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Mahdi Qezlou

Education

2018–present **PhD, Physcis & Astronomy**, *University of California, Riverside.*
Machine learning and Bayesian statistics for problems in Astrophysics.

2018–2019 **M.Sc, Physcis & Astronomy**, *University of California, Riverside.*

2013-2018 : **B.Sc in Physics** , *Sharif University of Technology, SUT.*

Skills

Programming Skills: Python, C, MPI parallel computing, cloud computing

Data skills: Bayesian statistics, Gaussian Process, Deep Learning, Visualizing large datasets

Experience:

Research Projects as Graduate Research Assistant:

October,2022 – present **Deep Learning**, *AI assisted super-resolution techniques help model the unresolved physics in the cosmological simulations.* .
Using deep learning techniques (e.g. Generative Adversarial Networks, GAN), we model the merger rate of the Primordial black holes in large cosmological simulations. The direct calculation of these rates is computationally prohibitive; therefore, deep learning techniques assist in approximating these quantities. We expect a potential order of magnitude improvement in our estimations compared to the traditional approaches. *Publication* Qezlou et. al. in prep

Apr,2022 – present **Statistical modeling**, *Improving Bayesian inference from synergies between different cosmological probes.*.
With a Bayesian approach, we forecast the improvement on cosmological parameter constraints when simultaneously analyzing different observational probes. After accounting for different systematics and missing data in each data set, this statistical model improves the inference (on molecular emission from galaxies) by a factor of ~ 10. *Publication* : Qezlou et. al. in prep *Github* : Upon request

Jan,2020 – Dec,2021 **Computer graphics, Gaussian Process**, *Characterizing galaxy clusters in 3D maps of gas in the universe.*
Classic Image-recognition techniques help detect progenitors of massive galaxies in the largest 3D maps of the gas in the universe. To optimize the hyper-parameters in our model, I generated $\sim$ `TBs` of simulated data. Recently, I started developing a Gaussian Process model to infer the physical properties of these structures. *Publication :* Qezlou et. al. 2021, `Github` repo

2018 – 2019 **Python, C, MPI parallel computing**, *Fast python package for post-processing extremely large hydrodynamical simulations,* .
Collaborating with the author, I maintain this widely used python/C package to generate $\sim$ `TBs` of data from large simulations. I improved the scalability of the code to many computational nodes through MPI-parallelism. *Publication :* *Qezlou et. al. 2021* `Github` `fake_spectra`

Relevant courses

UCR: Machine Learning, Probabilistic model in AI

Coursera: Deep Learning specialization

Mentoring Experience

2020–2021 **CASSI Summer research program for undergraduates at Carnegie observatory** , *Teaching python, parallel computing and visualizations to $\sim$ 40 students.*