

Giannina Guzmán Caloca

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Education

GPA: 3.55

Villanova University

Graduation Date: May 2019

Degree: Bachelor of Science, *cum laude*
Major: Astrophysics and Planetary Science
Minor(s): Communication, Physics

First year student at University of Maryland, Department of Astronomy

Work Experience

Villanova University- Public Observatory Worker / Supervisor

August 2015-May 2017

- Manning the 14" reflecting telescope at Villanova, setting up the public observatory and welcoming tours

NASA'S PDART-funded project 'sbpy'- Developer

May 2018-June 2019

- Code developer assisting the sbpy team (project funded by NASA's PDART).

Lowell Observatory – Software Engineer

June 2019-August 2019

- Continued work assisting the sbpy team with code development. Worked on setting up remote operations software for the Titan Monitor Telescope (TiMo), which Lowell Observatory operates and utilizes. Publication in Research Notes.

Teaching

Villanova University- Teacher's Assistant

August 2016-May 2018

- Assists professors in grading, and in-class help to the students. Deals with grading matters personally.

University of Maryland- Teacher's Assistant

August 2020-Present

- Leads and prepares a discussion and two lab sections for AST 101. Takes care of grading.

Memberships

All Hands-On Science

May 2017- May 2018

- Villanova volunteer group that attended the Wissahikon Boys and Girls Club every Friday to perform scientific experiments with underprivileged kids in order to get them excited about pursuing science.

Villanova Astronomical Society

August 2015-May 2019

- *Position of leadership (2017-2018): Treasurer.* Villanova club that focuses on amateur astronomy

The Superlative

January 2016-May 2019

- *Position of leadership (2016-2019): Public Relations and media representative.* Villanova dance- crew that focuses on all-style choreographies and aims to have people from different backgrounds embrace dance through diversity of culture and dance form. Under our leadership, the club's first showcase was held

National Physics Honor Society

November 2017-November 2019

- Membership awarded due to excelling and meeting GPA requirements in the physical sciences.

Awards

First place in Villanova's 2018 Sigma Xi CRF Poster Symposium

Spring 2018

- Best poster award in the category of: Undergraduate, for the Astronomy & Astrophysics, Physics, Computing Sciences, Mathematics & Statistics category by the Sigma Xi Villanova chapter.

Villanova's Dean's List

Fall 2016-May 2019

- Awarded to students who maintain a GPA of 3.5 or above

Jason A. Cardelli Memorial Award for Undergraduate Research

Spring 2019

- "The Jason A. Cardelli Memorial Award for Undergraduate Research is presented to a graduating Astronomy & Astrophysics major whose body of undergraduate research work exhibits particularly high standards of independence, originality, and quality." (Villanova Website) Prestigious award given by the department to deserving graduating seniors.

Research

Digitizing Villanova University's Eclipsing Binary Card Catalog

Summer 2017

- In this project, I worked on building a database, a data-entry user interface, and a catalog website interface for Villanova University's eclipsing binary card catalog. This card catalog is an almost century-old card catalog that contains annotations on eclipsing binaries by various scientists throughout the years. The catalog contains over 2,000 cards, which will have to be added to the database manually. Therefore, the project has been left as a legacy project, but the database, data-entry interface, and website backbone are already coded and in use. The 'skeleton' of the code for this project can be seen on my GitHub account. This project was presented at the 231st AAS meeting in D.C. and was done under the mentorship of Dr. Andrej Prsa.

The Red Thumbs: A Study in Plant Growth on Martian Regolith Simulant

Spring 2018

- This project was done under the mentorship of Dr. Edward Guinan. It was a qualitative study, with a few quantitative measurements, on the growth of various plants in Martian regolith simulant. I tested the plants with fertilizer, acidifiers (due to Mars regolith's basic nature), vermiculite, and organic soil builder. I controlled for water, while the plants were subject to changes in both temperature and light that were mapped and related back to certain health issues with the plants. The project was featured on various news outlets like WHY-FM radio and I was interviewed a few times about the project. This project's poster won the best poster in Sigma Xi's symposium competition and was presented as an educational project at the 233rd AAS meeting in Seattle. It has already pioneered various schools to follow suit in order to get kids involved in the excitement of STEM research.

Designing a Python Module for the Calculation of Molecular Parameter and Production Rates in Comets

2018

- I worked at NASA GSFC as part of the Astrobiology Institute's URAA summer program led by Dr. Michael Mumma. I worked with Dr. Miguel de Val Borro on an astroquery package called jplspect (which is already available with the newest version of astroquery) that allows the query of JPL's molecular spectral catalog in order to obtain molecular constants needed for the analysis and calculation of production rates in comets. I also worked on implementing two models (LTE, with and without photodissociation) for the calculation of production rates in comets as functionalities on the sbpy spectroscopy package. 'sbpy' is a NASA funded python package in development that contains tools and data analysis specific to small body (asteroids and comets) science. The open source code and my work can be found on GitHub. This project was presented at the 233rd AAS meeting in Seattle. The results of the project were also presented in an institute-wide final presentation at the end of the summer. I was funded and kept as part of the sbpy development team for a year after this project by the PI, and I am an author for the astroquery version paper, as well as an author in the sbpy JOSS publication.

FUSE and IUE Spectroscopy of the Prototype Dwarf Nova ER Ursa Majoris During Quiescence

Fall 2018

- I used de-reddened FUSE and IUE spectra along with Gaia parallax to revisit and extract new information about the dwarf nova ER Ursae Majoris and its current evolutionary stage. ER Ursae Majoris is the prototype star for a subset of SU UMa-type dwarf novae characterized by short cycle times between outbursts, high outburst frequency, and negative superhumps. We fit both the FUSE and IUE data with accretion disk and photosphere models to find optimal inclination angles, white dwarf mass, and accretion rates. The accretion rates were well within what was expected of a dwarf nova from the disk instability model. My mentor for this project was Dr. Edward Sion, and the paper for which I am first author, is published on the *Astronomical Journal*.

Modern Retrieval Methods for Exoplanets and Planetary Atmospheres

8 Fall 2019-Fall 2020

- I worked at NASA GSFC under the mentorship of Geronimo Villanueva and Avi Mandell. To work on an exoplanetary retrieval algorithm (written in C) in order to interpret exoplanetary observations. The algorithm included a grid-based forward modeling algorithm as well as tested various parameter space samplers and their efficiency/accuracy. Results presented at an end of year talk as well as the UMD exoplanets weekly meeting.

Skills

- Native Spanish speaker/writer.
- Comfortable with: UNIX, C, Git commands, Python, some IRAF, Microsoft Office suite, and Django-specific database/web development. Some C++
- Diligent, hardworking, outgoing, and enthusiastic researcher with no trouble presenting in front of crowds due to my extensive background in performing arts, communications, and public relations.
- I've also pursued dancing and acting as hobbies for most of my life + I'm extremely good at Disney music trivia, but all of that is just a bonus.

First Author Publications

- Guzman, G., Sion, E., & Godon, P. (2019). FUSE and IUE Spectroscopy of the Prototype Dwarf Nova ER Ursa Majoris during Quiescence. *Astronomical Journal*. DOI: [10.3847/1538-3881/ab322f](https://doi.org/10.3847/1538-3881/ab322f) and [ARXIV LINK](#)

N-Author Publications

- Ginsburg, A., et al. (2019). astroquery: An Astronomical Web-querying Package in Python. *Astronomical Journal*. DOI: [10.3847/1538-3881/aafc33](https://doi.org/10.3847/1538-3881/aafc33)
- Mommert, M., et al. (2019). sbpy: A Python module for small-body planetary astronomy. *JOSS*. DOI: [10.21105/joss.01426](https://doi.org/10.21105/joss.01426)
- van Belle, G.T., Collins, M., Guzman, G., Mommert, M. (2020). Improved ASCOM Dome Following. *Research Notes of the AAS*. DOI: [10.3847/2515-5172/abb29b](https://doi.org/10.3847/2515-5172/abb29b)
- Campbell, H., Sheldon, Z., Gibson, J., Guzman, G. (2020). Technological and Mediated Identity in American Multisite Churches. *Ecclesial Practices*. DOI: [10.1163/22144417-bja10002](https://doi.org/10.1163/22144417-bja10002)

