Avinash Kumar

avialxee@gmail.com
github.com/avialxee
PhD Student. Institute of Astrophysics - FORTH, Greece

Education

PhD in Astronomy and Astrophysics   2023 - Present

The primary goal of my research is to develop an automated pipeline utilising the new CASA software and study the nature of the Supermassive Compact Object - Read more

M.Sc Physics   2016 - 2018

Ewing Christian College (Autonomous) - a constituent college of the University of Allahabad

Semester 4: Specialization in Electronics
Semester 3: (Specialization in Electronics) Condensed Matter, Nuclear Phy, Analog & Dig, Microwaves
Semester 2: Quantum Mechanics Advanced, Statistical Mech, Solid State Elec, Atomic & Molecular
Semester 1: Mathematical Phy, Classical Mech, Electromagnetic Theory, Quantum Mechanics

B.Sc (Physics, Computer Application, Mathematics)   2013 - 2016

Ewing Christian College (Autonomous) - a constituent college of the University of Allahabad

Past Research Experience

Senior Project Associate   ARIES, Nainital   Sep 2022 - Jan 2023

Working for the ARIES and ISRO collaboration on data processing and development for the dedicated Aditya L1 Science Support Cell for the Indian space mission to study the Sun; funded by ISRO.

Junior Research Fellow   UC Berkeley SETI - Amity node, Mumbai   Nov 2021 - Sep 2022

Using FPGAs for high-speed data capture for the search for advanced extraterrestrial life

Built a pipeline for the SETI backend for the upgraded Giant Metrewave Radio Telescope (uGMRT) to process raw voltage data and utilise visibility data for imaging the source of interest; Funded by Breakthrough Listen Initiative.

Research Intern   RAD@home India   Aug 2018 - Oct 2021

Black Hole and Galaxy co-evolution under Dr Ananda Hota

Multiwavelength analysis using GMRT's TGSS ADR1 all-sky archival data; Built rgbmaker a python-based astronomy web app to communicate with different astronomical services, fetch FITS images from NASA Skyview and numerical data from TGSS and NVSS catalogue. doi:10.1017/S1743921323000674

Summer Research Associate   UM-DAE CEBS, Mumbai   May 2018 - July 2018

Summer Associate Research Programme 2018, Centre for Excellence in Basic Sciences, University of Mumbai-Department of Atomic Energy, Mumbai (14 May - 13 July 2018)
Black Hole and Galaxy co-evolution using the DAE-funded GMRT and RAD@home under Dr Ananda Hota

Schools/Courses

7th LOFAR school for data analysis at ASTRON, Dwingeloo   (14 - 19 April 2024)   2024

learned the data analysis techniques on high-time resolution data, the concept of beamforming, challenges in low-frequency data analysis and hands-on data reduction of LOFAR data for VLBI.

Astrostatistics school in Crete, Greece   (19 - 23 June 2023)   2023

Bayesian statistics, Curve Fitting, Maximum Likelihood Estimation, MCMC, Machine Learning, Deep Learning etc

CASA-VLBI school at JIVE, Dwingeloo   (4 - 9 June 2023)   2023

Introduced to the basics of using CASA software, Calibration philosophy, and Hands-on

Machine Learning by Stanford University on Coursera certificate   2022

Basic concepts of Machine Learning algorithms, Supervised and Unsupervised Learning, Neural Networks, Anomaly Detection, Multivariate Gaussian Distribution, Recommender system, Stochastic Gradient Descent etc; Problems and programming challenges; 11 Weeks;

10th IRAM 30-meter school on millimetre Astronomy certificate   2021

Lectures covering instrumentation, observing techniques, and data processing; study of the chemistry of interstellar clouds, low and high mass star formation, in the Milky Way, in nearby galaxies, and at high-redshifts. (November 15-23, 2021)

Data-driven Astronomy by The University of Sydney on Coursera certificate   2019

The course taught me how to investigate the challenges of working with large datasets, implement algorithms that work, use databases to manage your data and learn from the data with machine learning tools. Certificate earned on Thursday, February 14, 2019, 3:33 PM GMT

Telescope Time

Very Large Baseline Array (VLBA) observation time accepted for 20 hours (VLBA/24B-151)   **2024**
Proposal Authors: Felix Poetzl, Carolina Casadio, Diego Alvarez-Ortega, **Avinash Kumar**, Peter Wilkinson, Michael Janssen, Nikolaos Loudas

Giant Metrewave Radio Telescope(GMRT) observation time accepted under DDT proposal for 3 hours   **2022**
PI: **Avinash Kumar**. Code: ddtC226; Cycle 42; A pilot exploratory proposal for a search for advanced extraterrestrial life with the uGMRT

Publication (Peer reviewed journals)

**RAD@home citizen science discovery of an AGN spewing a large unipolar radio bubble onto its merging   2022
companion galaxy; Hota et al 2022** - *co-author* - *MNRAS Letter* - *doi.org/10.1093/mnrasl/slac116*

Conferences (First Author)

Conference proceeding at the International Astronomical Union(IAU) meeting   **2023**
RAD@home RGB-maker web-tool for citizen science research in multi-wavelength study of AGNs with radio jets
 - **Kumar, A.**, Avinash, C., Purohit, A., et al. 2023, The Multimessenger Chakra of Blazar Jets, 375, 40. doi:10.1017/S1743921323000674

Conference paper presented at the Astronomical Society of India (ASI) meeting   **2022**
SETI India: Using uGMRT to search for advanced extraterrestrial life
- *Avinash Kumar* et al abstract poster - Instrumentation and Techniques

**Delivered a talk in Plenary Session 5: Enabling technologies for space exploration of the 21st National   2022
Space Science Symposium 2022**
SETI India: Using uGMRT to search for advanced extraterrestrial life
- *Avinash Kumar* et al. abstract   youtube

Conference paper presented at the Astronomical Society of India (ASI) meeting   **2020**
Spreading astronomy education through #RGBviaNASAnRADatHomeIndia and Citizen Science research through #DilSeDiscovery -
- *Avinash Kumar* et al. abstract (13 - 17 Feb 2020)

Outreach Activities/Talks

**Taught 4 lectures (online) as an expert in advanced Python programming, for the second boot camp 2024 by   2024
Nehru Planetarium Delhi**
June 21st to July 21st 2024

Taught 2 lectures on Introduction to Numpy, data processing   **2023**
"Introduction to Python for Undergrads 2023-24 (UoC)"; The sessions were aimed at the University of Crete Undergraduate students in the Department of Physics, University of Crete, Greece (09 - 16 Nov 2023)

**Taught 4 lectures (online) as an expert in advanced Python programming, for the Jantar Mantar Positional   2023
Astronomy Observations, Nehru Planetarium Delhi**
Nov 22 - Apr 23

Assisted in conducting the second Aditya-L1 Support Cell(AL1SC) Workshop   **2022**
https://al1ssc.aries.res.in/workshop-2

**Assisted in RAD@home Astronomy Workshop hosted by the Department of Science & Technology, Govt. of   2021
Rajasthan**
#RADatDSTRajasthan 7-8 August 2021

Assisted in One Day RAD@home Astronomy Workshop at AstraX at IIT Mandi   **2021**
Sponsored by The International Astronomical Union IAU Office of Astronomy for Development (15-16 May 2021)

Volunteered to educate the public about the SKA project in SKA week of "Vigyan Samagam"   **2020**
National Science Centre, New Delhi

Volunteered to educate the public about the Square Kilometer Array project in the SKA week of "Vigyan Samagam" a
mega-science exhibition of DAE, DST NCSM (Govt of India) (22 February - 2 March 2020)

**Assisted in training STEM students at "One Day Radio Astronomy Workshop (ODRAW) - by RAD@home India"   2019
hosted by St Stephen's College, University of Delhi**

(23 February 2019)