Tegan Thomas

4th Year Student, Washington University in St. Louis, St. Louis, MO
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RESEARCH INTERESTS

Computational Physics, High Energy Astrophysics, Gravitational Physics, Scientific Illustration/Visualization

EDUCATION

Washington University in St. Louis, St. Louis, Missouri — August 2021 — Present
Bachelor of Science: Computer Science & Astrophysics — Cumulative GPA: 3.67/4.00
In addition to my double major, I am part of the Beyond Boundaries program which focuses upon identifying and tackling interdisciplinary issues. I specifically have been exploring the relationship between academia/universities and the communities that they are in, with a focus on astronomy. I also have been exploring the use of art and scientific illustration for public outreach/education.

RESEARCH PROJECTS

Harvard-Smithsonian Center for Astrophysics — Cambridge, Massachusetts
NSBP/SAO EHT Scholars Summer Intern — June 2024 — Present
With Dr. Angelo Ricarte I am exploring how to detect near-maximally spinning black holes with next generation Event Horizon Telescope (ngEHT) observations. Specifically, I am utilizing the general relativistic magneto-hydrodynamics (GRMHD) code KHARMA, the general relativistic radiative transfer (GRRT) code IPOLE, and the VLBI data analysis code ehtim in order to simulate ngEHT observations and analyze unique characteristics that arise as black hole spin approaches the theoretical limit of 0.998.

Skills/Ideas Learned

- Understanding MHD concepts & implementations
- Computation with high performance GPUs
- Grounding theory in VLBI observations
- Scientific writing

University of Illinois, Urbana-Champaign — Urbana-Champaign, Illinois
Undergraduate Research Assistant — May 2023 — Present
I'm working on a project to explore modified theories of gravity within simulated images of black holes with Dr. Charles F. Gammie's computational astrophysics group as well as Dr. Nico Yunes' gravity theory group. Specifically, I modified the general relativistic radiative transfer (GRRT) code IPOLE to implement Einstein-dilaton Guass-Bonnet and dynamical Chern-Simons gravity.

Skills/Ideas Learned

- General Relativity & notation standards
- Radiative Transfer process
- Extensive debugging of pre-existing code
- Computation on CPU clusters

Washington University in St. Louis — St. Louis, Missouri
Undergraduate Research Assistant — August 2022 — Present
Working with Dr. Yajie Yuan, I created a procedure to make interactive 3D visualizations of the magnetic field lines around neutron stars. We hope to use this to help improve understanding of ejecta processes within the magnetosphere of neutron stars, in addition to being a general tool for physics education.

Skills/Ideas Learned

- Data processing & handling
- Navigating & understanding Python package source code
- 3D visualization in Python (with k3D package)
- Performing independent research & problem solving

ADDITIONAL WORK EXPERIENCE

Kopolow Business Library, Washington University in St. Louis — St. Louis, Missouri
Circulation Assistant — August 2021 — Present

- Assist patrons with library books, research databases, and other questions
- Keep library space up to standards especially as we can receive up to 250 patrons at a time
- Correctly shelf books and other library materials according to Library of Congress order
- Consistently collect data on space usage

CONTRIBUTED TALKS AND POSTERS

WashU Physics Research Symposium November 20, 2024; Washington University in St. Louis
Observational Properties of Near-Maximal Spin Black Holes with ngEHT *Poster Presentation*
Thomas, T. A., Ricarte, A., Prather, B. S., & Cho. H..

Society of Physics Students' Zone 12 Meeting March 30, 2024; Washington University in St. Louis
Exploring Modified Gravity Theories in Simulated Images of Supermassive Black Holes *Talk*
Thomas, T. A., Joshi, A., Majumdar, S., Dhruv, V., Xie, Y., Yunes, N., & Gammie, C. F..

Conference for Undergraduate Women in Physics January 20, 2024; Missouri S&T
Interactive 3D Visualizations of Simulated Neutron Star Magnetic Field Lines *Poster Presentation*
Thomas, T. A. & Yuan, Y..

American Astronomical Society Winter Meeting January 9, 2024; New Orleans, LA
Exploring Modified Gravity Theories in Simulated Images of Supermassive Black Holes *Poster Presentation*
Thomas, T. A., Joshi, A., Majumdar, S., Dhruv, V., Xie, Y., Yunes, N., & Gammie, C. F..

Illinois Summer Research Program Alliance Symposium July 26, 2023; University of Illinois, Urbana-Champaign
Exploring Modified Gravity Theories in Simulated Images of Supermassive Black Holes *Talk*
Thomas, T. A., Joshi, A., Majumdar, S., Dhruv, V., Xie, Y., Yunes, N., & Gammie, C. F..

LEADERSHIP AND SERVICE

WashU Physics Department Diversity, Equity, & Inclusion Committee St. Louis, Missouri
Undergraduate Representative August 2024 — Present

WashU Society of Physics Students St. Louis, Missouri
Public Relations Board Member December 2023 — Present

Starfish Cooperative/St. Louis Affordable Student Housing Inc. St. Louis, Missouri
Social Community Health Committee Leader December 2021 — Present

AWARDS

Dean's List St. Louis, Missouri
Students will be cited on the Dean's list if they achieve a GPA of 3.6 or higher for the semester. December 2021

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RELEVANT COURSEWORK

Computer Science Courses

- Introduction to Data Science
- Introduction to Parallel and Concurrent Programming
- AI and Society
- Data Structures & Algorithms

Astrophysics Courses

- Introduction to Computational Physics
- From Black Holes to the Big Bang (General Relativity)
- X-ray and Gamma-ray Astrophysics
- Astrostatistics

SKILLS

- **Programming:** C++, C, Python, Java, R
- **Software:** SAOImageDs9, LaTeX, Microsoft Excel, Microsoft Powerpoint
- **Soft Skills:** Attention to detail, Rigorous work ethic, Public Speaking