

Sina Ghafouri

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Education

2019—
present **Degree:** Master of Science in Physics of Complex Systems
 Where: Shahid Beheshti University, Tehran, Iran
 GPA: 16.42 of 20

2014—
2019 **Degree:** Bachelor of Science in Physics
 Where: Shahid Beheshti University, Tehran, Iran
 GPA: 14.44 of 20

Research Interests

- Statistical Physics, Stochastic Processes and Complex Systems
 - Topological Data Analysis (TDA) of Brain Networks
 - Agent Based Modeling
 - Complex Network Analysis in Neuroscience and Social Science
 - Using Data Analysis and Machine Learning in Complex Systems
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Research and Academic Projects

2020—
2021 **Project:** TDA of Biological Datasets for Anomalies Diagnostic
 Where: Shahid Beheshti University
 Advisor: Dr. M. Sadegh Movahed
 Contributions:

- We used topological data analysis (TDA) in order to analyze biological datasets. We trained a support vector machine (SVM) model with the feature vectors obtained by persistent homology to locate infected regions in chest CT scan.

2017—
2018 **Project:** Signal Analysis and Manipulation with Python
 Where: Shahid Beheshti University
 Advisor: Dr. Ali Sadeghi
 Contributions:

- I used different data analysis methods like Fourier transform, singular value decomposition (SVD) and JPEG to analyze and manipulate audio and image datasets.

2021—
present

Project: Dynamical Time Series Analysis using Persistent Homology

Where: Shahid Beheshti University

Advisor: Dr. M. Sadegh Movahed

Contributions:

- I am part of a team that is trying to classify dynamical systems based on chaotic and periodic behaviour using and persistent homology.

2022—
present

Project: Sentimental Analysis on Persian Twitter

Where: Shahid Beheshti University

Advisor: Prof. G. Reza Jafari

Contributions:

- I am part of a team that is trying to train a model to provide sentimental analysis of Persian comments on Twitter regardless of context.

Skills

- **Proficient in Python and it's major Scientific, Data Analysis and Visualization libraries:** NumPy, SciPy, scikit-learn, TensorFlow/Keras, Pnadas, Matplotlib, Seaborn, PyGame, Ripser, Gudhi.
- **Experienced in:** C/C++, R, MySQL.
- **Casually using:** Linux shell, \LaTeX .

Honors and Awards

- Ranked First at Iranian Young Physicists Tournament held at Shahid Beheshti University (2014)
- Accepted in the First Level of National Physics Olympiad (2011)

Teaching

2021

Position: Teaching Assistant

Course: Advanced Computational Physics

Where: Department of Physics, Shahid Beheshti University

2021 **Position:** Teaching Assistant
Course: Optimization and Computational Approaches
Where: Department of Physics, Shahid Beheshti University

Publications

- **Sina Ghafouri**, Mehdi Yousefzadeh, Seyed Mohammad Sadegh Movahed. "*Topological Analysis of Lung CT Scan Images*". In: The 4th Iranian computational physics conference (Summer 2021).
 - **Sina Ghafouri**, Mehdi Yousefzadeh, Seyed Mohammad Sadegh Movahed. "*TDA Based ML Algorithm for Positioning of Infection in Chest CT Scan*". In: The 5th Iranian computational physics conference (Winter 2022).
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Talks and Presentations

- **Topological Analysis of Lung CT Scan Images**
Summer 2021, the 4th Iranian Computational Physics Conference, Isfahan University of Technology.
 - **TDA Based ML Algorithm for Positioning of Infection in Chest CT Scan**
Winter 2022, the 5th Iranian Computational Physics Conference.
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Attended Workshops

2020 **Where:** University of Maryland
Title: Understanding and Exploring Network Epidemiology

Description:

- participants engaged in rigorous multidisciplinary research and training alongside some of the top researchers in the field of network science.

2021 **Where:** Physics Department of Shahid Beheshti University
Title: Statistical Analysis of Cosmic Fields

Description:

- We learned and used some common statistical tools like two-point correlation function, Fourier transform and excursion sets for cosmological data analysis.

References

- **Dr. M. Sadegh Movahed**

@ Department of Physics, Shahid Beheshti University, Tehran, Iran

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● Professor of Physics, Shahid Beheshti University

● Resident researcher, School of Physics, Institute for research in fundamental sciences (IPM), Tehran, IRAN. (2013-2021)

● Junior Associate of ICTP, International Center for Theoretical Physics, Trieste, ITALY (2009-2016)

- **Prof. G. Reza Jafari**

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● Professor of Physics, Shahid Beheshti University

● CCNSD, Physics Department, Shahid Beheshti University (SBU), Tehran, Iran

● The Institute for Cognitive and Brain Science (ICBS), Shahid Beheshti University (SBU), Tehran, Iran

- **Dr. Ali Hosseiny Esfidvajani**

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● Assistant Professor, Physics Department, Shahid Beheshti University, Tehran, Iran

● Resident Researcher, School of Particles and Accelerators Institute for Researches in Fundamental Sciences (IPM), Tehran, Iran