

Fatemeh Bagheri

Exoplanet and Planetary Scientist
Astrophysicist

CONTACT

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📍 US citizen

? INTERESTS

- Exoplanets
- Planetary magnetosphere
- Astrobiology and habitability
- Stellar wind-magnetosphere coupling

🎓 EDUCATION

University of Texas at Arlington (UTA)

2021 **Ph.D.**

Space Sciences

Dissertation: Energy Dissipation during Geomagnetic Storms

Sharif University of Technology (SUT)

2021 **Ph.D.**

Astrophysics

Dissertation: Detection of Exoplanets using Space-based telescope via microlensing binary-source events

2013 M.Sc. Gravity and Cosmology

2011 B.Ss. Physics

SKILLS

Programming languages

Most used: Python, Fortran,

Some: MATLAB, C++

Other

- Git, Cloud compuAng
- LaTeX, MS Office
- Linux, Windows, and Mac OS

Languages:

English

Persian

EXPERIENCE

📅 2024-pres. 📍 NASA Goddard Space Flight Center

NPP Postdoctoral Fellow

- Investigated the influence of planetary rotation on solar wind-magnetosphere coupling through advanced MHD simulations.
- Developed and implemented modifications to the Space Weather Modeling Framework (SWMF) to accurately model planetary environments in sub-Alfvénic regions.

📅 2022-2023 📍 UTA

NSF MPS/Ascend Postdoctoral Fellow

- Pioneered a novel method for detecting exoplanets and exomoons by analyzing their radio emissions, which are generated through interactions between solar wind and planetary magnetic fields, enhancing detection capabilities.
- Utilized the GAMERA MHD code to simulate interactions between exoplanetary magnetic fields and various stellar winds.

📅 2023 📍 UTA

Assistant Professor of Instruction

- Instructed Python for Data Science course for undergraduate students.

📅 2022 📍 UTA

APS Data Science Education Community of Practice (DSECOP) Fellow

- Created and taught two educational modules for deep learning and random forest methods for undergraduate students in physics.

📅 2020-2021 📍 UTA

Graduate research assistant **Advisor: Ramon E. Lopez**

- Conducted a comprehensive study of 314 moderate to strong storms, revealing decreased correlation between the Dst index and ionospheric energy dissipation for storms with lower Mach numbers.
- Investigated Joule heating during magnetic storms by comparing empirical models with integrated observations and SWMF simulations, finding discrepancies in scale factors between empirical and simulated results.

📅 2017-2018 📍 UT Austin

Visiting scholar **Advisor: John Wheeler**

- Investigated the conditions required for primordial RNAs to evolve into the first DNA molecules in oceanic environments.

📅 2013-2017 📍 SUT

Graduate research assistant **Advisor: Sohrab Rahvar**




- Investigated the potential for detecting exoplanets orbiting source stars during microlensing events using Roman and Spitzer telescopes by conducting Monte Carlo simulations of their observations. Analyzed detection probabilities, finding negligible detection chances for rocky planets but a non-zero probability for Jovian planets.

📅 2011-2013 📍 SUT



Graduate research assistant **Advisor: Reza Mansouri**

- Discovered an axially symmetric spacetime that leads to a spherically symmetric Einstein tensor, providing a solution of Einstein's equations with a spherically symmetric matter distribution in a non-spherically symmetric spacetime.



AWARDS and FUNDING HISTORY (500K in total)


 2024-2026  NASA Goddard Space Flight Center  290,000
NASA Postdoctoral Program (NPP) Fellowship (PI)


 awarded by: NASA Goddard Space Flight Center


 2023  Argonne National Laboratory
Argonne Training Program on Extreme-Scale Computing (ATPESC)


 awarded by: Argonne National Laboratory

 2023  UT Austin
Rising Stars in Computational & Data Sciences

 awarded by: UT Austin's Oden Institute for Computational Engineering and Sciences,
Sandia National Laboratories, and Lawrence Livermore National Laboratory

 2022-2023  UTA  200,000
NSF- MPS/Ascend Postdoctoral Fellowship (PI)

 awarded by: National Science Foundation



 2022  UTA  5,000
APS- DSECOP Fellowship (PI)



 awarded by: American Physical Society

 2017-2018  UT Austin  20,000
Visiting Scholarship



 awarded by: National Elites Foundation

MENTORSHIP

 2022-2024  UTA
Anshuman Garga - undergraduate - research co-advisor
Co-advising with Ramon Lopez. Radio emission of exoplanets.

 2022-2023  UTA
Rana Abdulaziz - undergraduate - research co-advisor
Co-advising with Ramon Lopez. Formation of exoplanets.

 2019-2020  UTA
Rushikesh Patil - undergraduate - research co-advisor
Co-advising with Ramon Lopez. Solar wind-magnetosphere's data analysis.


 2019-2020  UTA
Chelsi Nelson - undergraduate - research co-advisor
Co-advising with Ramon Lopez. Magnetopause location, analyzing THEMIS data.

PUBLICATIONS (12 papers in peer-reviewed journals, 1 preprint on arXiv, 8 first-author papers)


Impacts of Tidal Locking on Exoplanets Magnetosphere Energy

 **F. Bagheri**, A. Glocer

 2024

 submitted to at Astrophysical Journal (ApJ)

Exploring Radio Emissions from Confirmed Exoplanets Using SKA


 **F. Bagheri**, A. Garga, R E. Lopez

 2024


 accepted at Frontiers in Astronomy and Space Science



Infrared-Radio-follow-up Observations for Detection of the Magnetic Radio Emission of Extra Solar Planets: A New Window to Detect Exoplanets

 **F. Bagheri**, A. Garga, A. Shahmoradi, R E. Lopez

 2024


 Frontiers in Astronomy and Space Science



A Fresh Look into the Interaction of Exoplanets Magnetosphere with Stellar Winds using MHD Simulation


 **F. Bagheri**, A. Garga, K. Pham, R E. Lopez

 2024

 Frontiers in Astronomy and Space Science



An alternative statistical interpretation for the first direct evidence of Collapsars

 J A. Osborne, C M. Bryant, **F. Bagheri**, A. Shahmoradi

 2024


 Astronomy & Astrophysics (A&A)



Comparison of Empirical Models of Ionospheric Heating to Global Simulation

 **F. Bagheri**, R E. Lopez

 2023


 Frontiers in Astronomy and Space Science



Solar Wind Magnetosonic Mach Number as a Control Variable for Energy Dissipation during Magnetic Storms

 **F. Bagheri**, R E. Lopez

 2023

 Frontiers in Astronomy and Space Science



Bayesian Methods for Inferring Missing Data in the BATSE Catalog of Short Gamma-Ray Bursts

 J A. Osborne, **F. Bagheri**, A. Shahmoradi

 2022

 Universe



ParaDRAM: A Cross-Language Toolbox for Parallel High-Performance Delayed-Rejection Adaptive Metropolis Markov Chain Monte Carlo Simulations

 A. Shahmoradi, **F. Bagheri**

 2022


 Computer Methods in Applied Mechanics and Engineering



Are there radio-loud and radio-quiet Gamma-Ray Bursts?

 J A. Osborne, **F. Bagheri**, A. Shahmoradi

 2021


 Monthly Notices of the Royal Astronomical Society (MNRAS)



ParaMonte: A high-performance serial/parallel Monte Carlo simulation library for C, C++, Fortran


 A. Shahmoradi, **F. Bagheri**, J A. Osborne

 2021


 Journal of Open-Source Software (JOSS)



Detection of Exoplanet as a Binary Source of Microlensing Events in WFIRST Survey

 **F. Bagheri**, S. Sadjadian, S. Rahvar

 2019

 Monthly Notices of the Royal Astronomical Society (MNRAS)



The symmetry of the energy momentum tensor does not necessarily reflect the space-time symmetry: a viscous axially symmetric cosmological solution

 **F. Bagheri**, R. Mansouri

 2014

 arXiv



SERVICE


Panelist/Reviewer, National Science Foundation (NSF)

SELECTED TALKS and CONFERENCE PRESENTATIONS

 2024

The Roman Galactic Exoplanet Survey Project Infrastructure Team (RGES PIT) Year 2 F2F Meeting

Hosted by NASA Goddard Space Flight Center

 Greenbelt, MD

 2024

Astrobiology and the Future of Life Meeting

Oral Presentation:

Infrared-Radio-follow-up Observations for Detection of the Magnetic Radio Emission of Extra Sola Planets: A New Window to Detect Exoplanets and Exomoons

 Houston, TX

 2024

4th NASA SMD AI Workshop

Hosted by NASA Headquarter, Astrophysics Division

 Huntsville, AL

 2024

243rd Meeting of The American Astronomical Society

Oral Presentation:

Infrared-Radio-follow-up Observations for Detection of the Magnetic Radio Emission of Extra Sola Planets: A New Window to Detect Exoplanets and Exomoons

Poster Presentation:

Jovian Exoplanets Magnetosphere Interaction with Stellar winds

 New Orleans, LA

 2024

Introduction to Exoplanet Science II (one-day workshop), UTA

Organizer and Presenter

 Arlington, TX

 2023

 Pasadena, CA

IPAC, California Institute of Technology

Invited talk:

Magnetic Radio Emission as A New Window to Exoplanets Detection

📅 2023

📍 Austin, TX

Oden Institute for Computational Engineering and Sciences

Invited talk:

Finding Aliens: MA Study of Exoplanets Magnetosphere Interactions with Stellar Winds using MHD Simulations

📅 2023

📍 Arlington, TX

Introduction to Exoplanet Science I (one-day workshop), UTA

Organizer and Presenter

📅 2023

📍 Arlington, TX

UTA Physics colloquia, UTA

Invited Talk:

New Method to Detect Exoplanets using their Radio Emission

📅 2023

📍 Seattle, WA

241st Meeting of The American Astronomical Society

Oral Presentation:

A Study of Exoplanets Magnetosphere Interactions with Stellar Winds using MHD Simulations

📅 2022

📍 Pasadena, CA

Sagan Summer Workshop, Caltech

Hosted by the Nasa Exoplanet Science Institute

📅 2022

📍 Honolulu, HI

Geospace Environment Modeling (GEM) Summer Workshop

Poster Presentation:

Comparison of Empirical Models of Ionospheric Joule Heating to Global Simulations

📅 2022

📍 Los Vegas, NV

Exoplanet IV

Poster Presentation:

Direct Detection of Exoplanets in Microlensing Events

📅 2021

📍 New Orleans, LA

Fall Meeting of the American Geophysical Union

Poster Presentation: C

Comparison of Empirical Models of Ionospheric Joule Heating to Global Simulations

📅 2021

📍 virtual

GEM Summer Workshop

Poster Presentation:

An overview of ionospheric currents on October 8-9, 2012: A CUSIA Event Study

📅 2021

📍 virtual

Fall Meeting of the American Geophysical Union

Poster Presentation:

Correlation between Solar Wind Density and Ionospheric Electrojets during the Main Phase of Magnetic Storms

📅 2020

📍 virtual

Fall Meeting of the American Physical Society Texas Section

Oral Presentation:

Energy Dissipation in Storms with Low Solar Wind Magnetosonic Mach Number

📅 2020



📍 virtual



GEM Summer Workshop

Poster Presentation:



Correlation between solar wind density and ionospheric electrojets during the main phase of magnetic storms

 2020  virtual
March Meeting of the American Physical Society



 2019  San Francisco, CA
Fall Meeting of the American Geophysical Union
Poster Presentation:
Multipoint Observations of Solar Wind Conditions and Magnetopause Motion

 2019  Lubbock, TX
Fall Meeting of the American Physical Society Texas Section
Oral Presentation:
Identifying Magnetospheric Crossings between Northward and Southward IMF

 2019  Boulder, CO
Boulder Space Weather Summer School (SWSS)
Hosted by National Center for Atmospheric Research

 2019  Denver, CO
April Meeting of the American Physical Society
Oral Presentation:
The symmetry of the energy momentum tensor does not necessarily reflect the space-time symmetry:
a viscous axially symmetric cosmological solution
Poster Presentation:
Exoplanet Detection by Spitzer via Microlensing Events

 2019  Boston, MA
March Meeting of the American Physical Society

 2018  Austin, TX
Understanding of Planetary Habitability-Pop-up institute
Hosted by UT Austin

 2018  Los Angeles, CA
March Meeting of the American Physical Society

 2016  Trieste, Italy
Cosmology with Next Generation Radio Surveys
Hosted by ICTP

 2016  Trieste, Italy
Summer School in Cosmology
Hosted by ICTP