

Asad Hussain

☎ (512) 985 8090
✉ asadh@utexas.edu
🍌 potatoasad
Visa sponsorship not required

Education

- 2019-Present **PhD Physics, The University of Texas At Austin.**
Improving the application of Bayesian inference and hypothesis testing methods to test Einstein's theory of relativity – using stochastic time series data from black hole collisions
Advisor: Dr. Aaron Zimmerman
Relevant Courses: Foundations Of Data Science (*Gradient Descent proofs, Neural Networks, etc.*)
- 2014-2018 **Bachelor of Science, Physics, LUMS.**
Relevant Courses: Quantitative Finance (*Ito Calculus, Options pricing*), Applied Stochastic Processes

Relevant Experience

- 2020-Present **Graduate Research Assistant, Center for Gravitational Physics, UT Austin, TX.**
 - Created a novel statistical technique to alleviate catastrophic biases with state-of-the-art hypothesis testing methods
 - Performed Bayesian Inference on Stochastic Time Series data and implemented a new inference procedure (in `stan` & `pymc3`) to perform time series analysis on data from detected black holes.
 - Expertise in popular Python frameworks (PyTorch, JAX, NumPy, SciPy, Pandas, TensorFlow, etc...), e.g. implemented a Wave-U-Net neural network architecture in PyTorch for sound source separation
 - Performed the first ever computation of the effects of deviations from Einstein's theory on the detected signals of black hole collisions
- March 2022 **Visiting Researcher, Center for Computational Astrophysics (CCA), Flatiron Institute, NY.**
 - Worked with collaborators to compute the effect of a constrained parameter space on a population analysis.

Technical Skills

- Relevant Courses Quantitative Finance (*Ito Calculus, Options pricing*), Numerical Analysis (*C++, Finite Element Methods*), Foundations Of Data Science (*Gradient Descent proofs, Neural Networks, etc.*), Tools & Techniques in Computational Science (*Bash, C++*), Applied Stochastic Processes, Computational Physics (*Machine learning*)
- Programming Languages & Tools Julia, Python, Mathematica, C++, Bash, MATLAB, SQL, Javascript, HTML & JQuery, Git, SLURM, AWS (EC2, Kibana, Dataloader, Lambda), Azure
- Certifications Microsoft Azure Certified Data Engineer (DP-203)

Open Source Contributions & Packages (Github)

Contributions

- `Distributions.jl`: Contributed folded versions of univariate distributions.
- `ringdown`: Increased accuracy of model approximant by 100×, and improved waveform handling
- `ringdb`: Utility package that creates a local HDF5 database for Gravitational Wave data
- `TruncatedGaussianMixtures.jl`: Implementation of the Expectation-Maximization algorithm for a mixture model with truncated gaussians
- `typora2tex`: CLI to convert markdown files into latex documents

Relevant Publications

- 2023 ***Hierarchical Bayesian models with truncated parameters: Biases and Solutions***, Asad Hussain & Aaron Zimmerman (*In prep.*).
- 2022 ***Approach to computing spectral shifts for black holes beyond Kerr***, Asad Hussain & Aaron Zimmerman, Phys. Rev. D 106, 104018, .
- 2019 ***Decay of finite-length qubits on arbitrary spacetime trajectories***, Asad Hussain & Hamza Ahmed, ArXiv:1811.09432.