

Shahrzad Dehghani

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Profile

Physicist with experiences in simulations and data-driven analysis of scientific problems using Machine learning approaches in academia and industry. Experiences in running and analyzing large-scale computational workloads on high-performance computing (HPC) systems, including the Jülich Supercomputing Centre (JSC) and Pleiades at the Bergische Universität Wuppertal. Interested in solving practical problems using data.

Skills

Languages	English (C1), German (B1), Persian (C2).
Programming languages	Python, MATLAB, SQL, C++
Machine Learning	Scikit-learn, TensorFlow, Keras, PyTorch
Software	LaTeX, Excel, Power BI, Tableau, OriginLab, XPSpeak41, SpecsLab Prodigy
High-Performance Computing (HPC)	Distributed CPU/GPU computing, Job scheduling (SLURM), Large-scale numerical simulations, data-intensive ML workloads
Version Control	Git, GitHub
Web Dev	HTML, CSS

Employment History

- 08.2023 – Present **Researcher in Optoelectrical Engineering at the Bergische Universität Wuppertal, Germany**
- Applied rigorous coupled-wave analysis (RCWA) simulations and machine learning techniques to develop inverse design models for hybrid waveguide gratings using reflection spectra.
 - Research project conducted for Louisenthal Company on AI/data-driven photonics research.
 - Developed a GUI-based application for evaluation of university applicants.
- 11.2022 – 07.2023 **Internship at the Universität zu Köln, Germany**
- Thin film evaporation & fabrication by solution processing (Spin coating).
 - UHV systems: for deposition and surface-sensitive spectroscopy (XPS, UPS, IPES, REELS).
- 9.2021 – 08.2022 **Research Assistant - Master Thesis - at the Forschungszentrum Jülich, Germany**
- Analyzed large-scale N-body numerical simulations of star clusters using NBODY6++ to study the dynamical evolution of star clusters. Investigated environmental effects on protoplanetary disc sizes. Considered different cluster scenarios, including varying star formation efficiency and gas removal duration, across clusters with different masses.
- 7.2020 – 10.2020 **Summer Internship at the Universität Bonn, Germany**
- Analyzed molecular line emission and hyperspectral image data using the SPy module python to study the physical, kinematic, and chemical properties of star-forming molecular clouds.
- 02.2018 – 12.2019 **Research Assistant at the Institute for Research in Fundamental Sciences (IPM) in Tehran, Iran**
- Processed photometric on observational data to compile a stellar catalog and estimate the star formation history, stellar mass, and distance of the SagDIG galaxy (INT survey)

Education

- 04.2020 – 03.2023 **M.Sc. in Physics, Universität zu Köln.**
Thesis title: *Role of gas expulsion time on cluster expansion. [Jülich Supercomputing Center (JSC)]*
- 10.2014 – 07.2016 **M.Sc. in Theoretical Physics, Alzahra University, Tehran, Iran**
- 10.2009 – 08.2014 **B.Sc. in Physics, Shahid Beheshti University, Tehran, Iran**
Specialization : Atomic and Molecular Physics

Research Publications

- 1 S. Dehghani, C. Knoth, et al., “Data-driven inverse design of hybrid waveguide gratings using reflection spectra via tandem networks and conditional vaes,” *MDPI - Optics*, Nov. 2025.  DOI: 10.3390/opt6040061.
- 2 T. Parto, S. Dehghani, et al., “The isaac newton telescope monitoring survey of local group dwarf galaxies. v. the star formation history of sagittarius dwarf irregular galaxy derived from long-period variable stars,” *The Astrophysical Journal*, Jan. 2023.  DOI: 10.3847/1538-4357/aca471.
- 3 S. Pfalzner, S. Dehghani, et al., “Most planets might have more than 5 myr of time to form,” *The Astrophysical Journal Letters*, Oct. 2022.  DOI: 10.3847/2041-8213/ac9839.
- 4 T. Parto, S. Dehghani, et al., “Int monitoring survey of local group dwarf galaxies: Star formation history and chemical enrichment,” *Communications of the Byurakan Astrophysical Observatory*, 2020, ISSN: 2579-2776.  DOI: 10.52526/25792776-2020.67.2-232.

Certificates

- 07.2024 **MLx representation learning & generative AI** - Oxford Mathematical Institute
- 05.2024 **MLx Fundamentals** - Oxford ML summer school
- 03.2024 **ELLIS Winter School on Foundation Models**
- 08.2022 **SQL for Data Science** - Coursera, offered by University of California, Davis.
- 06.2022 **Google Analytics** - offered by Coursera Project Network.
 - Interpretation and analysis of a website performance with Google Analytics.
- 03.2019 - 06.2019 **Data Science Workshop Series** - Institute for Research in Fundamental Sciences, IPM, Tehran, Iran.
 - ML with Tensorflow, signal/image processing & data visualization.
 - At the end of the workshop, our team analyzed the GDELT Database for the final project.

Volunteering

- 06.2017 - 08.2017 **Build Your Future** - Held Soft Skills Workshops (AIESEC in Baku, Azerbaijan)

References

Available on Request