

Alexandra Masegian

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EDUCATION

Columbia University New York, NY
Ph.D. in Astronomy Expected May 2028
First-year project: “Investigating the Origins of Ba-rich Stars with the GALAH Spectroscopic Survey and MESA”

The University of Chicago Chicago, IL
B.S. in Astrophysics (minor in English and Creative Writing) Conferred June 2023
Honors thesis (astrophysics): “Constraining Models of Dwarf Galaxy Evolution with Observations and Bayesian Statistics”
Graduated summa cum laude with departmental honors. Average GPA: 3.93/4.00

HONORS AND AWARDS

Columbia University Provost Diversity Fellowship (\$10,000)	2023
Phi Beta Kappa Inductee	2022
AAS Chambliss Astronomy Achievement Student Award	2022
Student Marshal (<i>Highest honor for undergraduates at UChicago</i>)	2022
Astronaut Scholarship (\$15,000)	2021, 2022
Barry M. Goldwater Scholarship (\$7500)	2021, 2022
UChicago Dean’s List	2020, 2021, 2022
Stanek Prize (<i>\$6000 scholarship for excellence in leadership at UChicago</i>)	2021
Robert Maynard Hutchins Scholar (<i>Top 10% of sophomore class</i>)	2021
University of Chicago Green Fund Grant (<i>\$2000 for sustainability research</i>)	2021
Illinois Space Grant Consortium Undergraduate Scholarship (\$3000)	2021

RESEARCH EXPERIENCE

American Museum of Natural History New York, NY
Visiting Scientist: Characterizing Intergalactic Stellar Populations in Nearby Galaxy Clusters June 2023 – Present

- Developed Python scripts to perform narrowband PSF photometry on images from the new Condor Array Telescope
- Used the above scripts to identify OIII-bright objects (intergalactic planetary nebulae candidates) in the M81 group

WAVE Program, California Institute of Technology Pasadena, CA
Research Intern: Spectroscopy of Young Stellar Objects June 2022 – August 2022

- Learned techniques for the analysis of spectroscopic data (including normalization, cross-correlation, equivalent width and FWHM measurement) and applied these techniques to characterize four young “complex periodic variable” objects
- Analyzed light curves in multiple passbands and HIRES/Keck spectra for three pre-main-sequence eclipsing binary stars in the Orion Nebula Cluster to measure radial velocity shifts, eclipse widths and depths, and other physical parameters

Department of Astrophysics, University of Chicago Chicago, IL
Research Assistant: Measuring the IMF of Elliptical Galaxies January 2020 – December 2023

- Performed data reduction of NGC 1399 spectra from IMACS/Magellan-Baade using ESO’s Molecfit, IRAF, and Python
- Conducted a comparative analysis of the performance of four full-spectral-fitting codes (Alf, PyStaff, Starlight, and pPXF) in recovering the slope of the stellar initial mass function for early-type galaxies NCG 1399 and NCG 1404

Max Planck Institute for Astronomy Heidelberg, Germany
Research Intern: Simulating Magnetic Fields and Turbulence in the ISM July 2021 – September 2021

- Investigated how turbulence and magnetic fields of various strengths affect star formation in the interstellar medium
- Wrote Python scripts to create spectral PPV cubes from 3D simulations and perform spectral decomposition of the data

CASSUM Research Fellowship, Chalmers University Gothenburg, Sweden
Research Intern: Measuring Age Spreads in Simulations of Young Stellar Clusters May 2021 – August 2021

- Wrote interpolation codes to transform information stored in various sets of isochrones (primarily PARSEC and those presented in Baraffe+2015) into effective temperature and luminosity measurements for simulated stellar objects

- Developed statistical techniques for measuring age and luminosity spreads in HR diagrams of young stellar clusters
- Estimated the age of the Orion Nebula Cluster using data from the IN-SYNC survey (Da Rio+2016)

Physical Sciences REU Program, American Museum of Natural History

New York, NY

Research Intern: Metallicity and Binarity in the Magellanic Clouds

May 2020 – September 2020

- Led an independent investigation of the relationship btwn. the binary fraction and metallicity in the Magellanic Clouds
- Performed cross-matching between our DECam photometry and publicly-available data from SMASH and OGLE
- Implemented automatic identification of binary systems from short, noisy light curves via convolutional neural networks
- Generated vast sets of simulated data covering the parameter space of known binaries to quantify survey incompleteness

Fermi National Accelerator Laboratory

Batavia, IL

Dark Energy Survey Research Assistant

December 2019 – May 2021

- Investigated the distribution of dark matter in the cores of galaxy clusters by creating and examining cluster density profiles, then comparing these density profiles to simulations implemented with different dark matter paradigms
- Identified a magnitude bias phenomenon in the DES-developed Balrog pipeline, which injects simulated objects into real astronomy images for the purposes of estimating detection rates, and developed corrective Python algorithms

Science Internship Program, University of Santa Cruz, California

Santa Cruz, CA

Research Intern: Evolved Stars in M31

June 2018 – August 2018

- Investigated a population of evolved stars with a unusual mix of carbon and oxygen-based spectral features (“weak CN” stars), first discovered in M31 and thought to represent a distinct phase of stellar evolution
- Developed Python algorithms to classify unlabeled stars according to how similar their photometric colors and spectral features were to that of template weak CN stars; devised new statistical metrics to quantify this similarity
- Identified several dozen new examples of the weak CN phenomenon and compared them to PARSEC isochrones

PUBLICATIONS

1. Everett, S., Yanny, B., Kuropatkin N., et al. (**inc. Masegian, A.**) *Dark Energy Survey Year 3 Results: Measuring the Survey Transfer Function with Balrog*. *ApJS* 258 (1). 2022.
2. **Masegian, A.**, Shara, M.M., et al. *The relative fractions of B, A, and F-type binaries in the LMC and SMC*. In prep.
3. Lonoce, I., Feldmeier-Krause, A., **Masegian, A.** & Freedman, W.L. *A Comparison of Full Spectral Fitting Codes for Measuring the Stellar Initial Mass Function and Other Stellar Population Properties in Elliptical Galaxies*. Submitted to *ApJ* in December 2023.
4. **Masegian, A.** & Hillenbrand, L.A. *Three pre-main-sequence eclipsing binaries in the Orion Nebula Cluster*. In prep.

PRESENTATIONS

2023 UChicago Undergraduate Research Symposium (<i>Poster</i>)	April 2023
241 st Meeting of the American Astronomical Society (<i>iPoster</i>)	January 2023
2022 Astronaut Scholarship Technical Conference (<i>Talk</i>)	August 2022
Caltech Summer Seminar (<i>Poster</i>)	August 2022
240 th Meeting of the American Astronomical Society (<i>iPoster</i>)	June 2022
2022 UChicago Undergraduate Research Symposium (<i>Poster</i>)	May 2022
CASSUM Summer Symposium (<i>Talk</i>)	August 2021
2021 Astronaut Scholarship Technical Conference (<i>Talk</i>)	August 2021
2021 UChicago Undergraduate Research Symposium (<i>Poster</i>)	May 2021
AMNH REU Summer Symposium (<i>Talk</i>)	July 2020
233 rd Meeting of the American Astronomical Society (<i>iPoster</i>)	January 2019
SigmaXi Student Research Conference (<i>Poster</i>)	September 2018

TEACHING EXPERIENCE

Department of Astronomy, Columbia University

New York, NY

T.A. for ASTR UN2910: Introduction to Research Skills in Astro

January 2024 – Present

- Holding office hours, assisting with the development of curriculum, and occasionally teaching portions of the class

T.A. for ASTR UN1403: Earth, Moon, and Planets

September 2023 – December 2023

- Held exam review sessions and weekly office hours, answered student questions via email, and graded exams

- Department of Astronomy & Astrophysics, University of Chicago** Chicago, IL
T.A. for ASTR 21100: Computational Techniques in Astrophysics March 2022 – June 2022; March 2023 – June 2023
- Held biweekly office hours, graded problem sets, and assisted in development of curriculum
 - Independently developed a final project option for the course and guided students through completion of the assignment
- T.A. for ASTR 20500: Intro to Python with Applications to Astro Statistics* September 2022 – December 2022
- Taught weekly lab sessions, held biweekly office hours, graded problem sets, and assisted in development of curriculum

LEADERSHIP AND OUTREACH

- Columbia Astronomy Public Outreach** New York, NY
Member of the Public Lectures, Social Media, and Library Programs Committees September 2023 – Present
- Helped plan and execute biweekly public astronomy lectures that bring hundreds of visitors to Columbia's campus
 - Designed interactive, eclipse-themed programming for children and helped schedule/execute events at NYPL locations

- Women in Science (WiS), University of Chicago** Chicago, IL
President May 2021 – June 2023
- Led weekly board meetings and managed the annual recruitment and training of new board members
 - Planned and executed events intended to encourage interest in STEM careers and build community among members, including fireside chats with successful female scientists, career advice panels, and social/networking hours
- Vice President* May 2020 – May 2021
- Assisted with the planning and execution of WiS events; fulfilled the duties of the President when she was not available
 - Led a four-week workshop series in collaboration with the Society of Women Engineers to teach local high schoolers about STEM career paths, resume creation and formatting, interviewing best practices, and other career-oriented topics
- Social Media Coordinator* October 2019 – May 2020
- Managed the group's Facebook page by creating advertisements for club events and responding to member queries

- The Triple Helix, University of Chicago** Chicago, IL
Editor in Chief of the Spectrum June 2021 – June 2023
- Led a team of managing editors in coordinating quarterly writing cycles, including recruiting associate editors and writers, managing writer-editor pairs throughout the cycle, and publishing content on The Spectrum's website
 - Edited pieces spanning a wide range of scientific disciplines for readability and accuracy
- Science Writer* April 2020 – June 2021
- Wrote and published quarterly articles for *The Spectrum*, The Triple Helix's e-publication that features short articles about the intersection of science and society, on a variety of astrophysics and physics-related topics

WORK EXPERIENCE

- College Center for Research and Fellowships, University of Chicago** Chicago, IL
Undergraduate Assistant November 2021 – June 2023
- Supported the office's outreach activities by creating graphics and writing copy for social media posts, regularly updating the CCRF website, and maintaining an internal database of research and fellowship opportunities
 - Spoke on multiple panels aimed at informing the undergraduate population of national fellowship opportunities

- Research Computing Center, University of Chicago** Chicago, IL
Research Computing Support October 2020 – October 2021
- Staffed the virtual RCC Help Desk to provide users with timely and informative support for their computing needs
 - Handled account creation requests, cluster login issues, software install requests, and other common support tickets
 - Provided grant-writing and organizational support for a project to reduce the cost of electricity for the computing center

ADDITIONAL INFORMATION

Workshops: Code/Astro 2022, Caltech FUTURE 2021

Memberships: American Astronomical Society (2021 – Present); Condor Array Telescope Collaboration (2023 – Present)

Programming Languages: Python, Java, HTML/CSS, SQL, C, LaTeX

Languages: Native speaker of English. Proficient in German.

Interests: Video game design, science fiction, needle crafts (knitting, cross-stitch), soccer, German culture, novel-writing