

Marc Williamson

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- EDUCATION** **New York University**, New York, NY (2016-present)
PhD Candidate in Physics
Advisor: Maryam Modjaz
- Stanford University**, Stanford, CA (2011-2015)
Bachelor of Science with Honors, Physics
Advisor: Risa Wechsler
Minor, Computer Science
- WORK EXPERIENCE** **PhD Student at New York University** (2016-present)
Conducting doctoral research with Professor Maryam Modjaz studying the explosions of massive stars (stripped-envelope supernovae). Work includes statistically analyzing one of the largest datasets of stripped-envelope supernovae optical spectra. Research on progenitor star chemical abundances and velocity structure with Wolfgang Kerzendorf using the radiation transport code TARDIS.
- Research Assistant at ETH Zurich** (2015-2016)
Hired by Professor Alexandre Refregier to work on simulating Dark Energy Survey images using the Ultra Fast Image Generator(UFig). Final goal of understanding and correcting sources of systematic error in the DES images. Responsibilities include organizing collaboration between ETH Zurich and the Blind Cosmology Challenge(BCC) simulation team lead by Risa Wechsler at Stanford University, and stress testing BCC generated galaxy catalogs.
- Research Assistant at Stanford University** (2012-2015)
Student researcher in Professor Risa Wechsler's cosmology group at Stanford and SLAC. Primary focus on large scale structure and galaxy evolution. Research on subhalo abundance, Milky Way mass calculations, incorporating machine learning techniques into simulation data analysis pipelines. Experience running dark matter only N-body simulations: generating initial conditions using MUSIC, particle evolution using GADGET, halo finding using ROCKSTAR.
- PUBLICATIONS** **Data Driven Stripped-Envelope Supernovae Analysis** (2019)
Presents a new classification method for stripped-envelope supernovae spectra using Principal Component Analysis and Support Vector Machine. Provides quantitative, continuous classification capable of characterizing transition supernovae and statistically identifying outliers. Results relevant to LSST include best time to classify spectra is two weeks after maximum brightness.
Citation: **Williamson, Marc**, Maryam Modjaz, and Federica Bianco. "Optimal Classification and Outlier Detection for Stripped-Envelope Core-Collapse Supernovae." arXiv preprint arXiv:1903.06815 (2019).
- Subhalo Abundance Modeling:** (2015)
Creating a theoretical model for the abundance of subhalos belonging to Milky Way sized host halos. Using marked correlation functions to study the dependence of subhalo abundance on environment (ie concentration). Model calibrated with zoom-in N-body simulations. Paper published in ApJ.
Citation: Mao, Yao-Yuan, **Marc Williamson**, and Risa H. Wechsler. "The Dependence of Subhalo Abundance on Halo Concentration." *The Astrophysical Journal* 810.1 (2015): 21.

**GRANTS
AWARDED**

1. James Arthur Graduate Award (\$37,000.00) (2019)
2. STScI Spring Symposium Conference Funding (\$700.00) (2019)
3. AAS Travel Grant ITG 2018-2 (\$872.00) (2018)

**Conferences and
Presentations**

1. STScI Spring Symposium (Poster presented) (2019)
2. XXX Canary Islands Winter School of Astrophysics (Poster presented) (2018)
3. AAS 231st Annual Meeting (Poster presented) (2018)

TEACHING

Lab Assistant: *PHYS 72, Intro Experimental Physics* (Spring 2018)

One section of about 20 students. Responsible for experiment setup, lab grader.

Teaching Assistant: *PHYS 95, Thermodynamics, NYU* (Fall 2017)

Teaching two sections, each about 20 undergraduates, grading and writing homework solutions.

Teaching Assistant: *PHYS 2000, Computational Physics, NYU* (Fall 2017)

Graduate level course on computational physics. One section of about 15 PhD students.

Teaching Assistant: *PHYS 106, Mathematical Physics, NYU* (Spring 2017)

Teaching two sections, each about 20 undergraduates, grading and writing homework solutions.

Teaching Assistant: *PHYS 95, Thermodynamics, NYU.* (Fall 2016)

Teaching two sections, each about 20 undergraduates, grading and writing homework solutions.

Course Grader: *PHYS 261, Extra-galactic Astrophysics, Stanford.* (Spring 2015)

Grading and writing solutions to problem sets for mixed undergraduate and graduate level cosmology class.

Course Instructor: *PHYS 91SI, Scientific Computing, Stanford.* (Spring 2014)

Developed and taught curriculum to familiarize students with programming skills and methods relevant for scientific computing primarily in Python on a Linux environment.

**COMPUTER
SKILLS**

Languages: C, Python, C++, Java, MatLab, Bash, Mathematica, L^AT_EX.

Applications: Vi/Vim, Eclipse, Git, Mercurial

Operating Systems: Unix, Linux, Mac OSX