

CONTACT	Personal Website: https://litingxiao.github.io Email: lxiao@caltech.edu LinkedIn: https://www.linkedin.com/in/litingxiao/
RESEARCH INTERESTS	Gravitational wave physics/astrophysics/cosmology, black hole astrophysics, gravitational wave data analysis with machine learning, astrophysical inference with Bayesian statistics
SKILLS	<ul style="list-style-type: none"> • Areas: Signal Processing; Statistical Inference; Data Science; Machine Learning • Computing: Python (NumPy, SciPy, pandas, scikit-learn, TensorFlow, PyTorch), MATLAB, BASH, Condor, L^AT_EX, C, Java, SQL, JavaScript • Languages: English (<i>full professional</i>), Mandarin Chinese (<i>native</i>)
EDUCATION	<p>California Institute of Technology (Caltech), Pasadena, CA <i>2016 – Present</i> Ph.D. candidate, Physics; M.S., Physics, 2020 (GPA: 4.1/4.0)</p> <ul style="list-style-type: none"> • Graduate research assistant at the LIGO Laboratory at Caltech • Thesis advisor: Prof. Alan J. Weinstein • Minor: Computational Science and Engineering • Relevant coursework: Probability Models; Statistical Inference; Bayesian Statistics; Learning Systems; Machine Learning & Data Mining <p>University of Virginia (UVA), Charlottesville, VA <i>2011 – 2015</i> B.A., High Distinction, Astronomy-Physics; B.A., Mathematics (GPA: 3.8/4.0)</p> <ul style="list-style-type: none"> • 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 (<i>Journal Ref: ApJ (2019) 873 124</i>) • 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 <p>Joseph Fourier University, Grenoble, France <i>Jun – Jul 2012</i> Summer, Bachelor Summer Program – Physics Large Scale Facilities</p>
PHD RESEARCH HIGHLIGHTS	<ul style="list-style-type: none"> • Leading algorithmic development efforts in mapping anisotropies in the Stochastic Gravitational-wave Background in distinct frequency bands • Developing novel improvements for streamline detection pipeline PYCBC and operating it to detect gravitational waves (GWs) from compact binary coalescences • Vetting and characterizing exceptional GW events during LIGO observing runs, resulting in Gravitational-Wave Transient Catalogs for the astronomy community • Developing and operating the Bayesian inference module BILBY for GW science • Summer Detector Exploration Fellowship: implemented a real-time Kalman filter for optimal thermo-optical aberration estimates in LIGO optics; enhanced detector calibration of optics suspension cavity lengths; tuned the LIGO Livingston detector for commissioning towards Observing Run 3 • The Nobel Prize in Physics in 2017 was awarded to three LIGO founders: Rainer Weiss (MIT), Kip S. Thorne (Caltech), Barry C. Barish (Caltech)
SELECTED PUBLICATIONS	<p>[1] A Bayesian Ranking Statistic to Find High-mass Black Holes in LIGO data, in preparation, <i>A. Vajpeyi, ..., L. Xiao.</i></p> <p>[2] Realtime search for compact binary mergers in Advanced LIGO and Virgo’s third observing run using PYCBC Live, arXiv: 2008.07494, <i>T. D. Canton, ..., L. Xiao.</i></p>

- [3] Bayesian inference for compact binary coalescences with BILBY: Validation and application to the first LIGO–Virgo gravitational-wave transient catalogue, *MNRAS* Vol. 499, Iss. 3 (2020), *I. M. Romero-Shaw, ..., L. Xiao.*
- [4] The GstLAL Search Analysis Methods for Compact Binary Mergers in Advanced LIGO’s Second and Advanced Virgo’s First Observing Runs, arXiv:1901.08580, *S. Sachdev, ..., L. Xiao.*
- [5] GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run, arXiv:2010.14527, *LIGO Scientific Collaboration and Virgo Collaboration*
- [6] 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), *LIGO Scientific Collaboration and Virgo Collaboration.*
- [7] GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral, *Phys. Rev. Lett.* 119 161101 (2017), *LIGO Scientific Collaboration and Virgo Collaboration.*
- [8] Sensitivity and Performance of the Advanced LIGO Detectors in the Third Observing Run, *Phys. Rev. D* 102, 062003 (2020), *LIGO Instrument Science List.*
- [9] The GstLAL template bank for spinning compact binary mergers in the second observation run of Advanced LIGO and Virgo, *Phys. Rev. D* 103, 084047 (2021), *D. Mukherjee, ..., L. Xiao,.*
- [10] The Occurrence of Compact Groups of Galaxies Through Cosmic Time, *ApJ.* 873, 124 (2019), *C. D. Wiens, T. V. Wenger, P. Tzanavaris, K. E. Johnson, S.C. Gallagher, L. Xiao.*

MENTORSHIP

- Caltech LIGO SURF student, Mahlet Shiferaw. *Summer 2019*
- Caltech LIGO SURF student, Phoebe McClincy. *Summer 2019*
- Caltech LIGO SURF student, Sierra Garza. *Summer 2019*

PAST
RESEARCH
HIGHLIGHTS

Experimental High Energy Physics with the CMS Detector at the LHC,
 Physik-Institut der Universität Zürich, Zürich, Switzerland
Research Assistant *Sept 2015 – Jun 2016*

- Analyzed trigger efficiencies of the CMS Higgs searches using Monte Carlo simulations for the upgraded LHC running at 13 TeV (*C/C++*, *ROOT*)
- *The 2013 Nobel Prize in Physics* was awarded to Francois Englert and Peter Higgs after the discovery of the Higgs Boson at the LHC at CERN

The Occurrence of Compact Groups of Galaxies through Cosmic Time, UVA
 Department of Astronomy, Charlottesville, VA
Undergraduate Research Assistant *Jan – May 2015*

- 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

Searching for Gravitational Waves from the Coalescence of High-mass Black Hole Binaries, LIGO Laboratory at Caltech, Pasadena, CA
Undergraduate Research Assistant *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

NASA-UVA JefferSat Cosmic Ray Mission, UVA Department of Mechanical and Aerospace Engineering, Charlottesville, VA

Science Investigator

Aug 2013 – May 2014

- Adapted the existing JefferSat CubeSat balloon satellite design to accommodate one spectrometer for cosmic ray measurements at $\sim 124,000$ feet in the atmosphere
- Integrated onboard power system, thermal insulation system, and navigation system within the payload structural and high-altitude environmental limitations
- Designed and implemented both the ground and the payload data handling and communication hardware and software
- Measurements were used to validate and improve the NASA NAIRAS model for predicting commercial flight crew and passenger exposure to cosmic radiation

Identification of Upward-going Muons for an Indirect Dark Matter Search in the NO ν A 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 NO ν A Far Detector at Fermilab
- Designed and implemented an algorithm to reconstruct muon tracks and separate muon signals from cosmic rays efficiently (*C/C++*, *ROOT*, *Grid computing*)
- 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 NO ν A Near Detector

HONORS, FELLOWSHIPS, & AWARDS

- University of Virginia Echols Scholar
- Member of Sigma Pi Sigma, National Physics Honor Society
- 2015 UVA International Studies Office Award for Academic Excellence
- 2014 UVA Public Day: invited to showcase two of my research projects
- 2014 UVA Outstanding Undergraduate Physics Research Award
- 2014 – 2015 UVA Physics Department Mitchell Scholarship
- 2013 – 2014 UVA Physics Department Mitchell Scholarship
- 2013 UVA Undergrad Physics Research Symposium: 3rd Place in oral presentation
- University of Virginia Dean's List 7/8 Semesters

TALKS & POSTERS

Talks

- Searching for Gravitational Waves from the Coalescence of High-mass Black Hole Binaries
- 2014 Caltech SURF Summer Seminar Series at LLO, Livingston, LA *Aug 2014*
- Identification of Upward-going muons for NO ν A Dark Matter Searches
- 2013 80th Annual Meeting of SESAPS, Bowling Green, KY *Nov 2013*
- NO ν A Dark Matter Searches Triggering
- 2013 July NO ν A Collaboration Meeting, Lemont, IL *Jul 2013*

Posters

- Searching for Dark Matter with the NO ν A Neutrino Telescope
- 2014 National Collegiate Research Conference, Boston, MA *Jan 2014*
- 2013 80th Annual Meeting of SESAPS, Bowling Green, KY *Nov 2013*

Conferences

- 2015 APS Conference for Undergraduate Women in Physics at the North Carolina Research Triangle, Duke University, Durham, NC *January 2015*
- 2014 National Collegiate Research Conference, Harvard University, Boston, MA *January 2014*

- 2013 80th Annual APS Southeastern Section Meeting, Western Kentucky University,
Bowling Green, KY *November 2013*
- 2013 July NO ν A Collaboration Meeting, Argonne National Laboratory, Lemont, IL
July 2013