Nicole Wolff

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Undergraduate senior pursuing a degree in Astrophysics. My experience includes collaborating in various research groups, analyzing data with computational tools, scientific outreach, and tutoring. My research interests span exoplanet detection and characterization, radio astronomy, and technosignatures.

EDUCATION

Columbia University, New York, NY — Expected graduation: May 2024

B.S. in Astrophysics, 3.89 GPA

Relevant Coursework: Classical Mechanics, Electricity & Magnetism, Optical Systems & Networks, Radiative Processes, Quantum Mechanics, Exoplanets & Astrobiology, Observational Astronomy, Multivariable Calculus, Differential Equations, Linear Algebra, Data Structures in Java, Machine Learning

Illinois Mathematics & Science Academy, Aurora, IL — Graduation: May 2020

SCIENCE EXPERIENCE

American Museum of Natural History & Columbia University, New York, NY — September 2023 – Present

Senior Thesis

- Automating the data reduction pipeline for the Palomar Radial Velocity Instrument (PARVI), a near-infrared spectrograph designed for precision radial velocity measurements of low-mass stars
- Integrating a solar telescope with PARVI to enable long-term observations of the Sun and its activity in the near-infrared, ultimately enhancing the accuracy of radial velocity measurements of Sun-like stars
- Anticipating a written thesis in May 2024

University of Berkeley Radio Astronomy Lab, Berkeley, CA — June 2023 – Present

Breakthrough Listen REU Intern

- Working with both the Berkeley Axion Works laboratory and the Berkeley SETI Research Center to search for dark matter with radio spectra from the Green Bank Telescope
- Performing optimizations and statistical tests to improve sensitivity of the analysis
- Developing a codebase to efficiently search through different datasets and higher-frequency regimes
- Attended Breakthrough Discuss conference
- Paper in prep. (expected January 2024)
- Presentation at AAS, January 2024

Max Planck Institute for Astronomy, Heidelberg, Germany — July 2022 – September 2022

Summer Intern in the Atmospheric Physics of Exoplanets Group

- Coded a post-processing routine for atmospheric models of photochemical hazes on GJ 1214b, a sub-Neptune exoplanet, ultimately placing lower limits on the metallicity of the planet
- Collaborated with scientists studying James Webb Space Telescope atmospheric spectra to produce model transmission and emission spectra for an impending full phase curve observation

Planetarium of Modena F. Martino, Modena, Italy — May 2022 – June 2022

Astronomy Education and Outreach Volunteer

- Developed curriculum to teach elementary and middle school students light, and led an activity to build a homemade spectroscope
- Wrote and delivered two scientific lectures in Italian for the general public
- Operated a Zeiss ZKP2 digital projector to lead planetarium shows
- Received a leadership and outreach stipend through the Laidlaw Scholars Fund

Columbia University Department of Astronomy, New York, NY November 2020 – May 2022
High Energy Astrophysics Research Student
- Searched for X-Ray counterparts to Binary Black Hole mergers
- Analyzed NASA Swift Telescope data using Python, Unix, and HEASARC tools
- Received a summer research stipend through the Laidlaw Scholars Fund

Las Cumbres Observatory (LCO)**,** Remote June 2021 – July 2021
Science Intern in the Gravitational Microlensing Group
- Interned for the LCO Microlensing Group, which observes microlensing events to detect exoplanets
- Developed and implemented a Python broker for ASAS-SN (All-Sky Automated Survey for Supernovae) that redirects their microlensing candidates to the LCO database
- Collaborated with LCO software engineers using GitHub

Northwestern University Department of Physics, Evanston, IL June 2019 – September 2020
Physics Research Student for the Axion Resonant InterAction Detection Experiment
- Collaborated on an experimental search for the theoretical axion particle, intending to detect its coupling to nuclear matter
- Modeled different geometries and properties of a magnetic shield for the cryogenic experiment using COMSOL Multiphysics

Loyola University Medical Center, Maywood, IL September 2018 – May 2019
Microbiology Research Student
- Researched results of genetic modifications on *vibrio fischeri* bacteria in a microbiology lab

WORK EXPERIENCE

Math, Physics & Astronomy Tutor, Aurora, IL & New York, NY September 2018 – Present
Harlem Reading Team Math Elementary School Tutor
Illinois Math & Science Academy Peer Tutor
Paid Physics & Astronomy Tutor
- Tutored math to 2nd-5th grade through interactive activities & games with the Reading Team Math after-school program, virtually & in-person
- Tutored students from 7th-12th grade in Calculus, differential equations, introductory physics, chemistry, astronomy, and Spanish

Bareburger Restaurant, New York, NY September 2022 – December 2022
Bartender
- Memorized and prepared a variety of mixed drinks for bar and restaurant guests
- Managed and prioritized drink and food orders at the bar
- Attended to customer payments and resolved payment issues

SKILLS

Technology: Python (Astropy, Numpy, Scipy, Scikit-learn, Pandas), UNIX Shell Scripting & Automation, Java, HTML, CSS, GitHub, Zemax Optical Studio, Matlab, LaTeX, Microsoft Office
Languages: English (native), Spanish (advanced), Italian (intermediate), Russian (intermediate)

HONORS

Columbia University Laidlaw Scholar, 2021 Cohort