

RONNY NGUYEN

LIGO SCIENTIFIC COLLABORATION



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SUMMARY

I am a recent bachelor's student of physics from the University of New Hampshire (UNH). Since 2017, I have been engaged in research in experimental gravitation, numerical relativity, and high-energy astronomy at UNH, NASA, and Cardiff University accumulating in 4 years of research experience. I have been a member of various research groups ranging from small teams to international collaborations.

Outside of research, I enjoy challenging myself physically and mentally by hiking in the mountains of New England, farming, and reading philosophy.

PROGRAMMING

Python

MATLAB

C

Bash

Git

FINESSE

SKILLS

High Performance Computing

Parallel Computing

Machine Learning & Neural Networks

Signal Processing

Parameter Estimation

Physics Simulation

Mathematical Modeling

Laser Interferometry

Scientific Writing

Science Communication

Research Collaboration

Teaching

EDUCATION

Aug. 2015 | B.S. PHYSICS, MINOR PHILOSOPHY, GPA: 3.5
May 2019 | UNIVERSITY OF NEW HAMPSHIRE – DURHAM, US

EXPERIENCE

Sep. 2020 | LIGO SCIENTIFIC COLLABORATION, CARDIFF, UK
Present | RESEARCH ASSISTANT
Research assistant at Cardiff University doing research with the LIGO Scientific Collaboration in gravitational waves.

- Collaborated internationally with researchers at University of Texas at Austin and Cardiff University.
- Applied Bayesian parameter estimation algorithms to infer the parameters of gravitational wave sources.
- Utilized parallel computing via the LIGO Data Grid to process 3000+ numerical simulations of black hole mergers.
- Simulated tabletop laser interferometers using the FINESSE Python library.
- Tested a neural network to perform likelihood-free inference of the parameters of gravitational wave events.

Jun. 2020 | NASA MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, AL
Aug. 2020 | SUMMER RESEARCH STUDENT
Intern working with the Fermi-GBM collaboration doing research in gamma-ray bursts.

- Performed systems analysis by calibrating Python data tool parameters for the Fermi-GBM space-based mission based on satellite geometry.
- Wrote Python code to search through the Fermi and Swift gamma-ray catalogs.
- Used NASA data tools to analyze each gamma-ray event to produce signal-to-noise ratio (SNR) graphs, waterfall likelihood ratio plots, and sky localization maps.

Jun. 2019 | INTERNSHIP
Aug. 2019 | Intern for the Fermi-GBM collaboration with Dr. Tyson Littenberg's research group doing research in gravitational wave astronomy.

- Worked on the development of space-based gravitational wave mission, LISA (Laser Interferometer Space Antenna).
- Analyzed astrophysical noise received by LISA using Bayesian inference and Fourier analysis.
- Presented poster of findings for the intern PosterExpo.

COURSEWORK

ONLINE

MITLL – Intro. to Radar Systems

MITLL – Adaptive Antennas and Phased Arrays

PHYSICS

General Physics I, II & III

Classical Mechanics I & II

Experimental Physics I & II

Quantum Mechanics I & II

Electromagnetism I & II

Thermodynamics and Stat. Mech.

General Relativity and Cosmology

Nuclear Physics

Experimental Gravitation I & II

Advanced Research Methods I & II

Data Analysis

Numerical Relativity and Waveforms

Gravitational Wave Astrophysics

MATHEMATICS

Calculus I & II

Multidimensional Calculus

Differential Equations

Linear Algebra with Applications

HONORS

US-UK Fulbright Alternate Candidate

UNH Honors Scholar

Sigma Pi Sigma Physics Honors

Sep. 2017
May 2019

UNIVERSITY OF NEW HAMPSHIRE, DURHAM, NH RESEARCH ASSISTANT

Research assistant working with Dr. Francois Foucart's research group doing research in numerical relativity.

- Tested numerical simulations of binary neutron star mergers (~6.5 million particles) using on the Trillian and Blue Waters supercomputing clusters.
- Performed data analysis on neutrino radiation transport from a binary neutron star merger that used a Monte-Carlo algorithm.
- Modeled the matter outflow of particles from a binary neutron star merger to study the time evolution of the system.

May 2017
May 2019

RESEARCH ASSISTANT

Research assistant working with Dr. Dacheng Lin at the UNH Space Science Center doing research in X-ray astronomy.

- Updated the XMM-Newton space observatory X-ray catalog funded by NASA grant #NNX17AJ57G.
- Performed data analysis using Python on 30,000+ X-ray sources to analyze lightcurves and SNR graphs.
- Collaborated in writing the scientific paper to accompany the updated catalog.

Aug. 2016
Dec. 2018

TEACHING ASSISTANT

Teaching assistant for studio physics I, and general physics I at the UNH Department of Physics.

- Coordinated peer-based group work in a classroom of 40 students (10 groups of 4).
- Aided in problem solving strategies, and explained fundamental principles in calculus based physics in a studio environment.
- Instructed lab sessions that were integrated into the course and introduced students to LaTeX and Python.

Ronny Nguyen

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EDUCATION

Aug. 2015 – May 2019 B.S. Physics, University of New Hampshire (UNH)
Minor in Philosophy
Thesis: Determination of Multi-messenger Signals from Matter Outflows
of Merger Systems
Advisor: Francois Foucart

RESEARCH

Research areas Experimental gravitation, high-energy astronomy, theoretical
astrophysics

Publications

In progress Parameter Estimation of Intermediate-mass Black Hole Candidates with
RIFT
R. Nguyen, J. Lange

Jan. 2021 Extracting the Parameters of GW190519 with RIFT
R. Nguyen, J. Lange, V. Raymond

Jun. 2018 Evaluating radiation transport errors in merger simulations using a
Monte-Carlo algorithm
F. Foucart, M.D. Duez, L.E. Kidder, **R. Nguyen**, H.P. Pfeiffer, M.A.
Scheel

Presentations

Nov. 2019 Poster – A Study of Matter Outflows from a Binary Neutron Star Merger
The New Faces of Black Holes Conference, Annapolis, Maryland

Apr. 2019 Poster – A Study of Matter Outflows from a Binary Neutron Star Merger
UNH Undergraduate Research Conference, Durham, New Hampshire

Apr. 2018 Poster – X-ray Sources from XMM-Newton and the Search for Tidal
Disruption Events
UNH Undergraduate Research Conference, Durham, New Hampshire

WORK EXPERIENCE

Sep. 2020 – Present	Research Assistant/LIGO Scientific Collaboration member Cardiff University/UT Austin Principle Investigator(s): Vivien Raymond, Jacob Lange
Jun. 2020 – Sep. 2020	Summer Research Student NASA Marshall Space Flight Center Principle Investigator: Colleen Wilson-Hodge
Aug. 2019 – Dec. 2019	Adjunct Researcher UNH Department of Physics Principle Investigator: Francois Foucart
Jun. 2019 – Aug. 2019	Internship NASA Marshall Space Flight Center Advisor(s): Tyson Littenberg, Colleen Wilson-Hodge
Sep. 2017 – Jun. 2019	Research Assistant UNH Department of Physics Principle Investigator: Francois Foucart
May 2017 – Jun. 2019	Research Assistant UNH Space Science Center Principle Investigator: Dacheng Lin

TECHNICAL SKILLS

Programming	Python, C, Git and Github, bash, MATLAB, FINESSE, High performance computing, Parallel computing
Laboratory	Interferometer design and operation, NMR techniques, Nuclear spectroscopy
Data Analysis	Bayesian inference, Signal processing, Machine learning, Markov-Chain Monte-Carlo, Physics simulation, Mathematical modeling

TEACHING EXPERIENCE

Aug. 2019 – Dec. 2019	Tutor PHYS 508 – Thermodynamics and Statistical Mechanics UNH Department of Physics
Jan. 2019 – May 2019	Teaching Assistant MATH 645 – Linear Algebra for Applications UNH Department of Mathematics
Aug. 2016 – Dec. 2018	Teaching Assistant PHYS 407S – Studio Physics I, PHYS 407 – General Physics I UNH Department of Physics

OUTREACH

Nov. 2019	Public talk – LISA Ambassadors Listening to the Universe presentation at Oyster River High School
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Oct. 2019	Public talk – LISA Ambassadors Listening to the Universe presentation at Somersworth High School
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HONORS & AWARDS

Apr. 2020	US-UK Fulbright alternate candidate
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Jan. 2016 – May 2019	UNH Honors Program scholar
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May 2018	Sigma Pi Sigma physics honors society member
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