Curriculum Vitae

Reza Monadi

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Education

Physics, University of California, Riverside, *California*, USA, 2017-2023. **Ph.D.**
Thesis Topic: Statistical studies of quasar spectra

Astrophysics, Shahid Beheshti University, *Tehran*, Iran, 2010-2013. **M.Sc.**
Thesis Topic: Statistical studies of glitches in pulsars

Physics, University of Guilan, *Rasht*, Iran, 2005-2009. **B.Sc.**

Teaching Experience

Discussion: Electricity and Magnetism, *UC Riverside*, Spring 2022, I helped the students to work out the problems in their assigned groups. Then I directed group heads to discuss their solutions with the rest of the class. **Teaching Assistant**

Discussion: Physics for life sciences, *UC Riverside*, Fall 2021 and Winter 2022, I discussed some problems in each session while asking for volunteers to express their ideas about each question. **Teaching Assistant**

Discussion: Adventure in astronomy and astrophysics, *UC Riverside*, Spring 2021, We discussed some problems in each session and then I gave a relevant quiz to the class. **Teaching Assistant**

Discussion: Space-Time, Relativity, And Cosmology, *UC Riverside*, Winter 2021, I reviewed the instructor's main points and then took a quiz at the end. **Teaching Assistant**

Lab: General Physics, *UC Riverside*, Winter 2019, I gave a short lecture at the beginning, give a pre-quiz, helped students with any issues with their lab manual or pieces of equipment, and graded their lab reports. **Teaching Assistant**

Lab: Electricity and Magnetism, *UC Riverside*, Fall-2017, Winter-2018, I wrote pre-lab quizzes and helped students in understanding the lab manual and electrical circuits and equipment. Also, I graded their lab report. **Teaching Assistant**

Lab: Electricity and Magnetism, *University of Guilan*, 2015-2017, I wrote exams, prepared lectures, helped them in performing experiments, and graded their reports and exams. **Lab Instructor**

Astronomy, *Mirza Kouchak High School*, 2015-2017, I taught introductory astronomy, conducted some research projects about physics and astronomy, helped them in a science fair competition, and I was a judge in a student research competition. **Teacher**

Astronomy and Cosmology, *Thaqib Astronomical Association*, 2012-2017, I taught cosmology and introductory astronomy in various classes during the summer program of the astronomy association. **Teacher**

Advising Undergraduate Research

- I advised an undergraduate student to write a bachelor's thesis about a statistical study on the properties of pulsars.

Research Experience

- **Selecting Extremely Red Quasars using Machine Learning:**
  I carried out different *clustering analyses* and *outlier detection* methods and did a comparative analysis on the spectra of extremely red quasars. We could find more exotic quasars in the class of extremely red quasars in a large sample of more than 30000 objects which was very challenging. Our machine learning-based selection criteria could find more extremely red quasars with even more exotic physical properties.
- **Cataloguing CIV absorption lines using machine learning:**
  I built the largest triply ionized carbon absorption catalog using *machine learning* which is combination of *Bayesian* analysis and *Gaussian Processes*. I classified a large sample of quasars (Sloan Digital Sky Server DR12) consisting of more than 185000 objects. The the resultant catalog will be widely used by our group and other astrophysicists and will have a lot of impact on the community. I presented a poster and gave a short talk at a conference about this project. Also, I am preparing a paper.
- **Data mining graduate course research**: *I did* outlier detection *and* dimensionality reduction *to uncover a population of outlier Quasars in SDSS DR16Q and* visualize *them. I got an* A^+ *in this course considering that it was offered to graduate students in a different department (i.e. department of computer sciences).*
- **Statistical study of glitch in pulsars:**
  I did **correlation analysis** and **statistical inference** to study glitches in radio pulsars. I investigated if the glitch events are random or can be modelled by Poisson processes. This resulted in my master's dissertation.
- **General Relativity of charged and magnetized super dense stars:**
  We studied the stellar structure of a charged and magnetized strange quark star. We made a novel assumption about the internal pressure of strange quark stars and our calculations were compatible with a newly observed mass of a pulsar which could not be explained by previous models. This project resulted in a paper published in the Chinese Physics Letters journal.
- **Complexity of pulsars pulse profile:**
  We used complexity measures in the literature and introduced a novel one and then examined them on a sample of high-resolution millisecond pulsars pulse profiles. Then we simulated some pulse profiles and tested our algorithm on them. We then try to relate the complexity of a pulsar pulse profile. to the physical properties of pulsars. We submitted a paper about this project to the Monthly Notices of Royal Astronomy journal and it is under review.
- **Undergraduate research:** *I designed and built a simple but novel solar positioning system. I presented my project as a poster at the most important annual physics conference in Iran considering most of the participants were graduate students while I was an undergrad.*

Publications

- Studying Carbon in quasar absorption lines: Constructing the catalog with Gaussian processes, **Reza Monadi**, Simeon Bird, Ming-Feng Ho, Kathy Cooksey (in prep.)
- Improved selection of extremely red quasars with boxy CIV lines in BOSS, **R. Monadi**, Simeon Bird, Monthly Notices of the Royal Astronomical Society 511 (3), 3501-3513
- A Gaussian Model for Anisotropic Strange Quark Stars: H. Panahi, **R. Monadi** and I. Eghdami, Chinese Physics Letters 33 (7), 072601, 2016,

Presentations

- **Talk:** Machine learning uncovers the hiden gems of Universe: Albuquerque, NM, 242 American Astronomical Society Summer Meeting, Jun 2023
- **Talk:** Cataloging metal lines using machine leraning: iid2022 Conference, Alabama, Nov. 2022
- **Talk:** Detecting CIV absorption lines in SDSS spectra with Gaussian Processes
  Debating the potential of machine learning in astronomical surveys, Institut d'Astrophysque de Paris, France, 2021
- **Poster:** Improved selection of extremely red quasars with boxy CIV lines
  Statistical Challenges in Modern Astronomy VII, Pennsylvania University, USA, 2021
- **Talk + Poster:** Precise Selection of Extremely Red Quasars
  Keck Science Meeting, University of California, Los Angeles, USA, 2019

Research Skills

Python, MATLAB, FORTRAN, SQL. **Programming languages**

UC Riverside's HPC cluster, Amazon Web Service. **High-Performance Computing**

Outliers, Clustering, Classification, Dimensionality reduction. **Machine Learning**

Bayesian Analysis, Gaussian Processes. **Statistics**

Workshops

- Multi Messenger Astronomy Workshop organized by UC Berkeley, Summer 2023
- Graduate Certificate in Science to Policy, Fall 2022
- UCR Leadership in Science Workshop, Spring 2022
- UCR Public Speaking Certificate, Spring 2019

Services

- Volunteer in 242 American Astronomical Society Summer Meeting, Jun 2023
- Volunteer in 2021 Fall Joint UC Software Carpentry Workshops.
- Rviewer for the Journal of Cosmology and Astroparticle Physics, Feb. 2022
- Educator for outreach events at UC Riverside for K-12 students 2019-2021
- Scientific Judge for Riverside County Science and Engineering Fair, 2020
- Scientific Judge for Inland Empire High schools competition, UC Riverside, 2019
- Scientific Organizer of science fairs, Thaqib Astronomy Association, Iran, 2017
- Educator in at Thaqib astronomy association, Iran, 2013-2017

Honours and Awards

- Travel grant for giving a talk in the *"Statistical Methods for Event Data Illuminating the Dynamic Universe"* conference from the conference organizers.
- UC Riverside's graduate students association travel grant for attending two conferences
- Dean's distinguished fellowship award, UC Riverside, 2017-2020
- Top 2% in PhD program applicants for physics in Iran, 2013
- Top 1% in MSc program applicants for physics in Iran, 2010