

Preet Patel

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Summary: Highly motivated learner with a background in physics, math, python programming, data science, and statistics. I am strongly motivated by data-driven work which provides further insight into society, businesses, and the natural world. Key areas of interest are large-scale data management/statistical data analysis and visualization.

EDUCATION

2020 - 2023 M.S. in Physics at University of California - Davis
2015 - 2019 B.S. in Physics at University of Michigan - Ann Arbor
2015 - 2019 B.S. in Astrophysics at University of Michigan - Ann Arbor
Minor in Statistics

WORK EXPERIENCE

Astrophysicist/Researcher (Galaxy Evolution, Simulations) March 2021 - Sept 2023

- Utilized Python, parallel processing, high performance computing, advanced mathematics, statistical/ML methods (MCMC, likelihood analysis), weak/strong scaling analysis, and hydrodynamic simulations for multiple projects with the FIRE collaboration. These data are stored as HDF5 files and sum up to **several petabytes**, which I parsed through across national supercomputing centers and local clusters. A subset of this data is found in a public data release at: <http://flathub.flatironinstitute.org/fire>

Teaching Assistant (TA) October 2020 - April 2023

- Used data visualization, verbal communication, black/whiteboard skills to teach students about complex physical phenomena across various subfields of physics. (example: teaching quantum mechanics to non-STEM majors, through detailed lectures and spontaneous visualizations).

Bluewaters Student Intern May 2018 - May 2019

- Intern at the Petascale institute at UIUC. Created my own computing cluster using basic hardware and software. Optimized parallelization based on job type and processor architecture.

SKILLS

Hard skills	Git version control; high proficiency in Python and relevant libraries (Numpy, Scipy, Matplotlib, Multiprocessing, Astropy); large scale data processing, visualization, and analysis; high proficiency in MS Office; strong mathematical skills (calculus, linear algebra, geometry, and statistics)
Soft skills	Impeccable English communication skills, strong presentation skills, motivated and independent self-learner, persuasive writing, critical thinking, curiosity, teamwork, adaptability
Language	English, Gujarati, & working proficiency in Spanish
Other	Graphic Design (Photoshop, Cinema 4D), Media Production (Sony Vegas, After Effects)

PROJECTS AND PUBLICATIONS

Maximum Likelihood Estimation and MCMC: ([GitHub Link](#))

Wrote data analysis pipeline to analyze raw observational data of an emission line source. Methods used: simple means and standard deviations from fits to a gaussian profile; a maximum likelihood estimation after constructing a log-likelihood function; an MCMC algorithm (AstroPy/Emcee) to converge on likely values

Metropolis-Hastings Algorithm: ([GitHub Link](#))

Manually implemented an MCMC algorithm using a Metropolis-step to determine the best fit line to galaxy-catalog data in log-space.

Simple Regression and Error Analysis on Simulation Data: ([GitHub Link](#))

Used linear regression and "recursive" regression to assess galaxy-wide properties.

Patel, Preet B. et al. (Mar. 2022). "Predictions for complex distributions of stellar elemental abundances in low-mass galaxies". In: 512.4, pp. 5671–5685. DOI: [10.1093/mnras/stac834](https://doi.org/10.1093/mnras/stac834). arXiv: [2110.08287](https://arxiv.org/abs/2110.08287) [[astro-ph.GA](#)].