

Catherine Petretti

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

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

HONORS AND AWARDS

Special Teaching Recognition, Harvard University	2023
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

Testing Inflation with Future CMB Experiments 2023 – Present
Advisor: Dr. Xingang Chen, Harvard University
Performed an analysis for upcoming experiments of the CMB to determine if will be able to detect and distinguish between different cosmic inflation models.

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., Braglia, M., Chen, X., Hazra, D., & Paban, S. (2024) “Investigating the Origin of CMB Large-Scale Features Using LiteBIRD and CMB-S4.” arXiv:[2411.03459](https://arxiv.org/abs/2411.03459).

Petretti, C., Neilsen, J., & Homan, J. (2023) “Determining the Orbital Period and Wind Geometry in GRO J1655–40.” *The Astrophysical Journal*, 957, [44](#).

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.” *Research Notes of the AAS*, 5, [263](#).

Petretti, C., Akiyama, K., & Matthews L. D. (2021) “Next Generation Very Large Array: Evaluation of the Revision D Array Configuration for Stellar Imaging.” arXiv:[2110.01625](https://arxiv.org/abs/2110.01625).

PRESENTATIONS

Unlocking the Hidden Potential of the CMB: A Jun 2023

Forecast Analysis for LiteBIRD Measurements to Distinguish between Inflationary Models

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

Next Generation Very Large Array: Evaluation of the Jun 2022

Revision D Array Configuration for Stellar Imaging

AAS 240th Meeting. Pascadena, CA. Poster.

Next Generation Very Large Array: Evaluation of the Mar 2022

Revision D Array Configuration for Stellar Imaging
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 Apr 2021
President’s Advisory Council Meeting. Villanova University. Invited Talk.

Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI Jan 2021
APS Conference for Undergraduate Women in Physics. Virtual. Talk.

Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI Jan 2021
AAS 237th Meeting. Virtual. Talk.

Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI Aug 2020
REU/UROP Research Symposium. Haystack Observatory. Talk.

Mapping a Black Hole Wind: Determining the Orbital Period and Wind Geometry in GRO J1655–40 Sep 2019
Student Research Symposium. Villanova University. Poster.

TEACHING EXPERIENCE	Teaching Fellow, Harvard University, <i>AY 130: Cosmology</i>	Fall 2024
	Teaching Fellow, Harvard University, <i>AY 140: General Relativity</i>	Fall 2024
	Teaching Fellow, Harvard University, <i>AY 140: General Relativity</i>	Fall 2023
	Teaching Assistant, Villanova University, <i>MSE 2151: Astronomy Lab - Stars</i>	Spring 2022
	Teaching Assistant, Villanova University, <i>AST 2133-2134: Observational Lab II</i>	Spring 2021
	Teaching Assistant, Villanova University, <i>AST 2133: Observational Lab I</i>	Fall 2020
	Teaching Assistant, Villanova University, <i>PHY 1101: General Physics Lab</i>	Fall 2019
	LEADERSHIP AND OUTREACH	Student Editorial Board, <i>Veritas: Villanova Undergraduate Research Journal</i>

Secretary, Villanova Astronomical Society
Public Observatory Attendant, Villanova University

2020 – 2021
2018 – 2019