Liting Xiao

Resume

Contact

Personal Website: https://litingxiao.github.io
LinkedIn: https://www.linkedin.com/in/litingxiao/
Email: lxxiao@caltech.edu
Mobile: (626) 360-5841

Professional Summary

Analytically-driven Ph.D. Candidate in Physics with 8 years of quantitative research experience, focusing on algorithmic development and data pipeline implementation in Python. Highly skilled at understanding, devising and deploying efficient streamline statistical analysis techniques in working with large datasets with a holistic view. Frequently communicated progress and results to colleagues.

Education

California Institute of Technology (Caltech), Pasadena, CA *2016 – 2022*

Ph.D. Candidate, Physics; M.S., Physics, 2020 **(GPA: 4.1/4.0)**

- Graduate research assistant at the Laser Interferometer Gravitational-Wave Observatory (LIGO) at Caltech (**The Nobel Prize in Physics in 2017**)
- Thesis advisor: Prof. Alan J. Weinstein
- Minor: Computational Science and Engineering
- Relevant coursework: Introduction to Probability Models; Statistical Inference; Bayesian Statistics and Data Analysis; Learning Systems; Machine Learning & Data Mining

University of Virginia (UVA), Charlottesville, VA *2011 – 2015*

B.A., High Distinction, Astronomy-Physics; B.A., Mathematics **(GPA: 3.8/4.0)**

- Senior Theses: (1) Probing the Orbital Lifetime and Stability in Kepler Multi-planet Extrasolar Systems; (2) The Occurrence of Compact Groups of Galaxies Through Cosmic Time
- Honors: **Echols Scholar**; Member of National Physics Honor Society – **Sigma Pi Sigma**; 2015 UVA International Studies Office Award for Academic Excellence; 2014 UVA Outstanding Undergraduate Physics Research Award; 2014 – 2015 and 2013 – 2014 UVA Physics Department Mitchell Scholarship

Joseph Fourier University, Grenoble, France *Jun – Jul 2012*

Summer, Overseas Summer Program – Physics Large Scale Facilities

Skills

- Computing: **Python** (NumPy, SciPy, pandas, scikit-learn, TensorFlow, PyTorch), MATLAB, Unix Shell, Git, Condor, LaTeX, C, Java, SQL, JavaScipt
- Languages: English (*full professional*), Mandarin Chinese (*native*)

PhD Research Highlights

An Unmodeled Search for Anisotropic Stochastic Gravitational-wave Backgrounds (SGWBs)

- Leading the development of a Python-based, end-to-end data pipeline to map the intensity of the SGWB signal on the sky in the pixel domain model-independently via maximum likelihood solutions
- Casting time-segment radiometer analysis to a matrix multiplication problem using folded data and employing efficient parallel processing of data for a speedup of 1000-fold
- Identifying spectral leakage to neighboring pixels of well-localized simulated sources due to the detector response function through Monte Carlo sampling
- Investigating better regularization techniques of inverting the full pixel-pixel Fisher information matrix through adaptive frequency banding and adaptive pixellation in distinct frequency bands

Improving the Streamline Gravitational-wave (GW) Detection Pipeline – PyCBC

- Collaborated in expanding the search ability of the PyCBC GW detection pipeline by 10%, windowing out a small stretch of data centered on loud instrumental transients
- Operated PyCBC to analyze months of time-series data and personally identified 2 GW events during LIGO–Virgo Observing Run 3
- Characterized confident detections and potential triggers, integrated into an extended catalog of GW transients, and prepared open data release for the astronomy community
- Exploiting signal coherence and noise incoherence in different detectors to improve detection statistic

Optimizing the Bayesian Inference Library for GW Science – Bilby

- Sped up calculation of prior distributions by 2-fold to 1000-fold in the Bilby library
- Reproduced results for previously published GW signals to demonstrate Bilby was production-ready

Independent Projects

- High Frequency Price Prediction of Index Futures: Built a machine learning pipeline (data processing and manipulation, model building and training, model selection) using high frequency market order book data of a futures contract to predict the probabilities of future 1-second price movements
- MovieLens Dataset Matrix Factorization and Visualization: Explored and cleaned the MovieLens data, implemented different singular value decomposition methods to visualize and interpret the movies
- Shakespearean Sonnet Generator: Built and trained Recurrent Neural Networks (RNNs) and Hidden Markov Models (HMMs) to generate sonnets of Shakespeare's writing style

Leadership Experience

- Serving on the executive committee in the Caltech/JPL Association for GW Research (CaJAGWR), organizing the seminar series
- Volunteered as a session leader in the 2020 GW Open Data Workshop
- Co-mentored 3 students for 2019 Caltech LIGO summer undergraduate research projects

Past Research Experience

- Sept 2015 – Jun 2016: Analyzed trigger efficiency of the Higgs Boson search in the Compact Muon Solenoid Experiment at the Large Hadron Collider at CERN
  Research Assistant Physik-Institut der Universität Zürich, Zürich, Switzerland
- Jan – May 2015: Investigated the occurrence of "compact groups of galaxies" through cosmic time using the Millennium Simulation
  Undergraduate Research Assistant UVA Department of Astronomy, Charlottesville, VA
- Jun – Sept 2014: Evaluated the sensitivity of the GstLAL analysis pipeline searching for gravitational-waves from the coalescence of high-mass black hole binaries
  Summer Undergraduate Research Fellow LIGO Laboratory at Caltech, Pasadena, CA
- Aug 2013 – May 2014: Adapted an existing CubeSat balloon satellite for cosmic ray measurements and designed the software for data transmission to the ground
  Science Investigator NASA-UVA JefferSat Cosmic Ray Mission, Charlottesville, VA
- Mar 2013 – Jan 2014: Devised, implemented and evaluated an algorithm of identifying upward-going muons for an indirect dark matter search in the NOνA Experiment
  Undergraduate Research Assistant Fermi National Accelerator Laboratory, Batavia, IL

Publications

- **8** short-author list publications in physics and astronomy
- **70**+ full-author list publications in physics and astronomy