Edgar Marrufo Villalpando

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Education

University of Chicago, Chicago, IL
Ph.D., Physics   *Expected, June 2024*

Northern Arizona University, Flagstaff, AZ
B.S., Physics & Astronomy Cum Laude   *2019*

Research

Cosmological Simulations   **The University of Arizona**
REU Research Assistant   *2017*
o Developed Python code to determine a calibration factor for measuring the mass of galaxy clusters.

N-body Simulations   **Northern Arizona University**
Undergraduate Research Assistant   *2018-2019*
o Constructed N-body simulations to constrain physical parameters for formulating mathematical relationships between the dark matter halo and galaxy gravitational stability.
o Utilized the ZENO N-body simulation code and performed data analysis in Python.

Skipper CCDs for Cosmological Applications   **Fermi National Accelerator Laboratory**
Graduate Researcher   *2019-*
o Developing Python code to characterize CCDs' performance and response via readout noise analysis, quantum efficiency, and linearity gain.

Constraining the Nature of Dark Matter through Stellar Streams   **University of Chicago**
Graduate Researcher   *2020-*
o Developing a Python analysis framework to characterize gravitational perturbations of dark matter subhalos, in the Local group, on stellar streams for probing dark matter particle's mass.

Presentations and Publications

Calibrating the Mass-Correlation Function Relationship for Galaxy Clusters   *Aug 4, 2017*

Oral presentation at the Undergraduate Research Opportunities Consortium's Summer Colloquia. The University of Arizona, Tucson, AZ.

Calibrating the Mass-Correlation Function for Galaxy Clusters   *Aug 7, 2017*

Poster presented at 22nd Annual Undergraduate Research Opportunities Consortium's Research Conference. The University of Arizona, Tucson, AZ.

Calibrating the Mass-Correlation Function for Galaxy Clusters   *Aug 2017*

Abstract published in the Undergraduate Research Opportunities Consortium's Summer Research Journal. The University of Arizona, Tucson, AZ.

Simulating Dark Matter Deficient Galaxies   *Sept 26, 2018*

Poster presented at the 5th Annual STEM Poster Session. Northern Arizona University, Flagstaff AZ.

Simulating Dark Matter Deficient Galaxies   Apr 25, 2019

Poster presented at the 11th Annual Undergraduate Symposium, Northern Arizona University, Flagstaff AZ.

Academic Appointments

Teaching Assistant   2015-

Dept. of Physics and Astronomy, Northern Arizona University & Dept. of Physics, The University of Chicago

- Northern Arizona University: *Newtonian Mechanics, Electricity & Magnetism*
- The University of Chicago: *Intro Classical Mechanics, Electricity & Magnetism, Light & Optics*

Computational Skills

Operating Systems: Unix, Microsoft OSs, macOS

Operating Systems: Python, Java, C, MATLAB, Mathematica

N-body Simulations: GADGET 2, ZENO

Astronomical Image Analysis: IRAF

Machine Learning: Neural Networks, Supervised Learning, Unsupervised Learning

Outreach

Mentor for Louis Stokes Alliances for Minority Participation (LSAMP)   *2017-2019*

- Mentored students from underrepresented backgrounds majoring in STEM fields.
- Held programming courses for mentees.

Member of the UChicago Physics Working Group for Anti-Racism   *2020-*

- Plan and Organize REU experiences for high school URM students.
- Strive to create a more inclusive environment in the UChicago physics department by helping increase the number of URM students who apply to the department's PhD program.

Awards and Distinctions

Lumberjack Scholar, Northern Arizona University	*2015-2019*
College Success Arizona Scholarship Award	*2015-2019*
Dept. of Physics and Astronomy Willis Family Scholar, Northern Arizona University	*2017-2019*
Council on Undergraduate Research Posters on the Hill Honorable Mention	*Apr. 2019*