

Aryana Haghjoo

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Aryana Haghjoo is an early-career astrophysicist with a strong foundation in both theoretical and data-driven research. She holds an M.Sc. in Physics from McGill University, where she specialized in computational global 21cm cosmology, and is currently pursuing a Ph.D. in Astronomy at the University of California, Riverside. Her recent research leverages deep learning to super-resolve low-resolution galaxy spectra.

Education

Ph.D. Astronomy, [University of California, Riverside \(UCR\)](#)

GPA: 3.7/4

Sept 2025 – Jun 2030 (Expected)

Riverside, California, USA

M.Sc Astronomy, [UCR](#)

GPA: 3.7/4

Sept 2024 – Sept 2025

Riverside, California, USA

M.Sc Physics, [McGill University](#)

GPA: 3.5/4

Sept 2021 – Dec 2023

Montreal, Quebec, Canada

Thesis Title: [Parameter Estimation of The Global 21cm Signal](#)

B.Sc Physics, [Sharif University of Technology \(SUT\)](#)

GPA: 18.25/20

Sept 2018 – Jul 2021

Tehran, Iran

Research Experiences and Projects

Super-Resolving Low-Resolution Galaxy Spectra with Deep Learning

Dec 2024 – Present

Under the supervision of [Bahram Mobasher](#) and [Shoubaneh Hemmati](#)

UCR

- Developed a generative model to enhance spectral resolution of PRISM data by a factor of 10 using data from the JADES program
- Trained and validated the model with a physics-informed loss function targeting emission line accuracy and flux ratios (e.g., $H\alpha/H\beta$), achieving improved deblending of close spectral features
- Demonstrated the potential of the method to increase the resolution of deep spectral data from future instruments (e.g., Nancy Grace Roman Space Telescope)
- Currently extending the model to a multi-modal foundation framework that integrates photometric and spectroscopic data, enabling cross-modal inference

H2O Mission Catalog

Dec 2024 – Present

Under the supervision of [Bahram Mobasher](#)

UCR

- Inspected 2D spectral data from the Keck Observatory
- Extracted spectroscopically confirmed sources
- Assisted in constructing the H2O catalog, including redshifts and emission lines

Investigating the Effects of Non-Standard Physics on the Global 21cm Signal

Sept 2021 – Dec 2023

Under the supervision of [Jonathan Sievers](#) and [Oscar Hernandez](#)

McGill University

- Investigated the potential of the global 21cm signal to reveal non-standard physics
- Developed a pipeline using Markov Chain Monte Carlo (MCMC) and Levenberg-Marquardt (LM) algorithms to estimate the astrophysical parameters of the global signal
- Employed Accelerated Reionization Era Simulations (ARES) to generate theoretical models
- Validated the approach using data from Experiment to Detect the Global EoR Signature (EDGES)
- Results will aid in constraining future models and defining theoretical limits for upcoming experiments

A Machine Learning Approach to Classification of Variable Stars

Jan 2020 – Sept 2020

Under the supervision of [Sadegh Raeisi](#) and [Sohrab Rahvar](#)

SUT

- Collaborated on the classification of variable stars in the OGLE dataset
- Applied machine learning techniques including KNN, random forest, and CNNs
- Addressed dataset imbalance challenges during model training

Honours and Awards

UCR Dean's Fellowship	2024
McGill Faculty of Science Graduate Award	2023
McGill Graduate Excellence Award	2021
Trottier Space Institute at McGill Graduate Fellowship	2021
National University Entrance Examinations: Top 0.5% Among 180K Candidates	2017

Presentations

Deep Learning for Astronomical Data Enhancement	June 2026
Poster presentation at the 248th AAS Meeting	Pasadena, CA
Learning to see sharper: A physics-informed AI Framework for Spectral Super-Resolution	June 2026
Poster presentation at the 2026 Conference on Physics and AI (PAI26)	Stanford University
Learning to see sharper: A physics-informed AI Framework for Spectral Super-Resolution	Apr 2026
Verbal presentation at the AstroAI Lunch Talks (Invited)	CfA, Harvard and Smithsonian
Learning to see sharper: A physics-informed AI Framework for Spectral Super-Resolution	Mar 2026
Verbal presentation at the Euclid US Tag up Meeting (Invited)	Euclid Consortium
Super-Resolving Low-Resolution Galaxy Spectra	Jan 2026
Poster presentation at the Arizona Winter School on Cosmology in the Roman ST Era	University of Arizona
Super-Resolving Low-Resolution Galaxy Spectra	Oct 2025
Verbal presentation at the IR Spectroscopy from Space	IPAC, Caltech
Super-Resolving Low-Resolution Galaxy Spectra	Aug 2025
Verbal presentation at the Greater IPAC Science Symposium	IPAC, Caltech
Super-Resolving Low-Resolution Galaxy Spectra	Jul 2025
Poster presentation at the Cosmic Cartography with Roman	Space Telescope Science Institute
Super-Resolving Low-Resolution Galaxy Spectra	Jul 2025
Verbal presentation at the AstroAI Workshop	CfA, Harvard and Smithsonian
Unraveling Non-Standard Physics Through the Global 21cm Signal	Jun 2023
Verbal presentation at the SUT Cosmology Seminar	SUT
Parameter Estimation of the Global 21cm Signal	Mar 2023
Poster presentation at Cosmology on Safari 2023	Hluhluwe, South Africa
Clarifying the Effects of Non-Standard Physics on the Global 21cm Signal	Oct 2022
Verbal presentation at the McGill Radio Lab Meetings	McGill University
Effects of Non-Standard Physics on 21cm Signal	May 2022
Verbal presentation at the McGill Early Universe Cosmology Meetings	McGill University

Work Experience

Teaching Assistant	2025 – Present
Department of Physics and Astronomy	UCR
Teaching Assistant	2022 – 2023
Department of Physics	McGill University
Teaching Assistant	2019 – 2020
Department of Physics	SUT

Technical Skills

Programming Languages	Python, Matlab, $\text{\LaTeX}$ Bash, C, C++, Quick Basic, Visual Basic
Platforms	GitHub, GitLab, SLURM

Languages

Persian	Native
English	Fluent / Full Professional Proficiency

Selected Courses

Undergraduate Program

- Machine Learning in Physics
- General Relativity
- Quantum Field Theory
- String Theory
- Elementary Particles
- Modeling Statistical Phenomena
- Complex Systems

Graduate Program

- Computational Physics
- Galaxy Formation and Evolution
- Astrophysics of the Interstellar Medium
- Advanced Cosmology
- Observational Astrophysics
- Radiative Processes in Astrophysics
- Stellar Structure and Evolution

Other Activities and Interests

Mentor at STEM High school, Assisting senior students on their projects	Sept 2025 – Mar 2026
Member, TEDxAveLorne Curation Team	Jul 2023 – Dec 2023
Representative, McGill Graduate Association of Physics Students (MGAPS)	Jan 2023 – Dec 2023
SUT Mentoring Program Volunteer: Senior-Freshman Buddy Program	2020 – 2021
Amateur Astronomer: Outreach Observing Nights	2015 – 2020

References

Bahram Mobasher	Distinguished Professor, UCR	✉ mobahser@ucr.edu
Shoubaneh Hemmati	Research Scientist, Caltech	✉ shemmati@ipac.caltech.edu
Jonathan Sievers	Associate Professor, McGill University	✉ jonathan.sievers@mcgill.ca
Oscar Hernandez	Adjunct Professor, McGill University	✉ oscarh@physics.mcgill.ca
Bahram Mashhoon	Emeritus Professor, University of Missouri	✉ mashhoonb@missouri.edu
Shant Baghran	Associate Professor, SUT	✉ baghran@sharif.edu