Devang Haresh Liya

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INTERESTS

Galaxy formation and evolution in light of primordial structures in the universe. Particularly, using multi-wavelength tools and novel statistical techniques to study the galaxy-halo connections.

EDUCATION

Indian Institute of Science Education and Research, Mohali, India

- Candidate for Integrated BS-MS in Physics with a minor in Astronomy — Aug 2017 – Jul 2022
  - CPI: 8.3

VESIT, Mumbai University, Mumbai, India

- Dropped out of the Department of Computer Engineering to pursue physics. — Jun 2016 – May 2017

Hill Spring International Junior College, Kalyan, India

- High School — Jun 2014 – May 2016
  - Cleared HSC Class 12 Examinations with 89.8%

COMPUTATIONAL SKILLS

Python, C/C++, MATLAB, SageMath, Julia, DS9, HEASoft suite, CASA, MySQL, Proteus, LTSpice, Photoshop/Illustrator, Office softwares, Linux OS, MPI, git, LaTeX, HTML/CSS, GNU Bash

RELEVANT COURSEWORK

- **Physics:** Classical mechanics, Electrodynamics, Advanced quantum mechanics, Thermodynamics & statistical mechanics, Solid state physics, Nuclear and particle physics.
- **Mathematics:** Group theory & linear algebra, Probability & statistics, Curves & surfaces, Mathematical methods for physicists, Computational methods for physicists.
- **Astronomy:** Astronomy & Astrophysics, Astrophysical processes and stars, High energy astrophysics, Physics of fluids.
- **Others:** Network science, Modelling complex systems, Climate change & sustainable development, Philosophy of science, Principles of economics

RESEARCH EXPERIENCE

IISER, Mohali, India; **IUCAA**, Pune, India; **NISER**, Bhubaneshwar, India

- Master's thesis — Aug 2021 – Present
  - Supervisors: Prof. Jasjeet Singh Bagla, Dr. Aseem Paranjape, and Dr. Nishikanta Khandai
  - Project: Study of the influence of large scale tidal field in a variety of ways to quantify the effect of the shape of the power spectrum on the mass function of the collapsed halos in power law models.
  - Key concepts: Excursion set theory, Halo model, Cosmological simulations.

Astronomical Institute of the Czech Academy of Sciences, Praha, Czechia; **IISER**, Mohali, India

- Extended summer research project — May 2021 – Present
  - Supervisors: Dr. Peter Boorman and Dr. Aru Beri
  - Project: A multi-mission broadband study of x-ray spectrum of a heavily obscured Active Galactic Nucleus – NGC 2788A – using robust global sampling algorithms. Also **wrote a proposal** to observe this source using **XMM-Newton**.
  - Key concepts: X-ray spectral analysis, Bayesian techniques, Global sampling algorithms, scientific proposal writing.

Royal Observatory of Edinburgh, Edinburgh, UK; **IUCAA**, Pune, India

- Extended summer research project — May 2020 – Present
  - Supervisors: Dr. Shadab Alam and Dr. Aseem Paranjape
  - Project: Study of the effectiveness of Voronoi Volume Function (VVF) as a clustering measurement in constraining various cosmological and HOD parameters.
  - Key concepts: Fisher forecast, Galaxy redshift survey, Interplay between HOD and cosmology.

Ludwig Maximilian University of Munich, Munich, Germany

- Research Collaboration — Jan 2020 – Jul 2020
  - Collaborator: Dr Arpit Kumar Pradhan
  - Project: Robust genome analysis of SARS-CoV-2 and identifying potential targets for drug repurposing using molecular dynamics simulations.
  - Key concepts: Mutation analysis, docking and modelling studies.

IISER, Mohali, India; **Raman Research Institute**, Bangalore, India

- Long term project — May 2019 – Jan 2020
  - Supervisors: Prof. Jasjeet Singh Bagla and Prof. Avinash Deshpande
  - Project: Development of software tools to produce an image in radio band using raw data from the MWA type 7-tile telescope. Study of electronics, beamformers, data acquisition system, and remote observations.
  - Key concepts: Radio data analysis, aperture synthesis.

IISER, Mohali, India

- Summer project — May 2018 – Jul 2018
  - Supervisor: Prof. Kulinder Pal Singh
  - Project: Understand imaging/non-imaging x-ray telescopes and various emission mechanisms that produce x-rays. Extract light curves, images, and spectra for galaxy cluster A85 using ESAS software.
  - Key concepts: Basics of x-ray astronomy, x-ray data analysis.

IISER, Mohali, India

- Student project — Oct 2017 – Nov 2018
  - Supervisor: Prof. Anand Kumar Bachhawat
  - Project: Development of a bio-synthetic deterrent by using genetically engineered yeast to produce cat pheromones along with hardware and software tools to deploy the product. Development of various visualizations and a website to document the work and present it in an accessible manner as a part of iGEM 2018.
  - Key concepts: Synthetic biology, diffusion modelling, 3D printing, web development.

PUBLICATIONS

PUBLISHED

[1] Mouroug Anand, Nithishwer; Haresh Liya, Devang; Pradhan, Arpit Kumar; Tayal, Nitish; Bansal, Abhinav; Donakonda, Sainitin; et al. (2020): A Comprehensive SARS-CoV-2 Genomic Analysis Identifies Potential Targets for Drug Repurposing. *Plos One* (https://doi.org/10.1371/journal.pone.0248553)

[2] Devang Haresh Liya, Mirudula Elanchezhian, Mukulika Pahari, Nithishwer Mouroug Anand, Shivani Suresh, Nivedha Balaji, Ashwin Kumar Jainarayanan et al. (2021): QPromoters: Sequence based prediction of promoter strength in *Saccharomyces cerevisiae*. *bioRxiv* (doi: https://doi.org/10.1101/2021.04.27.441621)

[3] Beal, J., Farny, N.G., Haddock-Angelli, T. ,Selvarajah, V. , Baldwin, G. S., Buckley-Taylor, R., Gershater M., Kiga, D., Marken, J., Sanchania, V., Sison A., Workman C. T. & iGEM Interlab Study Contributors et al. (2020): Robust estimation of bacterial cell count from optical density. Commun Biol 3, 512. *Communications Biology* (https://doi.org/10.1038/s42003-020-01127-5)

IN PREPARATION

[1] Liya D.H., Alam S., Paranjape A.: Impact of Galaxy physics on precision Cosmology from non-linear scales.

AWARDS & SCHOLARSHIPS

- Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship — Aug 2017- Present
  For scoring top 1 percentile marks in Class 12 examinations.
- Won Bronze medal and got nominated for the best food and nutrition project at iGEM, 2018 — Oct 2018
  Presented the work on FearOmone: A cat pheromone-based deterrent to minimize rat infestation.
- Won the Sky Watch Array Network (SWAN) Imaging challenge — Sep 2019
  Produced an image of the Sun at 195 MHz using the raw data from the MWA-type SWAN setup.
- Won the astronomy hackathon and quiz at the North India Astronomy Meet, IIT-Mandi — 2019, 2020
- Best project award at the Awakening a Scientist competition, VESIT, Mumbai — Oct 2016
- Various awards for documentaries and short films made at VESIT, Mumbai — Mar 2016
  Winner of the best documentary award, runner-up for the best short film award.

CONFERENCES & WORKSHOPS

- Chandra Data Science Workshop, Virtual, Organized by Chandra X-ray Center, Smithsonian Astrophysical Observatory, Cambridge, USA — Aug 2021
- MPI with C++, Virtual, Organized by Department of Physical sciences, IISER-Mohali, India — Apr 2021
- Workshop on Temporal Single Cell Analysis, Virtual, Organized by SCOG — Sep 2020
- Physics of the Early Universe - An Online Precursor, Virtual, Organized by International Center for Theoretical Sciences (ICTS), Bangalore, India — Aug 2020

- AstraX - North India Astronomy Meet, organized by IIT-Mandi, India Mar 2020, Mar 2019
- SWAN Hands-on workshop, Gauribidanur Radio Observatory, Bangalore, India Jun 2019
  Learnt about MWA-type antennas, Beamformers, and Data Acquisition System. Used the SWAN setup to observe Cassiopeia A and Cygnus A, performed preliminary analysis on the raw data.
- Modeling Synthetic Biology Systems with MATLAB and SimBiology, iGEM, Boston, USA Oct 2018
- International Genetically Engineered Machines (iGEM), Boston, USA Oct 2018
  Presented the work on Food safety and Security.

NON SCHOLASTIC & OUTREACH

- Organizing various outreach activities related to astronomy as a convener of The Astronomy Club at IISER-Mohali (Sep 2018 – Nov 2021)
- Involved in training younger members of the SWAN group at IISER-Mohali in radio astronomy.
- Quizmaster at Vigyan Samagam – first mega science exhibition in India – Delhi edition
- Hosted a Reddit AMA to spread awareness about synthetic biology and general scientific thinking.
- Speaker at the *Ignite Talks, Mumbai University*.
- Interested in developing computational and visual tools to aid holistic teaching in science.
- Expert in web-designing and video editing.

[*CV compiled on 2021-12-15*]