Eric Yu

https://aeric-underscore.github.io Champaign, Illinois, United States ericyu3@illinois.edu

Education

University of Illinois at Urbana-Champaign, Champaign, IL — August 2020-Present
B.S. in Physics and B.S. in Mathematics — Graduation: May 2024
- Minors: Computer Science
- GPA: 3.98/4.0

Presentations

3D Visualizations of Spinning, Tilted Black Holes with Gravitating Accretion Disks (UIUC URS 2023)

Research Experience

National Center for Supercomputing Applications — June 2023-Present
Professor Antonios Tsokaros
- **In progress: Developing** *COCAL* code that solves the initial value problem in numerical relativity for a rotating neutron-star surrounded by a self-gravitating gaseous disk for an upcoming paper.
- **In progress: Parallelizing** existing *COCAL* code that computes initial data for various astrophysical objects (rotating neutron stars, black holes with accretion disks) in full three dimensions.

Illinois Relativity Group — June 2021-Present
Professor Stuart L. Shapiro
- **Led a team of 5 undergraduates** to create 3D visualizations on supercomputers of neutron stars, black hole disks, and binary black holes using an internally developed and maintained VisIt CLI-based code.
- **In progress: Designing and implementing** a major update to the group's internal codebase that will allow for the visualization of a larger variety of astrophysical systems and features.
- **Developed a set of *Python*/*Bash*/*C++* scripts** that extract and visualize gravitational waveforms from numerical relativity simulation data.
- **Devised and implemented** a new and more intuitive rendering technique that visualizes gravitational wave data using a surface plot on the equatorial plane.
- **Co-developed a set of *Python* scripts** that can measure the proper circumference of black holes, neutron stars, and accretion disks in curved spacetime.
- **Visualizations featured** in 3 Phys. Rev. D articles and CASC 2023.
- **Applied for and received** undergraduate summer research support grant (RSG 2023).

Published Visualizations

M. Kotak, E. Yu, J. Huang, J. Zhou, M. Ruiz, A. Tsokaros, L. Sun, & S. L. Shapiro. "What happens when Black Holes collide?" CASC 2023 Brochure p14

A. Tsokaros, M. Ruiz, S. L. Shapiro, & V. Paschalidis. "Self-gravitating disks around rapidly spinning, tilted black holes: General relativistic simulations." 2022, Phys. Rev. D 106, 104010, arXiv:2209.04454

A. Tsokaros, M. Ruiz, S. L. Shaprio, & Kōji Uryū. "Magnetohydrodynamic simulations of self-consistent rotating neutron stars with mixed poloidal and toroidal magnetic fields." 2021, Phys. Rev. Lett. 128, 061101, arXiv:2111.00013

Grants/Awards

Office of Undergraduate Research Summer Research Support Grant — $1750 — March 2023
Ralph O. Simmons Undergraduate Research Scholarship — $3000 — May 2022
Lorella M. Jones Summer Research Award — $3000 — May 2021