Preet Baxi

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SUMMARY

Quantitative Researcher and ***Ph.D. Candidate in Physics and Scientific Computing*** at the ***University of Michigan*** with over ***5 years*** of experience in ***statistical modeling, stochastic optimization, algorithm development,*** and ***data-driven*** decision frameworks using ***Python/C++/R.*** Proven record of building high performance inference pipelines and machine-learning systems for ***signal extraction***, ***uncertainty estimation***, and ***algorithmic trading***.

EDUCATION

PhD *in* ***Physics*** *and* ***Scientific Computing*** *(CGPA: 3.55/4)* Aug. 2022 – Sep. 2026 *(Expected)*
Master of Science in Physics
University of Michigan - Ann Arbor, MI, USA

EXPERIENCE

Graduate Student Research Assistant (GSRA) Jan. 2025 – Present
Prof. Stefanus Jasin, University of Michigan - Ann Arbor, MI, USA

- Building an end-to-end automated trading system that ingests ***real-time financial headlines***, applies NLP-based ***sentiment scoring***, and runs ***predictive models*** to forecast ***short-term market movements***. Integrated API-linked brokers for autonomous order execution. Back tests demonstrated a ***20 % improvement in Sharpe ratio*** and ***consistent alpha generation*** across multiple market regimes. *(Personal Project)*
- Conducting an ***experimental study on prompt-injection behavior*** in LLM-based résumé evaluation, examining effects of manipulative instructions; relevant to **model-risk and robustness assessment** in AI-driven trading.
- Developed a ***universal AI-assisted heuristic-generation framework*** for ***stochastic inventory optimization,*** enabling language-model agents to autonomously design and refine decision policies under demand uncertainty; transferable to **policy-generation and reinforcement-learning strategy design** in finance.
- ***Improved heuristic efficiency*** by ***38 %*** and ***reduced expected total-cost variance*** across simulation trials through adaptive parameterization and optimizers. *(Final Draft ready for publication)*

Graduate Student Research Assistant (GSRA) Jul. 2022 – Dec. 2024
Prof. Keith Riles, University of Michigan - Ann Arbor, MI, USA

- Designed **multi-parameter signal-extraction algorithms** for weak time-series detection — conceptually parallel to **alpha-signal discovery under low-SNR conditions** in quant finance. Improved detection statistic by **50 %** via FFT-based segmentation and parameter optimization balancing computational cost and model variance.
- Architected **high-throughput simulation pipelines** in Python and C using **machine learning and parallel computing (MPI/OpenMP)**. Achieved **95 % classification accuracy** in signal filtering and enhanced estimation precision through Bayesian calibration: approach analogous to **factor model tuning and noise reduction** in market data.

LIGO Fellow (Visiting Student Researcher, Caltech) Jan. 2024 – Jul. 2024
Laser Interferometer Gravitational-wave Observatory (LIGO) – Richland, WA, USA

- Developed **machine-learning-based anomaly-detection models** (TensorFlow, scikit-learn) using **Python** for 200+ sensor channels to identify systemic bias and non-stationary noise, improving signal quality by **45 %**; comparable to **regime-shift detection** in financial time series.
- Created **predictive filter-optimization frameworks** that modeled signal propagation and noise suppression, yielding **60 % improvement in forecast accuracy**: similar to **volatility forecasting and model regularization**.

Research Student (Indian Academy of Sciences Fellow) May. 2019 – Jun. 2022

Prof. Chandrakant Mishra, Indian Institute of Technology (IIT) Madras – Chennai, TN, India

- Designed and optimized **parameter-estimation algorithms using Cramér-Rao bounds and Monte Carlo simulation**, achieving **97 % estimation accuracy**: analogous to **variance-bias trade-off and uncertainty quantification** in risk models.

PUBLICATIONS

- **P. Baxi** and K. Riles, *"Hardware Injection Monitoring Updates during O4a and improvements from O3",* (Sent for paper publication in Classical Quantum Gravitation Journal.).
- Divyajyoti, **P. Baxi**, CK Mishra, KG Arun, "*Detectability of gravitational higher order modes in the third-generation era",* **Physical Review D Journal, 104, 084080** – **October 2021**, https://doi.org/10.1103/PhysRevD.104.084080.

SKILLS and INTERESTS

- *Programming and Software Development:* **Python, MATLAB, C/C++, R, SQL, Mathematica, algorithm design, data structures, numerical computing, and object-oriented programming**
- *Data Analysis and Visualization:* **Pandas, NumPy, SciPy, Matplotlib, Seaborn, data wrangling, exploratory data analysis, time-series analytics, correlation modeling, feature engineering, and statistical visualization**
- *Quantitative Modeling and Machine Learning:* **TensorFlow, PyTorch, Scikit-Learn, Keras, XGBoost; time-series forecasting, predictive analytics, reinforcement learning, anomaly detection**
- *Statistical and Computational Techniques:* **Bayesian inference, Monte Carlo simulation, stochastic optimization, regression modeling, hypothesis testing, Scientific Computing**
- *Finance and Trading:* **Algorithmic trading systems, portfolio optimization, market microstructure analysis**
- *High Performance Computing:* **CUDA, MPI, OpenMP**
- *Operating Systems:* **Unix/Linux, macOS, Windows**
- *Professional Skills:* **Problem-Solving, Analytical Thinking, Collaboration and Communication, Leadership and Teamwork, Technical Writing, Documentation, Strategy Development, Creativity and Innovation**