020
	Mapping a Black Hole Wind: Determining the Orbital Period and Wind Geometry in GRO J1655–40 Student Research Symposium. Villanova University. Poster.	Sep 2019
TEACHING EXPERIENCE	Teaching Assistant, Villanova University	Spring 2022
	MSE 2151: Astronomy Lab - Stars	
	Teaching Assistant, Villanova University	Spring 2021
	AST 2133-2134: Observational Lab II	
	Teaching Assistant, Villanova University	Fall 2020
	AST 2133: Observational Lab I	
	Teaching Assistant, Villanova University	Fall 2019
	PHY 1101: General Physics Lab	
LEADERSHIP AND OUTREACH	Student Editorial Board, <i>Veritas: Villanova Undergraduate Research Journal</i>	2021 – 2022
	Secretary, Villanova Astronomical Society	2020 – 2021
	Public Observatory Attendant, Villanova University	2018 – 2019