Catherine Petretti

Center for Astrophysics | Harvard & Smithsonian
60 Garden St, Cambridge, MA, 02138
Email: catherine.petretti@cfa.harvard.edu
Website: cpetretti.github.io

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

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
(Ongoing) Performing a forecast analysis to determine if upcoming CMB experiments can 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. "Investigating the Origin of CMB Large-Scale Features Using LiteBIRD and CMB-S4." (in preparation).

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.

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 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, Fall 2024
AY 130: Cosmology

Course Assistant, Harvard University, Fall 2024
AY 140: General Relativity

Teaching Fellow, Harvard University, Fall 2023
AY 140: General Relativity

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, *Veritas: Villanova Undergraduate Research Journal* 2021 – 2022

Secretary, Villanova Astronomical Society	2020 – 2021
Public Observatory Attendant, Villanova University	2018 – 2019