

Xinyi Liu | Curriculum Vitae

Evanston, IL

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Education

Northwestern University, PhD Student, Evanston, IL *Expected June 2025*

- Doctor of Philosophy, Engineering Sciences and Applied Mathematics

Wheaton College

Norton, MA

Bachelor of Arts, Double Major in Mathematics & Physics

Sept 2015 - May 2019

with department honor, summa cum laude

- Double Minor: Astronomy, Music Performance
- Honors: Phi Beta Kappa, H. M. Pastra-Landis Prize in Physics, DAAD Research Internship Award, Mars Faculty-Student Research Grants, Wheaton Dean's Honor List (Fall 2015 - Spring 2019), Helen Zoe Duncan Prize in Piano Performance

Technical and Personal skills

- **Programming skills:** Python, MATLAB, C, R, Mathematica, HTML
- **Type-setting:** \LaTeX , Rmarkdown, Jupiter
- **Operating Systems:** Linux, Windows, Mac OS
- **Languages:** English, Chinese Mandarin

Research Experiences

Undergraduate Honors Thesis:

Norton, MA

Using Eclipse to Probe Physical Conditions Along the Jet in SS433.

Sept 2018 - June 2020

Department of Physics and Astronomy, Wheaton College. Advisor: Prof. Dipankar Maitra

- Modelled X-ray spectra of microquasar SS 433 with programmable spectroscopy package in S-Lang language.
- Analyzed the change of line centers, line widths and fluxes of emission lines using Voigt profiles to conjecture the physical properties of the jets from the compact object.
- Applied a four-temperature plasma model to the X-ray spectra to inspect spatial variation of physical conditions at different distances along the jet.

DAAD Summer Research Internship in Science and Engineering

Bremen, Germany

Department of Dynamical System, University of Bremen

May 2018 - Aug 2018

Supervisor: Prof. Dr. Marc Keßeböhmer

- Joined team of faculty and graduate studies researching on the Brownian motion on Sierpinski Gasket and the heat equations on its boundary.
- Simulated random walks on the fractal using Monte Carlo simulation method with MATLAB to find the hitting probability of Markov chains.
- Analyzed system's limiting behavior with different set-ups of transition probabilities.

Projects of Numerical Methods for PDE

- Solved 2D Nonlinear Schrödinger equation using Crank-Nicolson-Adam-Bashforth method.(2020)
- Modeled the earth-moon system to identify the five Lagrange points and found the energy stabled orbits for a satellite using leapfrog numerical method and Beeman's algorithm with MATLAB.(2018)

Mathematical Modelling of Proper Motion of Proxima Centauri

Norton, MA

Department of Physics & astronomy, Wheaton College

Jun 2017 - Sept 2017

Supervisor: Prof. Dipankar Maitra

- Obtained accurate positions of Proxima Centauri by comparing with reference stars using 200 images taken by Wheaton's telescope in Australia.
- Built a parameterized model for the motion of Proxima Centauri based on observations with MATLAB.

ArcGIS Digital Mapping Research

Land Preservation Society of Norton

Mentor: Prof. Dan Murray

Norton, MA

Jan 2016 - Aug 2019

- Led a team of 5 students to design digital maps for land properties in Norton using ArcGIS.
- Applied GPS device to survey GPS points of trails in Norton city and displayed analyzed data on the map.
- Prepared manuals and documentation on procedure of making digital map in professional software.

Presentations

20 Years of Chandra Science Symposium, MA

Poster

Xinyi, L. (2019, Dec) Using Eclipses to Probe the Jets in SS 433 using the Chandra High Energy Transmissions Grating Spectrometer

NASA Space Grant 2019 Symposium, Rhode Island School of Design, MA

15-min talk

Xinyi, L. (2019, April) Using Eclipse to Probe Physical Conditions Along the Jet in SS433.

APS March Meeting 2019, Boston, MA

15-min talk

Xinyi, L. (2019, March) Using Eclipse to Probe Physical Conditions Along the Jet in SS433.

WIMIN Conference, Smith College

15-min talk

Xinyi, L. (2018, September) MATLAB simulations of Brownian Motion on Sierpinski Gasket.

NASA Space Grant 2018 Symposium, RISD, MA

Poster

Xinyi, L. (2018, April) Modeling the Proper Motion of Proxima Centauri Based on Data Obtained Using the Wheaton 10" Telescope in Grove Creek Observatory in Australia.

Relevant Work Experiences

Calculus and Statistic Tutor

Boston, MA

Northwestern Math Place & Wheaton College Filene Center

Sept 2016 - Present

- Provided students at different levels learning math and science with academic guidance, including problem-solving skills and exam preparations.
- Helped students with homework and software (Mathematica and R) to improve problem-solving skills.

Teaching Assistant

Norton, MA

Department of Physics and Astronomy, Wheaton College

Sept 2017 - May 2019

- Graded homework and provided solutions for Physics First Year Seminar, Enhanced Intro Physics, Modern Physics, and Classical Mechanics.
- Assisted professors set up 6 experiments per month and helped students with in-class problems.

Leadership and Extra-curricular Activities

Flute & Solo Pianist

Norton, MA

Department of Music, Wheaton College

Sept 2015 - May 2019

- Performed 1st mvt of Mozart Piano Concerto in D minor with Wheaton Great Wood Symphony Orchestra.
- Played the flute in Wheaton Great Wood Symphony Orchestra for two years. Performed piano performance on student recitals, academic festival, and admission events every semester.

Co-President & Marketing Officer

Norton, MA

Wheaton Asian Student Association

Sept 2016 - May 2018

- Created ongoing dialog with group members to brainstorm on how to expand, promote, and strengthen the club by organizing weekly cultural activities.