Arta Khosravi *She/Her*

Female | Persian | Religion: Zoroastrian (Not-Muslim)
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Arta Khosravi | artakh10

With a Master of Science degree in Gravity and Cosmology, my research interests encompass Accretion Disks, Active Galactic Nuclei, Dark Energy and Dark Matter, Black Hole Cosmology, and Negative mass cosmology. As a Research Assistant with more than two years of experience, I am dedicated to advancing our understanding of the universe through cutting-edge research and using computational analysis methods.

Education

Shahid Beheshti University
2021 – 2023
M.Sc of Gravity and Cosmology — *Tehran, Iran*

- Overall GPA: 14.89/20 (WES format: 3.2/4.0)
- Thesis Title: Negative Mass Cosmology with SNIa and BAO Data.
- Supervisors: Prof. Marzieh Farhang, Prof. Hossein Shojaei
- Thesis Grade: Outstanding

Shahid Beheshti University
2016 – 2021
B.Sc of Physics — *Tehran, Iran*

- Overall GPA: 15.49/20 (GPA of last year: 17.92/20) (WES format: 3.03/4.0; WES format of last year: 4.0/4.0)

  Final Projects:
- Thesis title: Exoplanets and Habitable Zones
- Supervisor: Prof. Nima Khosravi
- Importance of Quasars for Dark Energy properties: during the Cosmology Undergraduate course

Research Experience

PDAT – Physics Data and Astronomy Technology Laboratory
Dec. 2023 – Present
Research Assistant — *Tehran, Iran*

› **Working on Cosmological Models by considering large-scale structures via the Friends of Friends & MCMC Algorithm.**
Using Data Analysis to efficiently group AGNs with the Friends of Friends Algorithm, applying flux and volume constraints from the QUOTAS Dataset; currently we're using the initial and corrected data to compare for different probabilities using different models with the MCMC (Metropolis) Algorithm. – The GitHub Code is available **here.**

PDAT – Physics Data and Astronomy Technology Laboratory
April 2023 – Present
Research Assistant — *Tehran, Iran*

› **Working on "On the Accretion Efficiency of High Redshift Quasars based on the QUOTAS & QuasarNET Data set". *(Paper is under preparation.)***
Using Data Analysis and Machine Learning to Investigate the Relations between *Black Hole Accretion Rate* and Super Massive Black Hole Mass, Bolometric Luminosity, Radiation Rate, Optical luminosity (νL_ν), Eddington Ratio (λ_{edd}) and Redshift Using the QUOTAS and QuasarNET data and to find the best fit with logical parameters. **Code and draft are available per request.**

PDAT – Physics Data and Astronomy Technology Laboratory
Jan. 2023 – April 2023
Research Assistant — *Tehran, Iran*

› **Worked on rotating Black Hole's Spin Effect on Black Hole Accretion Rate.**
Using Data Analysis via Python to Investigate whether a rotating BH's Spin (a) can affect BH's Accretion efficiency or not.

PDAT – Physics Data and Astronomy Technology Laboratory
Sep. 2022 – Jan. 2023
Research Assistant Intern — *Tehran, Iran*

› **Worked on Thermal Evolution from 21cm emission.**
Using Data Analysis via Python to solve the Thermal evolution equation from 21cm heating, Lyα heating, and X–ray heating; and Investigating the relation between T_k and T_{spin} with Redshift using 21CMSOLVER code.

Shahid Beheshti University
Jun. 2022 – Oct. 2023

Research Assistant — *Tehran, Iran*

- **M.Sc. Thesis Title: Negative Mass Cosmology with SNIa and BAO Data.** – The GitHub code is available **here**.
- Abstract: The Thesis presents the concept of negative mass in the cosmological model. We explore the potential impact of negative mass on the acceleration of the universe's expansion and its role as a component of the cosmos. The study aims to determine if the cosmological constant and cold dark matter can assume negative values within this model. A novel model is proposed to explain the observed positive acceleration of the cosmos in terms of the Hubble parameter while discounting certain characteristics. The model is tested using type Ia supernovae and baryon acoustic oscillations data, revealing two scenarios for obtaining the best values of cosmic parameters. It is important to note that this project does not investigate the negative mass cluster.
- Supervisors: Prof. Marzieh Farhang, Prof. Hossein Shojaei
- Future Aspects Include: Investigating the effects of Negative mass and comparing the data by adding another set of parameters Using MCMC.

Shahid Beheshti University
Nov. 2019 – Jun. 2020

Research Assistant — *Tehran, Iran*

- **B.Sc. Thesis Title: Exoplanets and Habitable Zones.**
- Supervisor: Prof. Nima Khosravi
- Abstract: Exoplanets are planets that orbit stars other than the sun, offering valuable information about planetary formation, evolution, and the possibility of extraterrestrial life. Despite challenges in detection and characterization, the study of exoplanets is crucial for understanding their significance to Earth and exploring potential habitable zones.

Publications

A. Khosravi, A. Karamzadeh, S.S. Tabasi, J.T. Firouzjaei, "On the Accretion Efficiency of High Redshift Quasars based on the QUOTAS & QuasarNET Data set"

- Under preparation, soon to be submitted to arXiv in Feb. 2024.

Teaching Assistant Experience

Shahid Beheshti University
Feb. 2023 – Jun. 2023

Teacher Assistant — *Tehran, Iran*

- Course: Cosmology (I) for Graduate Students
- Reference: Cosmology by Daniel Baumann
- Lecturer: Prof. Hossein Shojaei
- Highlights: Responsible for holding exercise classes, Designing computational exercises using Python and Mathematica, preparing students, recitations, and grading homework.

Workshops, Seminars, and Meetings

Cosmology: From Theory to Observation — Aug. 2023
Institude for Research in Fundamental Sciences (IPM) — *Tehran, Iran*

Cosmology and Astrophysics with New Data — Jul. 2022
K. N. Toosi University of Technology — *Tehran, Iran*

Machine Learning and Physics — June. 2022
SciSchool Institude — *Tehran, Iran*

Statistical Analysis of Cosmic Fields — Oct. 2021
Shahid Beheshti University — *Tehran, Iran*

Introduction to Various Topics in Quantum Physics — Oct. 2020
Inter Disciplinary Schools — *Tehran, Iran*

Introduction to Cosmology — Oct. 2020
Inter Disciplinary Schools — *Tehran, Iran*

Neuroscience: From Conciseness to Memory — Sep. 2019
Sharif University of Technology — *Tehran, Iran*

Research Interests

- Data Driven Cosmology
- Computational Cosmology and Astrophysics
- Accretion disks (Accretion efficiency)
- Active Galactic Nuclei (Quasars)
- PBH and SMBH cosmology
- Exopalents
- Dark matter and Dark Energy
- 21cm Cosmology
- Gravitational Waves
- Planet Formation
- Large Scale Structure
- Intergalactic Mediums
- Negative Mass Cosmology
- Interactive Dark Matter and Dark Energy (IDM)

Skills

Programming Languages Python, C++

Development Tools, Algorithms and Technologies Pandas, Seaborn, Matplotlib, SciPy, SymPy, NumPy, Scikit-Learn, TensorFlow, Git, Jupyter Notebook, WordPress, Friends of Friends (FOF) Algorithm, MCMC/Metropolis Algorithm, etc.

Softwares Wolfram Mathematica (xAct, etc.), Astrometrica, Microsoft Office, Adobe (Photoshop, After Effects, InDesign)

Industry Knowledge Machine Learning, Data Analysis, Statistical Data Analysis, Numerical Analysis

Markup Languages HTML5, CSS3, LaTeX

Languages English (Full professional proficiency), Farsi (Native), Dutch (Basic), French (Basic), Arabic (Basic)

Familiar with Ubuntu, Julia, Jekyll

Honors and Awards

Ranked within the top %10 in Gravity and Cosmology among my M.Sc. graduating class. Sept. 2023
Shahid Beheshti University *Tehran, Iran*

Ranked within the top %15 in Physics among my B.Sc. graduating class. Dec. 2020
Shahid Beheshti University *Tehran, Iran*

Ranked within the top %2 In the Iranian University Entrance Exam for Master Degree. 2021
For Shahid Beheshti University *Tehran, Iran*

Ranked within the top %3 In the Iranian University Entrance Exam for Bachelor Degree. 2016
For Shahid Beheshti University *Tehran, Iran*

Got Through the first level of Astronomy Student Olympiad. 2015
Manzoumeh Kherad Institute *Tehran, Iran*

Got Through the first level of Physics Student Olympiad. 2015
Manzoumeh Kherad Institute *Tehran, Iran*

Ranked within the Top three projects in Physics and Astrophysics Society two years in a row. 2014–2015
Manzoumeh Kherad Institute *Tehran, Iran*

Relevant Courses

Supervised Machine Learning: Regression and Classification Coursera
by Andrew NG

Data Analysis Using Python Pazhvak Danesh
by Mahdieh Tavakoli

Introduction to General Relativity In Mathematica Using xAct SciSchool Institute
by Sajad Aghapoor

Graduate Cosmology (II) — Shahid Beheshti University
by Prof. Nima Khosravi — *Grade: 4.0/4.0*

Advanced Astrophysics (I) — Shahid Beheshti University
by Prof. Sadollah Nasiri Gheydari — *Grade: 4.0/4.0*

Under-Graduate Cosmology — Shahid Beheshti University
by Prof. Nima Khosravi — *Grade: 4.0/4.0*

Under-Graduate Astronomy & Astrophysics — Shahid Beheshti University
by Prof. Nima Khosravi — *Grade: 4.0/4.0*

Earth in Space — Shahid Beheshti University
by Prof. Alireza Salehipoor — *Grade: 4.0/4.0*

References

Prof. Marzieh Farhang | Associate Professor at Physics Department of Shahid Beheshti University

M.Sc. Supervisor

Email: M_farhang [at] sbu.ac.ir

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Prof. Javad Taghizadeh Firouzjaee | Associate Professor at Physics Department of Khajeh Nasir Toosi University of Technology

Supervisor at Physics Data and Astronomy Technology Laboratory

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Prof. Hossein Shojaei | Assistant Professor at Physics Department of Shahid Beheshti University

M.Sc. Supervisor

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