KARAN PAL

Data Scientist | Astronomer

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Work Experience

Project Assistant

Chalmers University of Technology

Feb 2024 - Ongoing — Gothenburg, Sweden

- Working on a project to measure 3D magnetic field properties in the Galactic ISM using stellar polarization.
- Contributed in updating and refining parts of the data reduction pipeline.
- Contributed in updating the telescope instrument model for the RoboPol pipeline using the latest astropy models.
- Expanding the stellar polarization dataset by processing data from RoboPol polarimeter and integrating it with Gaia's distance and Planck's Synchrotron emission data.
- Calibrating RoboPol data by correcting instrumental polarization by observed standard star during observation nights.
- **Software:** Astrometry.net, Source Extractor, SAOImageDS9, Linux OS (KDE Plamsa), Git (Bitbucket.org)

Telescope Observer

Skinakas Observatory - University of Crete

29th April - 14th May — Crete, Greece

- Served as an observer for the 1.3-meter optical telescope at Skinakas Observatory, managing system controls and ensuring precise data capture during night observations.
- Conducted polarization observations of blazars in Markarian's cloud using the RoboPol high-accuracy polarimeter for the BOOTES project (Black Hole Optical polarization Time-domain Survey) at Skinakas Observatory.

Teaching Assistant

Department of Information Technology, Uppsala University

Sept 2020 - June 2022 — Uppsala, Sweden

- **Courses Taught:** Computer Programming – I in Python, Programming in Python, and Scientific Computing with MATLAB
- Administered university-level master courses to over 200 students in collaboration with PhDs

University Projects

Master Thesis - Solar Wind heating observed by the Solar Orbiter mission by NASA/ESA.

Swedish Institute of Space Physics

April 2022 – June 2023 — Uppsala, Sweden

- Analyzed time-series data from the Solar Orbiter mission (ESA/NASA) to locate scale-dependent MHD turbulent structures evolving over time in space.
- Developed a statistical methods in MATLAB to examine local and global plasma temperature effect on Solar wind. — **Thesis Link**

Computational Work in Theoretical Astrophysics Course

Uppsala University

Aug 2022 – Oct 2022 — Uppsala, Sweden

- Employed dynamic toy models in MATLAB and advanced numerical methods in Python to simulate the behavior and motion of Red Giant stellar wind and perform computational modeling of astrophysical plasma.

Solar System Modeling in Scientific Computing Course

Uppsala University

Aug 2022 – Oct 2022 — Uppsala, Sweden

- Developed a precise 3D dynamical model of the solar system with Python, utilizing differential equations and Matplotlib for 3D visualization. Extended the analysis by incorporating an extra star, to gain insights into the behavior of new solar system.

Analysis of time-series data of Coronal Mass Ejection (CME) from Solar Orbiter mission

Swedish Institute of Space Physics

Oct 2021 – Jan 2022 | Uppsala, Sweden

- Investigated the physical relationship between the magnetic field and electron density fluctuations in Coronal Mass Ejection (CME) sheaths and identified similarities with the turbulent properties of the solar wind.

About Me

A skilled data scientist/analyst with a background in astrophysical data analysis projects, seeking a dynamic and challenging work environment to apply and expand my theoretical expertise. Currently in Sweden with Job-seeking visa"

Education

M.S. in Astronomy and Space Physics

Uppsala University

2019 – 2023

B.Tech. in Engineering Physics

Indian Institute of Technology - IIT, Dhanbad

2014 – 2018

Relevant Courses

• Scientific Programming in Python • Statistical Methods in Physics • Computer programming • Computational Physics • Numerical and statistical methods • Digital Signal Processing • Data Structures • Analog and Digital Electronics • Signals and Networks

Technical Skills

Programming languages: Python, Shell Scripting (Bash), SQL
Machine Leaning Libraries : NumPy, Pyfits, Healpy, Scipy, Plotpy, Pandas, Astropy
Data Analysis Tools : MATLAB, Excel, Matplotlib, Spyder, Jupyter, VScode
Statistics : Bayesian Statistics, Probability distributions, Residual Plots, Linear regression

Public Talks

- Presented a public talk on "**Magnets in Space**" at the Onsala Space Observatory during the Vetenskapsfestivalen (Science Festival) in Gothenburg on 19th April 2024
- Presented a public talk on "**Cosmic Magnets: Exploring the Magnetic Fields of the Milky Way**" at Chalmers Aerospace Club (CAC) on 4th June 2024.

Extra Curricular

- **Co-founded** Astronomy club at IIT Dhanbad
- **Volunteering:** Managed a **national-level NGO** (Kartavya) with college students, providing academic mentoring and financial aid for underprivileged children (Dec 2015 – Jan 2018)
- **Hobbies:** Rubik Cubes, Playing Harmonica, Amateur Astronomy and Cooking

Languages

• English • Hindi • Marathi • Swedish (Basic)