Curriculum Vitae: Samuel John Dunham

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Department of Physics, Mathematics, and Astronomy
California Institute of Technology
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Research Experience

California Institute of Technology, Pasadena CA
Postdoctoral Scholar, 06/2024 - Present

- Theoretical development of 14-moment, resistive GRMHD

Vanderbilt University, Nashville TN
Research Assistant, 08/2016 - 05/2024

- Developing Fortran90 code to solve general relativistic hydrodynamics equations with Runge–Kutta discontinuous Galerkin methods for execution on leadership-class supercomputers
- Porting code to run on GPUs via OpenACC and OpenMP Offloading
- Coupling code to AMReX for MPI parallelism and adaptive mesh refinement

University of Michigan, Ann Arbor MI
Research Assistant, 06/2014 - 05/2016

- Analyzed data for multiple images of background sources due to strong gravitational lensing by galaxy clusters
- Found robust lens models for several galaxy clusters, from which was deduced the mass of the cluster core, the total magnification provided by the cluster, the location of the source, and its morphology

Education

Vanderbilt University, Nashville TN
Ph.D. Astrophysics, May 2024

Fisk University, Nashville TN
M.A. Physics, December 2018

University of Michigan, Ann Arbor MI
B.S. Astronomy and Astrophysics, May 2016
B.S. Interdisciplinary Physics with Astronomy, May 2016

- Graduated Magna Cum Laude

Washtenaw Community College, Ann Arbor MI
Associate's Degree in General Studies in Math and Natural Science, May 2013

Fellowships/Grants

- Earned McMinn summer research fellowship for outstanding students in the Department of Physics and Astronomy (May 2020)

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- Earned honors grant for poster presentation at American Astronomical Society (AAS) conference (January 2016)

Training/Development

Michigan State University, East Lansing MI
Binary Neutron Star Merger Summer School, 05/16/2018 – 05/18/2018

Vanderbilt University, Nashville TN
Statistics Workshop for Astronomers, 05/05/2017 – 05/11/2017

Publications

Samuel J. Dunham et al., "thornado-Hydro: A Discontinuous Galerkin Hydrodynamics Solver for Core-Collapse Supernova Simulations using the Extended Conformally-Flat Condition", (2024) (in prep.)

Samuel J. Dunham et al., "A Parametric Study of the SASI Comparing General Relativistic and Nonrelativistic Treatments", (2024) ApJ, **964**:38

David Pochik et al., "thornado-hydro: A Discontinuous Galerkin Method for Supernova Hydrodynamics with Nuclear Equations of State", (2021) ApJ, **253**:21

Samuel J. Dunham et al., "A discontinuous Galerkin method for general relativistic hydrodynamics in thornado", (2020) J. Phys.: Conf. Ser. **1623**:012012

Eirik Endeve et al., "thornado-hydro: towards discontinuous Galerkin methods for supernova hydrodynamics", (2019) J. Phys.: Conf. Ser. **1225**:012014

Samuel J. Dunham et al., "Lens Model and Source Reconstruction Reveal the Morphology and Star Formation Distribution in the Cool Spiral LIRG SDSS J1438+1454", (2019) ApJ, **875**:18

Presentations

"thornado-Hydro (xCFC)", AAS 243, January 2024, oral (dissertation talk)

"A Parametric Study of the SASI Comparing General Relativistic and Non-Relativistic Treatments", MICRA 2023, oral

"A Discontinuous Galerkin Method for General Relativistic Hydrodynamics in `thornado`", AstroNum 2019, oral

"A Discontinuous Galerkin Method for General Relativistic Hydrodynamics in `thornado`", APS April 2019, oral

"A Discontinuous Galerkin Method for General Relativistic Hydrodynamics", APS April 2018, poster

"Strong Lens Models for 10 Galaxy Clusters from the Sloan Giant Arcs Survey", AAS January 2016, poster

Outreach

- Led a two-week computational bootcamp for incoming Fisk-Vanderbilt Masters-to-PhD Bridge students (August 2022)
- Participated twice in Skype-a-Scientist (2020)

Skills

- Proficient in Python and Fortran90
- Familiar with Julia and C++
- Experience with submitting and monitoring jobs on leadership-class supercomputers
- Experience with programming for GPUs via OpenACC and OpenMP offloading

Misc

- GitHub page: `https://www.github.com/dunhamsj`
- Personal website: `https://www.samueljdunham.com`