Liting Xiao

Resume

Contact

Personal Webpage: https://litingxiao.github.io **Email:** lxxiao@caltech.edu
(Detailed contact omitted for privacy. Available upon request.)

Skills

Areas: Research, Statistical Inference, Machine Learning, Signal Processing
Computing: Python (NumPy, SciPy, pandas, scikit-learn, TensorFlow, PyTorch), MATLAB, BASH, Condor, LaTeX, C, Java, SQL
Languages: English (*full professional proficiency*), Mandarin Chinese (*native*)

Education

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

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

- Graduate research assistant at the LIGO Laboratory at Caltech
- Thesis advisor: Prof. Alan J. Weinstein
- Minor: Computational Science and Engineering
- Relevant coursework: Learning Systems; Machine Learning and Data Mining; Foundations of Machine Learning and Statistical Inference; Intro to Probability Models; Bayesian Statistics and Data Analysis; Algorithms (planned)

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 (*Journal Ref: ApJ (2019) 873 124*)
- Honors: UVA 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; 2013 – 2014 and 2014 – 2015 UVA Physics Department Mitchell Scholarship

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

Summer, Bachelor Summer Program – Physics Large Scale Facilities

PhD Research Highlights

- Developing novel improvements for streamline detection pipeline PyCBC and operating the pipeline to detect gravitational waves (GWs) from compact binary coalescences
- Characterizing exceptional compact binary coalescence events during observing runs
- Developing the Bayesian inference module Bilby for GW science
- Developing a rapid GW waveform generation model Roman with deep learning
- Implemented a real-time Kalman filter for optimal thermo-optical aberration estimates in the Thermal Compensation System of the LIGO Livingston detector
- Improved the calibration of suspension cavity lengths of the LIGO Livingston detector
- Performed a range of measurements to characterize the LIGO Livingston detector for commissioning towards LIGO Observing Run 3
- Mentored three Caltech LIGO SURF students in summer, 2019
- *The Nobel Prize in Physics in 2017* was awarded to three LIGO founders: Rainer Weiss (MIT), Kip S. Thorne (Caltech), Barry C. Barish (Caltech)

Computing Projects

- Shakespearean Sonnet Generator: Built and trained Recurrent Neural Networks (RNNs) and Hidden Markov Models (HMMs) to generate sonnets of Shakespeare's writing style
- High Frequency Price Prediction: Built and trained a Deep Neural Network (DNN) to predict future price movements using high frequency market orders

Past Research Highlights

Searching for Gravitational Waves from the Coalescence of High-mass Black Hole Binaries, LIGO Laboratory at Caltech, Pasadena, CA
Summer Undergraduate Research Fellow (SURF) *Jun – Sept 2014*

- Developed data analysis pipeline software in search for gravitational waves produced in the coalescence of binary black holes

- Included the population of spinning black holes in the analysis pipeline for Advanced LIGO, improved upon previous non-spinning searches in Initial LIGO
- Expanded the search parameter space and analyzed simulations to evaluate the pipeline search sensitivity
- Performed detailed timing analysis of the pipeline for future optimization work regarding sensitivity and timeliness

Identification of Upward-going Muons for an Indirect Dark Matter Search in the NOνA Experiment, Fermilab, Batavia, IL
Undergraduate Research Assistant *Mar 2013 – Jan 2014*

- Searched for energetic neutrinos originating from dark matter annihilation at the solar core using the NOνA Far Detector at Fermilab
- Designed and implemented an algorithm to reconstruct muon tracks and separate muon signals from cosmic rays efficiently
- Generated and ran simulations to evaluate the sensitivity of the search algorithm
- Performed electronics testing and liquid scintillator leak testing and helped assembly of the NOνA Near Detector

Other Research Projects:

- Analyzed trigger efficiencies of the CMS Higgs Boson searches using Monte Carlo simulations for the upgraded Large Hadron Collider running at 13 TeV at CERN (Research Assistant; Physik-Institut der Universität Zürich, Zürich, Switzerland; Sept 2015 – Jun 2016)
- Studied the population of "compact groups of galaxies" and the population of galaxies within compact groups at different epochs in the evolution of the universe using the Millennium Simulation (Undergraduate Research Assistant; UVA Department of Astronomy, Charlottesville, VA; Jan – May 2015)
- Adapted the existing JefferSat CubeSat balloon satellite design to accommodate one spectrometer for cosmic ray measurements at ∼124,000 feet in the atmosphere; designed and implemented both the ground and the payload data handling and communication hardware and software (Science Investigator; UVA Department of Mechanical and Aerospace Engineering, Charlottesville, VA; Aug 2013 – May 2014)

SELECTED PUBLICATIONS

[1] *T. D. Canton, ..., L. Xiao,* Realtime search for compact binary mergers in Advanced LIGO and Virgo's third observing run using PyCBC Live. arXiv: 2008.07494.

[2] *I. M. Romero-Shaw, ..., L. Xiao,* Bayesian inference for compact binary coalescences with BILBY: Validation and application to the first LIGO–Virgo gravitational-wave transient catalogue, arXiv: 2006.00714.

[3] *S. Sachdev, ..., L. Xiao,* The GstLAL Search Analysis Methods for Compact Binary Mergers in Advanced LIGO's Second and Advanced Virgo's First Observing Runs, arXiv:1901.08580.

[4] *LIGO Scientific Collaboration and Virgo Collaboration,* GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs, Phys. Rev. X 9, 031040 (2019).

[5] *LIGO Instrument Science List,* Sensitivity and Performance of the Advanced LIGO Detectors in the Third Observing Run, Phys. Rev. D 102, 062003 (2020).