



## Golnar Mirzad

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### Education

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| <b>Master's Degree in Astrophysics and Cosmology</b><br>Department of Physics, University of Padua, Italy                      | <b>Dec 2023</b> |
| <b>Master's Degree in Atomic &amp; Molecular Physics (Plasma)</b><br>Faculty of Physics, Sahand University of Technology, Iran | <b>Oct 2011</b> |
| <b>Bachelor's Degree in Applied Physics</b><br>Faculty of Physics, Payame Noor University, Sari, Iran                          | <b>Jun 2009</b> |

### Research Experience

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| <b>Computational Modeling of SFRT Combined with Immunotherapy</b><br>Research project, Tabriz University of Medical Sciences<br>Supervisor: Prof. Parinaz Mehnati  | <b>Feb 2025- Present</b> |
| <ul style="list-style-type: none"><li>- Developing numerical simulations to analyze tumor growth and immune response using a grid-based model</li><li>- Implementing spatially fractionated radiation therapy (SFRT) simulations to study non-uniform radiation effects</li><li>- Modeling immune cell activation and infiltration in response to radiation exposure</li><li>- Simulating the impact of immune checkpoint inhibitors(PD-L1 and CTLA-4) on tumor dynamics</li></ul>   |                          |
| <b>Irradiation Environment for Planets in Habitable Zone</b><br>Master's Thesis, University of Padova<br>Supervisors: Prof. Giampaolo Piotto & Prof. Riccardo Claudi   | <b>Padova-2023</b>       |
| <ul style="list-style-type: none"><li>- Utilized Python for numerical simulations and data processing to analyze stellar and planetary interactions</li><li>- Estimated mass loss of water in habitable zone exoplanets using evolutionary models and observational data</li><li>- Applied theoretical calculations to determine the evolution of planetary orbits and their changing distances over time</li><li>- Assessed the impact of orbital evolution on planetary habitability in varying stellar radiation environments</li></ul> |                          |
| <b>Chemical evolution of galaxies</b><br>Adviser: Prof. Rosa Maria Dominguez Tenreiro  | <b>Madrid-2022</b>       |
| <ul style="list-style-type: none"><li>- Analyzed chemodynamical simulations modeling element distribution and abundance over time</li><li>- Explained the impact of galactic processes on metallicity evolution using theoretical frameworks</li><li>- Developed skills in presenting complex astrophysical concepts.</li></ul>  |                          |
| <b>Kennicutt-Schmidt relation</b>  | <b>Madrid-2022</b>       |
| <ul style="list-style-type: none"><li>- Investigated the empirical relation linking gas surface density to star formation rates in galaxies</li><li>- Explored the influence of gas composition, galaxy morphology, and external conditions on star formation efficiency</li><li>- Applied the relation to different galaxy types to assess variations in star formation processes</li></ul>   |                          |
| <b>The Star-Forming Main Sequence in the Firstlight Database</b>   | <b>Madrid-2022</b>       |
| <ul style="list-style-type: none"><li>- Utilized Python to analyze the star-forming main sequence (SFMS) from the Firstlight Database</li><li>- Performed data extraction, statistical analysis, and visualization of SFMS trends</li><li>- Developed scripts to manage large astrophysical datasets and generate analytical plots</li><li>- Enhanced Python programming skills in astrophysical data analysis</li></ul>   |                          |
| <b>Debris disks</b>  | <b>Madrid-2022</b>       |
| <ul style="list-style-type: none"><li>- Examined the physical properties, formation mechanisms, and evolution of debris disks</li></ul>  |                          |

- Investigated their role in planetary system formation and development
- Explored the life cycle of planetary debris and its significance in circumstellar environments
- Developed a deeper understanding of disk dynamics and planetary system evolution

### **The Elusive Galactic Gamma-Ray Astrophysical Objects**

**Padova-2021**

#### **Summer Internship**

**Adviser: Prof. Eugenio Bottacini**

- Installed and utilized Fermi mission's analysis software for gamma-ray data processing
- Analyzed observations of transient astrophysical objects from the Fermi space telescope
- Investigated the origin and nature of gamma-ray sources using computational methods
- Gained experience in data analysis and processing with shell commands and astrophysical software

### **Investigation of Frequency Shifting of Electromagnetic Waves in Interaction with Plasma with Plasma**

**Tabriz-2012**

#### **Master's Thesis**

**Supervisor: Prof. Hossein Zahed**

- Applied MATLAB for theoretical analysis and programming in plasma physics
- Derived a relationship for frequency shifting in electromagnetic wave interactions within cold electron-positron plasma
- Developed an approximate vector potential for cold plasma, enabling analysis of particle dynamics and calculations of average velocities
- Investigated the influence of external magnetic fields and collisional effects on wave propagation and frequency modulation

### **Dispersion Relation for e-p Plasma**

**Tabriz-2011**

- Investigated the dispersion relation for a specific mode of electron-proton (e-p) plasma
- Analyzed its effects on frequency shifting and implications for type III radio wave interactions with Earth's magnetosphere
- Combined theoretical plasma physics with space weather applications
- Gained insights into plasma physics and its relevance to astrophysical and space science research

### **GUI Topics in MATLAB**

**Tabriz-2010**

- Provided an overview of Graphical User Interface (GUI) development in MATLAB
- Explained fundamental GUI concepts, components, and functionalities
- Designed and implemented interactive user interfaces integrated with MATLAB scripts
- Improved programming skills in MATLAB for creating user-friendly scientific software tools

### **Laser and Its Applications**

**Sari-2008**

#### **Bachelor's thesis**

**Supervisor: Dr. Ahmad Babanezhad**

- Explored various types of lasers and their mechanisms of operation
- Investigated applications in scientific research, medicine, and industry
- Developed a foundational understanding of laser physics and photonics

## **Award**

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### **Erasmus+**

**2022**

10-month study at the Autonomous University of Madrid

### **National Tuition Fee Waiver**

**2009 - 2011**

Full Master's scholarship at Sahand University of Technology (Iran)

## **Publication**

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### **Physics for Engineers Book**

**2018**

A five-section book on fundamental physics topics for biomedical engineering students, Faragirane Danesh Publication (in Persian)

## Personal Skills and Competences

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### Technical Skills

**Computer Programming** Python, MATLAB, MAPLE  
**Software** AutoCAD, Microsoft Project

### Language Skills

**Persian:** Native, **English:** Fluent, **Italian:** Beginner

### Additional Strengths

I have a strong ability to quickly learn and adapt to technical challenges. I am highly motivated by the opportunity to explore complex topics, and my curiosity and enthusiasm drive me to efficiently master new tools and concepts, making technical innovation and problem-solving both enjoyable and productive.

## Academic Experience

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**Teaching** , online **Jan 2025 – Present**  
Teaching the Physics and Astrophysics courses

**Teaching** Paramedics College, Amol, Iran **2013 - 2014**

**Basic Physics:** Basic Mechanics, Basic Electronics, and Thermodynamics for undergraduate students.

**Basic Physics Laboratory:** Trained students on the physics of medical equipment devices, such as autoclaves, incubators, and spectrophotometers.

**Teaching Assistant** Sahand University of Technology, Iran **2011**

**Basic Physics 1:** Assisted in instructing 40 undergraduate students in Fundamental Physics, providing support in both theoretical concepts and problem-solving exercises.

## Other work experience

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**Part-Time Inventory Team Member** Barcod Company, Padova, Italy **2024 - 2025**  
- Conducted inventory counts at supermarkets with a team of 15 to 20 people.

**Site Manager** Aryabon International Pharmaceutical Company, Tehran, Iran **2019 - 2020**  
- Led a ten-member team including electrical and mechanical engineers and technicians.

**Planning & Project Control Engineer** Aryabon International Pharmaceutical Company, Tehran, Iran **2015 - 2019**  
- Scheduled projects and ensured timely implementation using MS Project.  
- Responsible for project implementation on time.

## Reference

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**Professor Riccardo Claudi** (*University of Padova*)

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**Tel:** +39 320 695 0916

**Professor Christian Maes** (*KU Leuven*)

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**Tel:** +32 16 32 72 33

**Professor Rosa Maria Dominguez Tenreiro** (*Autonomous University of Madrid*)

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