Maria Guadalupe Barrios Sazo

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EDUCATION

- **Stony Brook University** — **Stony Brook, NY**
  Ph.D. Candidate in Physics — *2014 – Present*

- **Universidad del Valle de Guatemala** — **Guatemala City, Guatemala**
  Licenciatura en Física and B.Sc. in Physics, magna cum laude — *2008 – 2013*

- **North Central College** — **Naperville, IL**
  Physics, Global Undergraduate Exchance Program (Global UGRAD) — *Sept. 2009 – June 2010*

SUMMARY OF RESEARCH

- **Stony Brook University** — **Stony Brook, NY**
  Research assistant — *June 2015 – Present*
  - Catro developer: involved in the ongoing development of the Castro code, an AMR compressible hydrodynamics code. `https://github.com/AMReX-Astro/Castro`
  - White Dwarf merger studies: using Castro to perform various 3-d simulations of the system
  - Magnetohydronynamics (MHD) solver: contributing towards porting and extending, testing and optimizing an MHD solver in Castro
  - Black Widow Pulsar simulation: did exploratory studies with Castro to understand the interaction of the pulsar radiation with its companion star. Utilized yt package for visualization and further analysis
- **Fermi National Accelerator Laboratory** — **Batavia, IL**
  Intern collaborating on the MINERvA experiment — *April 2013 – April 2014*
  - Quasi-elastic neutrino-nucleon scattering: utilized C++, Python, GENIE, and ROOT to perform an analysis of the differential cross section in Q^2 to acquire the axial mass parameter in a model independent way
  - Inclusive neutrino cross section ratios on different nuclei at MINERvA: utilized C++, Python and ROOT to study how different Monte Carlo models affect the hadronic energy reconstruction and subsequent systematic errors for the ratios
  - Tested the MINERvA 64-channel photomultiplier tubes (PMTs) for light leaks and measured their cross talk
  - MINERvA Detector Monitoring Controls: Familiarization with the computers and other electronic devices that monitor and control the detector to become a detector monitoring expert shifter
- **Hope International Radiotherapy Center** — **Guatemala City, Guatemala**
  Intern — *Feb. 2012 – April 2013*
  - Developed a Monte Carlo simulation of a clinical linear accelerator - Varian 2300 CD, for 6MV energy
  - Installed the BEAMnrc/EGSnrc package and wrote an installation manual for future references
  - Implemented a way to run the simulations in parallel in the computer at the center (Intel Xenon processor) using the network queuing system PBS
  - Internship research and knowledge were turned into undergraduate written thesis and dissertation

TEACHING EXPERIENCE

- **Stony Brook University** — **Stony Brook, NY**
  Women in the Laboratory: Intro. to STEM Research, Project Leader — *Spring 2017*
  - Built, in collaboration with a colleague, an introduction to computational science four week class. This is a program for undergraduate women in science and engineering which gives the students exposure to research carried out at the university

- Taught and designed lessons using Jupyter python notebooks and provided grades for assignments

- **Stony Brook University** **Stony Brook, NY**
  Physics Department, Teaching Assistant *2014 – 2016*
  - Graded and helped physics students in the computation for physics and astronomy course
  - Taught engineering and physics students in the recitation section of the introductory physics course
  - Taught life science students in the lab sections of introductory physics courses and graded their activities

- **Universidad del Valle de Guatemala** **Guatemala City, Guatemala**
  Computer Science Department, Laboratory Assistant *Jan. – June 2012*
  - Taught engineering students in the lab section of introductory computer science course and graded their homework

- **Universidad del Valle de Guatemala** **Guatemala City, Guatemala**
  Physics Department, Laboratory Assistant *Jan. – Dec. 2011*
  - Taught engineering students in the lab sections of introductory physics courses and graded their lab reports and activities

AWARDS AND OTHER ACADEMIC RECOGNITIONS

- Institute for Advanced Computational Science Jr. Researcher Award 2017 - 2019
- SIAM CSE17 Broader Engagement Program February, 2017
  - Awarded with travel support and conference fees by Sustainable Horizons Institute. The program also provides scientific and professional guidance during the meeting and a mentoring program.
- Physics department - Peter B. Kahn Prize 2016
  - Awarded with travel support to attend MESA summer school
- Academic distinction (Distinción Académica) for high honors in the Physics Department 2008, 2010 – 2012
- Global Undergraduate Exchange Program Sept. 2009 - June 2010
  - Awarded with one-year, full-time scholarship by the U.S. State Department to study physics at North Central College

PUBLICATIONS

[1] P. Karpov, M. G. Barrios Sazo, M. Zingale, W. Zhang, and A. C. Calder. Toward simulating Black Widow binaries with CASTRO. *Journal of Computational Science Education*, 8:25–29, 2017.

[2] M. Zingale, A. S. Almgren, M. G. Barrios Sazo, V. E. Beckner, J. B. Bell, B. Friesen, A. M. Jacobs, M. P. Katz, C. M. Malone, A. J. Nonaka, D. E. Willcox, and W. Zhang. Meeting the Challenges of Modeling Astrophysical Thermonuclear Explosions: Castro, Maestro, and the AMReX Astrophysics Suite. *ArXiv e-prints*, November 2017. Proceedings of AstroNum 2017, St Malo, France.

[3] B. Eberly et al. Charged pion production in ν_μ interactions on hydrocarbon at $\langle E_\nu \rangle$= 4.0 GeV. *Phys. Rev.*, D92(9):092008, 2015.

[4] B. G. Tice et al. Measurement of Ratios of ν_μ Charged-Current Cross Sections on C, Fe, and Pb to CH at Neutrino Energies 2-20 GeV. *Phys. Rev. Lett.*, 112(23):231801, 2014.

LARGE COMPUTER TIME ALLOCATIONS

- Senior Investigator on NERSC 2018 allocation, Three-dimensional studies of white dwarf and neutron star systems (20.85 M MPP hours)
- Co-Investigator on INCITE 2018 award at OLCF, Approaching Exascale Models of Astrophysical Explosions (40 Mh)

PROFESSIONAL DEVELOPMENT

- **Advancing Theoretical Astrophysics summer school** **Amsterdam, Netherlands**
  University of Amsterdam *July 2019*
  - The school was two weeks of lectures, excercises and tutorials on the topics relevant for the study of accretion and outflows around compact objects.
- **Argonne Training Program on Extreme-Scale Computing** **St. Charles, IL**
  Argonne Leadership Computing Facility *July 2018*
  - The program consisted of two weeks of training in high performance computing, including different computer architectures, numerical algorithms and profiling.
- **ISC High Performance 2018 Student Volunteer Program** **Frankfurt, Germany**
  ISC Group *June 2018*
  - Took part of the Student Volunteer Program for the ISC High Performance conference.
- **Software Carpentry Instructor** **Stony Brook, NY**
  Software Carpentry *April 2018*
  - Completed the Software Carpentry instructor training program.
- **International HPC 2017 summer school** **Boulder, CO**
  XSEDE, PRACE, COMPUTE CANADA | CALCUL CANADA, RIKEN *June 2017*
  - School consisted on lectures with hands-on sessions and advanced mentoring about current technologies in HPC. In addition presented a poster with ongoing research.
- **GPU Hackathon 2017, 2018** **Brookhaven National Laboratory, NY**
  BNL, UD, ORNL, SBU *Jun. 2017, Sept. 2018*
  - Received mentoring and Hands-on training towards implementing application (from our research group) or part of it to run on GPUs.
- **MESA summer school** **Santa Barbara, CA**
  UC Santa Barbara *August 2016*
  - Lectures followed by extensive hands-on labs designed to learn the use of the stellar evolution code Modules for Experiments in Stellar Astrophysics (MESA)

PRESENTATIONS

- **Joint Science Meeting, Tokyo Institute of Technology and Stony Brook University** **Tokyo, Japan**
  Poster presentation and Invited talk *May 2019*
  - Gave a talk and poster presentation on "Explorations on White Dwarf Merger simulations with Castro"
- **SIAM CSE19 Meeting** **Spokane, WA**
  Minisymposium talk *February 2019*
  - Gave a talk as part of the "Applications of the AMReX Block Structured Adaptive Mesh Refinement Framework" minisymposium. The title of the talk was "CASTRO: A compressible astrophysical hydrodynamics code"
- **233rd AAS Meeting** **Seattle, WA**
  Poster presentation *January 2019*
  - Presented poster: Explorations on White Dwarf Merger Simulations with Castro (Maria G. Barrios Sazo, Max Katz, Michael Zingale)
- **Joint Science Meeting, Tokyo Institute of Technology and Stony Brook University** **Stony Brook, NY**
  Invited talk *May 2018*
  - Gave a presentation titled MHD studies towards simulating White Dwarf Mergers with Castro
- **Institute for Advanced Computational Science Research Day** **Stony Brook, NY**
  Invited talk *April 2018*
  - Presented talk: MHD studies towards simulating White Dwarf Mergers with Castro

- **Astronomy Seminar talk at University of Würzburg** **Würzburg, Germany**
  Invited seminar talk *July 2017*
  - Gave a presentation to the astronomy group titled: Simulations of white dwarf mergers and black widow pulsars using Castro
- **SIAM CSE17 Meeting** **Atlanta, GA**
  Poster presentation *February 2017*
  - Presented poster as part of the Broader Engagement Minisymposterium: Simulating Black Widow Pulsar system with radiation hydrodynamics (Maria G. Barrios Sazo, Michael Zingale, Weiqun Zhang)
  - This contributed towards Best Minisymposterium award
- **JINA-CEE Frontiers in Nuclear Astrophysics Meeting** **Lansing, MI**
  Poster presentation and Junior Workshop Talk *February 2017*
  - Gave a talk at the junior researcher workshop: Compressible hydrodynamics code, Castro
  - Poster at main meeting: Black Widow Pulsar radiation hydrodynamics simulation using Castro: Methodology (Maria G. Barrios Sazo, Michael Zingale, Weiqun Zhang)
- **229th AAS Meeting** **Grapevine, TX**
  Poster presentation *January 2017*
  - Presented poster: Black Widow Pulsar radiation hydrodynamics simulation using Castro: Methodology (Maria G. Barrios Sazo, Michael Zingale, Weiqun Zhang)
- **CURCCAF - Central American and Caribbean Course of Physics** **Guatemala City, Guatemala**
  Poster presentation *2012*
  - Presented a poster with the results of a Monte Carlo simulation of a clinical linear accelerator – Varian 2300 CD, for 6MV energy

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PROFESSIONAL SERVICE

- WISE graduate mentoring program Nov. 2018 – Present
  - Mentor of two undergraduate physics students who are part of the WISE (women in science and engieneering) program.
- Graduate Women in Science and Engineering 2017 – 2019
  - In 2018, Executive Board member of the group as treasurer.
  - In 2017, Executive Board member of the group as technical coordinator. Maintained emails including templates and mailing lists; and social media page
  - Blog contributor
- Physics Dept. Quality of Life Committee 2015 – 2018
  - Discuss with the committee issues seen as a student in regards of improving the quality of life outside of academics. This includes building improvements as well as organizing gatherings
- IACS Student ambassador 2017
  - Represented the Institute of Advanced Computational Science at two conferences. The duties included working with a team setting up a booth, and encourage potential future graduate students to pursue their goals and consider applying to Stony Brook University.
    * Tapia conference in Atlanta, Georgia on September 20 – 23
    * SACNAS conference held in Lake City, Utah on October 19 – 20
- Astronomy Club Secretary 2012 – April 2013
  - Helped staff with observations, seminars, and publicity of talks and events

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OUTREACH

- Stony Brook Astronomy Open Night 2015 – 2016
  - Helped with the observing which happens after a lecture of public interest. This program is offered once a month
- Fermilab Education Office Sept. 2013 – Apr. 2014
  - Participated in the activity "Ask a Scientist", organized by the Museum of Science and Industry in Chicago
  - Presented in the Evanston, IL public library for the program "Jugando con la Ciencia" (playing with science)
  - Assisted scientists in classroom presentations offered to local schools
- Exact Sciences Club - Contributor of first edition of newspaper 2013
  - Wrote a newspaper article - "Introduction to Einstein Relativity: Some Issues About the Luminic Ether", for the first edition of a newspaper intended to be for the general public

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LANGUAGES

English (fluent verbal and written), Spanish (native verbal and written), German (Goethe Zertifikat B1)

PROGRAMMING LANGUAGES

Python, Fortran, C++, Java, PHP