Samantha Lomuscio

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EDUCATION

University of Virginia — Charlottesville, VA
M.S. Physics — Expected: May 2023

New Jersey Institute of Technology, Albert Dorman Honors College — Newark, NJ
B.S. Applied Physics with concentration in Astronomy, Minor in Applied Mathematics, Magna Cum Laude — May 2020

Advanced Computing for Earth Sciences Summer School
NASA/University of Virginia Advanced Research Computing Services — Charlottesville, VA
Three-week long summer school focusing on the essentials of software engineering, machine learning, and high performance computing in the context of Earth Sciences — June 2018

RESEARCH EXPERIENCE

University of Virginia Department of Physics — Charlottesville, VA
Graduate Researcher under Dr. Kent Yagi — May 2021 – Present

- Analyze and refine a general, asymptotically flat parameterized-Kerr metric preserving Kerr symmetries
- Removed metric pathologies including divergences and singularities
- Test the parameterized metric's ability to recreate various beyond-GR theories including Braneworld, Bumblebee, Kerr-Sen, EdGB, dCS, Bardeen, and Kalb-Ramond
- Performed statistical analysis to quantify the parameterized metric's ability to recreate the beyond-GR metrics

University of Virginia Department of Astronomy/National Radio Astronomy Observatory — Charlottesville, VA
Graduate Researcher under Dr. Tim Bastian — August 2020 – May 2021

- Understand non-linearities in correlation between chemical composition of the solar corona and solar magnetic activity
- Produce full disk mosaic images of the Sun with a focus on data calibration and flagging using the Common Astronomy Software Applications (CASA) Python imaging processing routines
- Create and compare radio data maps from the Very Large Array (VLA) with ultraviolet maps from IRIS, and extreme ultraviolet maps from Hinode

American Museum of Natural History — New York, NY
NSF REU Student under Dr. Tim Paglione — May, 2019 – May, 2020

- Aimed to detect gamma-ray emissions from Jupiter to better understand extreme magnetic activity of young dwarf stars using all-sky gamma-ray photon data from the Fermi Gamma-ray Space Telescope Large Area Telescope
- Performed likelihood analyses on data to determine statistical significance of detected potential gamma-ray sources
- Developed Python routine to track any solar system object over a given time range in Fermitools
- Used tracking routine to create stacked gamma-ray photon counts maps centered on Jupiter over a 12 year period from Fermi LAT data to highlight potential gamma-ray sources originating from Jupiter
- Presented work at the 235th Meeting of the American Astronomical Society (link)

NASA Goddard Institute for Space Studies — New York, NY
Undergraduate Research Intern under Dr. Armando Howard — May, 2018 – August, 2018

- Participated in the Advanced Computing for Earth Sciences (ACES) summer coding bootcamp at the University of Virginia
- Assessed merits and deficiencies of the new GISS ocean Mesoscale mixing model through visualization and statistical analysis of it's temperature and salinity outputs
- Compared outputs to observations and the industry standard Gent-McWilliams isopycnal mixing model
- Selected as a finalist in the Goddard Space Flight Center Summer Intern Poster Session

- Presented work at the American Geophysical Union Fall Meeting 2019 (link)

Center for Solar Terrestrial Research Solar Radio Group at NJIT Newark, NJ

Undergraduate Research Intern under Dr. Bin Chen October, 2017 – June, 2020

- Studied solar flares and CMEs to locate the origin, in space and time, of accelerated particles in the solar atmosphere
- Reduced and analyzed solar radio data obtained by the VLA and extreme ultraviolet data obtained by NASA Solar Dynamics Observatory using Python (AstroPy, SciPy, SunPy) and CASA
- Produced flux density maps as a function of time and frequency, and full-disk and localized radio maps of the Sun using Matplotlib and CASA imaging software to ascertain the origin of particle acceleration

New Jersey Institute of Technology Physics Department Newark, NJ

Undergraduate Researcher under Dr. John Federici September, 2018 – January, 2019

- Investigated the effect of varied printing parameters on complex THz index of refraction of additively-manufactured plastics
- Utilized THz computed tomography procedures to evaluate the internal structure additively-manufactured parts nondestructively
- Tested 3D printed PLA and ABS hexagons with varied thickness, print orientation, mount orientation, layer height, nozzle size, and print speed

AWARDS & HONORS

Goldwater Scholar - *The Barry Goldwater Scholarship and Excellence in Education Foundation* 2019

Dr. Louis J. Lanzerotti and Dr. M. Yvonne De Wolf Lanzerotti Prize in Applied Physics - *NJIT Physics Department* May 2019

Outstanding Undergraduate Student Award - *NJIT College of Science and Liberal Arts* May 2019

Dean's Fund for Student Development Grant -*NJIT Albert Dorman Honor's College (ADHC)* 2019

Jerome Drexler Honors College Astrophysics/Physics/Chemistry Annual Scholarship -*NJIT ADHC* 2018 – 2020

SKILLS

Languages: Python, Git

Mathematical Computational Tools: Mathematica, MATLAB

Astronomical Packages: Common Astronomy Software Applications, Fermitools, AstroPy, SunPy

Soft Skills: Research, Statistical Modeling, Written and Verbal Communication, Critical Thinking, Problem Solving

Certifications: Deep Learning Specialization (Coursera)

TEACHING EXPERIENCE

- **University of Virginia**
  - *Head Teaching Assistant* Fall 2021 – Spring 2022
  - *Teaching Assistant* – Black Holes (ASTR 1290) Spring 2022
  - *Teaching Assistant* – Life Beyond the Earth (ASTR 3420) Spring 2022
  - *Teaching Assistant* – Introduction to the Sky and Solar System (ASTR 1210) Fall 2021
  - *Teaching Assistant* – Archaeo-Astronomy (ASTR 3410) Fall 2021
  - *Instructor of Record* – Introduction to Astrophysics II (ASTR 2120) Spring 2021
  - *Teaching Assistant* – Introduction to Astrophysics I (ASTR 2110) Fall 2020
- **New Jersey Institute of Technology** January 2018 – May 2020
  - *Teaching Assistant and Grader* – Physics II, Introductory Electromagnetism (PHYS 121)
  - *Teaching Assistant and Grader* – Physics I, Introductory Mechanics (PHYS 111)
  - *Teaching Assistant* – Calculus I (MATH 111), Precalculus (MATH 110)
  - *Mathematics Tutor* – Precalc., Calc. I, II, III, Differential Equations, Partial Differential Equations, Statistics

OUTREACH &s OTHER EXPERIENCE

UVA StatLab – *Graduate StatLab Associate* August 2021 – Present

Dark Skies Bright Kids – *Write-ups Team* September 2020 – Present

NJIT Astronomy Club – *Founding Events Chair* January 2018 – May 2020

United Astronomy Clubs of New Jersey January 2018 – May 2020

NJIT Chapter of the Society of Physics Students – *Events Coordinator* September 2017 – May 2020

NJIT Albert Dorman Honors College Honors Ambassador September 2017 – May 2020

PRESENTATIONS

add in APS Meeting for black hole project **Posters Presentations**

S. Lomuscio, M. Garcia, Y. R. Song, T. Paglione (2020). Gamma-rays from Jupiter. 235th Meeting of the American Astronomical Society, Honolulu, HI.

S. Lomuscio, A.M. Howard, V. Canuto, Y. Cheng, M. Dubovikov (2018). Assessing Ocean Mixing Parameterizations in the GISS Model E Ocean. American Geophysical Union Fall Meeting 2019, San Francisco, CA.

S. Lomuscio, A.M. Howard, V. Canuto, Y. Cheng, M. Dubovikov (2018). Assessing Ocean Mixing Parameterizations in the GISS Model E Ocean. Summer 2018 Goddard Space Flight Center Summer Intern Poster Session, Goddard Space Flight Center, Greenbelt, MD.

Conference/Public Talks

Gamma-rays from Jupiter. (17th Annual Physical Sciences REU Student Symposium, New York, NY)

Assessing Ocean Mixing Parameterizations in the GISS ModelE Ocean. (Summer 2018 NASA Goddard Institute for Space Studies Summer Internship Program Climate Science STEM Research Symposium, New York, NY)

Feasibility Study and Conceptual Design – Weston Hall Pedestrian Bridge. (April 2017 Dana Knox Research Showcase, New Jersey Institute of Technology, Newark, NJ)

ARTICLES

S. Lomuscio, "Getting Started with the Kruskal-Wallis Test", University of Virginia Library Research Data Services, Dec. 7 2021.

S. Lomuscio, "Logistic Regression Four Ways with Python", University of Virginia Library Research Data Services, Sept. 22 2022.