GABRIEL CASABONA

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RESEARCH INTERESTS

During my doctoral studies, I plan on studying merger models of various compact objects and the formation of electromagnetic radiation bursts, gravitational waves and r-process elements. Using code bases like Einstein Toolkit, GRHydro and Harm3D, I will perform high resolution simulations of black hole-neutron star mergers. This will lead to understanding how the magnetohydrodynamics in curved space time of neutron rich material generates heavy r-process metals and electromagnetic bursts.

CURRENT RESEARCH

For my thesis research, I am part of a group conducting computational research in the double-degenerate model of Type Ia Supernovae. Using the FLASH4 code and the supercomputer Stampede2, I conduct simulations of a possible scenario during the merger of a white dwarf system. The goal is to determine how the shock-fronts formed from the turbulently-driven detonation of helium can initiate detonation of carbon in the distributed burning regime.

EDUCATION

University of Massachusetts Dartmouth May 2019
M.S. in Physics
Research Assistant July 2018 - Present
Teaching Assistant September 2017 - Present

Florida International University May 2017
B.S. in Physics
Resident Assistant June 2015 - May 2017

PUBLICATIONS

Mozumdar, P., Fisher, R., & Casabona, G (Jul 2018). *Carbon Detonation Initiation in Turbulent Electron-Degenerate Matter.*

PRESENTATIONS

Casabona, G (Nov 2018). *Carbon Detonation Initiation in Turbulent Electron-Degenerate Matter.* APS Bridge/NMC Conference 2018. Stanford University

Casabona, G (Nov 2018). *Carbon Detonation Initiation in Turbulent Electron-Degenerate Matter.* APS New England 2018. University of Massachusetts Dartmouth

Casabona, G (Jul 2018). *Carbon Detonation Initiation in Turbulent Electron-Degenerate Matter.* IHPCSS. Technical University of Ostrava, Czech Republic

Casabona, G (Apr 2018). *Carbon Detonation Initiation in Turbulent Electron-Degenerate Matter.* APS April 2018. Columbus, Ohio

CONFERENCES & WORKSHOPS

Neutron Star Mergers for Non-Experts: GW 170817 in the Multi-Messenger Astronomy and FRIB Eras. (May 2018). Michigan State University

NuGrid/JINA/ChETEC School: Software Tools for Simulations in Nuclear Astrophysics. (Sep 2018). University of Hull, United Kingdom

PROGRAMMING

Proficient in Python for the use of data analysis and visualization.

Proficient with the Unix command system to maneuver in a computer terminal.

Experience with Fortran and C for scientific computing.

Experience with writing scientific documentation using LaTeX.

Advanced knowledge in High Performance Computing techniques:

- Parallel Processing, MPI, OpenMP, Parallel I/O, Scientific Visualization

OUTREACH

Physics Honors Society (ΣΠΣ)

- Casabona, G & Tumeo, B., *et al* (Aug 2016). *Minority and Women in S.T.E.M. Outreach.* Women in S.T.E.M. Living Learning Community, Florida International University

Its On Us/ Sexual Assault Awareness

- Casabona, G., & Nephew, A. (Jul 2016). *Lets Talk About Sex.* Office of Residential Life, Florida International University

EXPERIENCE

STEM Learning Lab September 2017 - December 2017
Tutor *UMass Dartmouth*

· Facilitate the understanding of materials in the following subjects:

- Introductory Physics I-II, Quantum Mechanics, Thermodynamics, Electrodynamics
- Algebra, Pre-Calculus, Trigonometry, Calculus I-III, Differential Equations

ARC Learning Center September 2016 - May 2017
Tutor *FIU*

· Facilitate the understanding of materials in the following subjects:

- Introductory Physics I-II, General Chemistry I-II
- Algebra, Pre-Calculus, Trigonometry, Calculus I-III, Differential Equations

ORGANIZATION MEMBERSHIPS

Society of Physics Students

Physics Honors Society (ΣΠΣ)

American Astronomical Society