Saba Etezad Razavi

Curriculum Vitae

Department of Physics
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sabaetezadrazavi.github.io

1 Research Interests

- Cosmology, Structure formation, Dark Matter and Dark Energy, Re-ionization
- Quasars, Compact objects and gravitational waves
- Early universe cosmology and primordial black holes

2 Education

2017 - 2022 **B.Sc. Physics** — Tehran, Iran
Sharif University of Technology (SUT) — current GPA: 19.01/20
The Top Ranked Physics Department in Iran

2013 - 2017 **Diploma in Mathematics and Physics** — Mashhad, Iran
Farzanegan 1 High-school
National Organization for Development of Exceptional Talents (NODET/SAMPAD)

3 Publications

2021 **Unraveling the role of cosmic velocity field in dark matter halo mass function using deep learning:** https://arxiv.org/abs/2112.14743

4 Research Experience

Oct 2021 - present / AEI[1]-Paid Internship
Understanding the accuracy and bias in the estimation of Hubble constant using BBH merger observations and galaxy catalogs
(Git) */ Dr. Sumit Kumar*
We measure the hubble constant by cross-correlating gravitational wave(GW) signal's parameter estimation and galaxy catalogs. We investigate the biases in the method mocking the procedure with simulations. Using this method we'll investigate the effect of future LISA observations in H0 measurements.

Jul 2021 - Oct 2021 / MPIA[2]-Paid Internship
Constraining temperature fluctuations from helium re-ionization using XQ100 dataset
To be submitted to MNRAS. (Draft, Slides)
Dr. Sarah Bosman - Dr. Frederick Davies
Using the quasar spectroscopy in $3 < z < 4$ and PCA method and comparing the observed amount of transmissions in Lymanα forest to Nyx[3], a cosmological numerical simulation, we put constraints on the amount of temperature fluctuations in IGM resulted by helium re-ionization.

Jan 2020 - Jul 2021 / SUT
Machine learning in structure formation
Submitted to MNRAS. (arXiv, Git)
Dr. Shant Baghram - Dr. Sadegh Raeisi - Dr. Farbod Hassani
We Develop an interpretable Convolutional Neural Network (CNN) model using the phase space information of dark matter particles at their initial condition using the **Millennium**[4]data and later **Gevolution**[5]simulations, to predict the halo mass function in $z = 0$ and getting insight toward the physical process of dark matter structure formation.

Jan. 2019 - Jan. 2020 / SUT
Probing primordial black holes (PBH) in the universe as a candidate for dark matter
Report (Persian only) */ Dr. Shant Baghram*
I reviewed the current state of the research on Primordial Black Holes as a dark matter candidate with a focus on the physics and the potenital reach of the gravitational wave background.

Jan 2021 - Jul 2021
Photometry of dwarf galaxies
Dr. Atefeh Javadi

[1]AEI: Max Planck Institute for Gravitational Physics, Albert Einstein Institute - Hannover/ Germany
[2]MPIA: Max Planck Institute for Astronomy - Heidelberg/ Germany
[3]Nyx Simulation: https://amrex-astro.github.io/Nyx/
[4]Millennium Simulation: https://wwwmpa.mpa-garching.mpg.de/millennium/
[5]Gevolution Simulation: https://arxiv.org/abs/1604.06065

5 Computer Skills

Advanced	Python, SQL, Unix, Machine Learning and Deep Learning, Data Analysis, C and C++, LaTeX
Intermediate	Mathematica, MATLAB
Softwares	IRAF, ds9, PyCBC, Rockstar halo finder, Pylians3, PyGadget, Tensorflow, scikit-learn

6 Teaching Experience

Teaching Assistant SUT

Fall 2020 - *Special Relativity, instructor: Dr. Shant Baghram*

Fall 2019 - *Laboratory of general physics (acoustic, optic and fluids), instructor: Dr. Sadegh Raeisi*

Fall 2018 - *Fundamentals of Programming C & C++, instructor: Dr. Maryam Asadi*

2016 - 2017 **Teaching Astronomy and Astrophysics Olympiad** Mashhad, Iran
-Spherical Astronomy and Introduction to Cosmology and Galactic Dynamic
Farzanegan 1 high-school

7 Talks

Feb. 2022 **Constraining IGM temperature fluctuations between redshift 3 and 4 using XQ100 (SAZERAC- Learning the high-redshift universe)**

Oct. 2021 **Constraining Temprature fluctuations in the IGM (Galaxy Coffee Seminars)** MPIA - Heidelberg

Oct. 2021 **Constraining Temprature fluctuations in the IGM (Cosmo Seminars)** SUT - Online

Oct. 2020 **Primordial Black Holes as a candidate for Dark Matter** SUT - Tehran

8 Conferences and Workshops (Attended)

Jan 2020 **Cosmology 2021: The rise of field theory**

July - August 2020 **DESY summer school in particle physics**
Terascale Summer School

July 2020 **New England Workshop on Theoretical Cosmology, Gravity, and Fields**

July 2019 **15th Summer School on Modern Astrophysics**
Astrosoma 2019 Moscow Institute of Physics and Technology(MIPT)

May-June 2019 **Data Science workshops** Iranian Institute for Research in Fundamental Sciences(IPM)
Statistical analysis, Machine learning, Deep learning(ANNs, Tensorflow)

Feb. 2019 **4th IPM Workshop on Particle Physics Phenomenology**
IWPPP IPM

Jan. 2018 **Workshop on Recent Progress in Hydrodynamics and Quantum Chaos (HQC)** IPM

Feb. 2018 **Cosmology: From theory to observations** IPM

9 Awards and Honors

2016 **National Astronomy and Astrophysics Olympiad** Tehran, Iran
Young Scholars Club, bronze medalist

2016 - present **Member of National Elite Foundation and awarded full scholarship for undergraduate studies**
Iran National Elites Foundation (INEF) is a statewide organization and consists of members with significant scientific and executive background.

2015 **Member of the national team of the 8th international scientific league of PAYA in physics** Tehran, Iran

2010 and 2013 **National Organization for Development of Exceptional Talents** Iran
Accepted in the junior school and high school Entrance Examination

10 Languages

Native	Persian
Fluent	English - TOEFL iBT score : 106

11 Conferences and Workshops (Organized)

Nov. 2018 **Dark Matter Day** convention — Physics Department of SUT
Member of organizing committee

May. 2018 **The 6th Workshop on "Collaborative Scientific Software Development and Management of Open Source Scientific Package"**
Member of local organizing staff — International Centre for Theoretical Physics (ICTP), Tehran, Iran

12 Outreach and engagement

2020 - present Member of the **Supernova Foundation**, an international community of women in physics. Supernova is a mentoring program designed to inspire and support young women and gender minorities who are looking to pursue careers in Physics. You can find more information about this world-wide program here.

2018 - present Involved in scientific magazines such as member of scientific and interview committee of **Shabahang Trade Magazine** (about astronomy and cosmology), and member of the scientific committee of **Takane Trade Magazine**; Takane is ranked the best Persian scientific journal by Iran Ministry of Science, Research and Technology.

Sep. 2018 - Sep. 2019 Host and presenter of **Tea and Physics Meetings**
Tea and Physics is a series of successful weekly meetings at Physics department of Sharif University for faculty and students to discuss scientific news and physics phenomena behind everyday observations.

Sep. 2018 - present Representer of **Zharfa Student Society**
Zharfa is a multi-major scientific society of students of physics, mathematics and philosophy of science.

Dec. 2019 - Sep. 2020 **Host of Philosophy of physics gatherings**
We started a series of conferences and meetings for reading historical papers in quantum mechanics together with the goal of investigating different philosophical approaches of quantum mechanics.

Dec. 2018 **Sharif University Open Day** — Physics Department of SUT
Performing experiments for high school students

13 References

Dr. Shant Baghram, *Associate Professor* — *baghram@sharif.edu*
SUT, Department of Physics

Dr. Sarah E. I. Bosman, *Research Fellow* — *bosman@mpia.de*
MPIA - Heidelberg

Dr. Sadegh Raeisi, *Assistant Professor* — *sraeisi@sharif.edu*
SUT, Department of Physics

Dr. Sumit Kumar, *Research Fellow* — *sumit.kumar@aei.mpg.de*
AEI - Hannover