

Curriculum Vitae: Dr. Zoheyr Doctor

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EMPLOYMENT

Center for Interdisciplinary Exploration and Research in Astrophysics, Northwestern University, Evanston, IL
Board of Visitors Research Assistant Professor
Aug 2021 -

The University of Oregon, Eugene, OR
Postdoctoral Scholar, Farr Group
Oct 2019 - Jun 2021

Lawrence Livermore National Laboratory, Livermore, CA
Summer Intern, High Energy Density Physics Group
Jun 2013 - Aug 2013

EDUCATION

The University of Chicago, Chicago, IL, PhD.
Sep 2014 - Sep 2019
Field: Physics
GPA: 3.74
Advisor: Prof. Daniel Holz
Thesis Topic: Multi-messenger Astrophysics with Gravitational Waves

Kavli Summer Program in Astrophysics, Copenhagen, Denmark
July 2017 - Aug 2017
Project: Constraining Compact-Binary Formation Using Supernova Rates

Dartmouth College, Hanover, NH, B.E.
Sep 2011 - Jun 2012, Sep 2013 - Jun 2014
Major: Electrical Engineering
GPA: 3.77

Vassar College, Poughkeepsie, NY, A.B.
Aug 2009 - May 2011, Aug 2012 - May 2013
Major: Physics
Minors: Mathematics, Analytic Philosophy
GPA: 3.96

HONORS AND AWARDS

Chair's Award for Distinguished Service
Physics Department, University of Chicago, 2019

Cristina Torres Outreach Award
LIGO Scientific Collaboration, 2019

2018-2019 William Rainey Harper Fellow
Dissertation fellowship, University of Chicago

Nathan Sugarman Award for Excellence in Graduate Research
Enrico Fermi Institute, University of Chicago, 2017

Blue Apple Award
For best student presentation, Midwest Relativity Meeting, 2016

National Science Foundation Graduate Research Fellow
Awarded 2015

Robert A. Millikan Fellowship for Research and Teaching
U.S. DOE Graduate Fellowship, 2014

Lucy Kellogg English Prize
For excellence in physics, Vassar College, 2013

Ethel Hickox Pollard Memorial Physics Award
For the junior physics major with the highest academic average, Vassar College, 2012

Vassar College General Honors

Vassar College Physics Departmental Honors

Phi Beta Kappa Society

Tau Beta Pi Society

SELECTED PUBLICATIONS

Black Hole – Black Hole Total Merger Mass and the Origin of LIGO/Virgo Sources
K. Belczynski, Z. Doctor, M. Zevin, A. Olejak, S. Banerjee, D. Chattopadhyay
arXiv:2204.11730, accepted in ApJ

The Population of Merging Compact Binaries Inferred using Gravitational Waves through GWTC-3
LIGO Scientific Collaboration, Virgo Collaboration, KAGRA Collaboration
arXiv:2111.03634, submitted to PRX

GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run
LIGO Scientific Collaboration, Virgo Collaboration, KAGRA Collaboration
arXiv:2111.03606, submitted to PRX

Ain't No Mountain High Enough: Semi-Parametric Modeling of LIGO-Virgos Binary Black Hole Mass Distribution
B. Edelman, Z. Doctor, J. Godfrey, B. Farr
The Astrophysical Journal, Volume 924, Issue 2, 2022

Poking Holes: Looking for Gaps in LIGO/Virgo's Black Hole Population
B. Edelman, Z. Doctor, B. Farr
The Astrophysical Journal Letters, Volume 913, Issue 2, id.L23, 7 pp.

Black Hole Leftovers: The Remnant Population from Binary Black Hole Mergers
Z. Doctor, B. Farr, D.E. Holz
The Astrophysical Journal Letters, Volume 914, Issue 1, id.L18, 6 pp.

GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run
The LIGO and Virgo Collaborations
Phys. Rev. X 11, 021053, 2021

Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog
The LIGO and Virgo Collaborations
The Astrophysical Journal Letters, Volume 913, Issue 1, id.L7, 41 pp.

Tests of General Relativity with Binary Black Holes from the second LIGO-Virgo Gravitational-Wave Transient Catalog

The LIGO and Virgo Collaborations
Phys. Rev. D 103, 122002, 2021

Counting on Short Gamma-Ray Bursts: Gravitational-wave Constraints of Jet Geometry

A. Farah, R. Essick, Z. Doctor, et al
The Astrophysical Journal, Volume 895, Number 2

Thunder and Lightning: Using Neutron-star Mergers as Simultaneous Standard Candles and Sirens to Measure Cosmological Parameters

Z. Doctor
The Astrophysical Journal Letters, Volume 892, Issue 1, 2020

Black Hole Coagulation: Modeling Hierarchical Mergers in Black Hole Populations

Z. Doctor, D. Wysocki, R. O'Shaughnessy, D.E. Holz, B. Farr
The Astrophysical Journal, Volume 893, Issue 1, 2020

The evolutionary roads leading to low effective spins, high black hole masses, and O1/O2 rates of LIGO/Virgo binary black holes

K. Belczynski, J. Klenki, C.E. Fields, et al.
Astronomy and Astrophysics, Volume 636, 2020

A Search for Optical Emission from GW170814 Using the Dark Energy Camera

Z. Doctor, R. Kessler, K. Herner, et al.
The Astrophysical Journal Letters, Volume 873, Issue 2, 2019

Constraints on the Neutron Star Equation of State from AT2017gfo using Radiative Transfer Simulations

M. Coughlin, T. Dietrich, Z. Doctor, et al.
Monthly Notices of the Royal Astronomical Society, Volume 480, Issue 3, 2018

Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817

The LIGO Scientific Collaboration and The Virgo Collaboration
The Astrophysical Journal Letters, Volume 850, L39, 2017

Statistical Gravitational Waveforms: What to Simulate Next?

Z. Doctor, B. Farr, D. E. Holz, M. Pürrer
Physical Review D 96, 123011, 2017

A Search for Kilonovae in the Dark Energy Survey

Z. Doctor, R. Kessler, H.-Y. Chen, et al.
The Astrophysical Journal, Volume 837:57, 2017

TEACHING AND OUTREACH

Data-Driven Research

Co-instructor, Northwestern University, Jan 2022 - Jun 2022

Co-taught in-person graduate course on data science techniques in connection with large experiments, specifically Vera Rubin Observatory, LIGO, and EarthScope

Physics of Sound and Music

Co-instructor, University of Oregon, Oct 2020 - Dec 2020

Taught University of Oregon non-majors course. Fully online, mix of synchronous and asynchronous.

Computational Methods in Gravitational-Wave Astrophysics Reading Seminar

Lecturer, University of Chicago, Oct 2018 - Dec 2018

Team-taught extra-curricular course for UChicago undergraduates focusing on computational skills.

Humans of LIGO

Blog Founder and Curator, Aug 2018 -

Curate posts for Humans of LIGO Blog to give visibility to all LIGO members regardless of academic level.

Guest Lecturer

Graduate general relativity, University of Oregon, Winter 2019

Graduate data analysis, University of Oregon, Spring 2019

Astronomy on Tap

Organizer, Sep 2016 - June 2019

Organize astronomy-related talks and trivia at local bars in Chicago.

LIGO Education and Public Outreach

Working Group Member, Sep 2015 -

Created fact sheets for detected gravitational waves and maintain websites for recognizing LIGO members.

Kavli Institute for Cosmological Physics Space Explorers Program

Space Explorers Strategy and Teaching Consultant, Sep 2017 - Sept 2018

Space Explorers Lead Instructor, Sep 2015 - June 2016

Designed and taught weekly physics course for high-school students from South Chicago.

University of Chicago Physics Department Teaching Activities Committee

Committee Member, Oct 2016 - June 2017

Worked with faculty and staff in Physics Department to improve undergraduate and graduate courses.

Adler Planetarium

Adler After Dark Coordinator, Oct 2015

Organized Dark Energy Survey sponsored activities at Adler Planetarium's astronomy event for adults.

University of Chicago Physics Department

Introductory Physics Teaching Assistant, Sep 2014 - Dec 2014 Taught weekly discussion section, laboratory, and graded papers and exams.

Vassar College QCenter

Tutor and Supplemental Instructor, Aug 2010 - May 2011, Aug 2012 - May 2013

Taught weekly recitation sessions for introductory physics students and tutored physics and math students one-on-one.

DIVERSITY, INCLUSION, MENTORSHIP**Research Mentor**

June 2018 -

Mentored five undergraduates, 12 graduate students and four postdoctoral scholars on astrophysics research.

CIERA Mentorship Action Team

Member, Aug 2022 -

Design and implement mentorship structures within the Center that connect students, postdocs, and faculty

Physics Graduate Student Mentorship

Co-founder and organizer, Aug 2018 - 2019

Oversaw the University of Chicago Graduate Student Mentorship Program for incoming physics graduate students

University of Chicago Astronomy and Astrophysics Diversity, Equity, and Inclusion Journal Club

Member, Sept 2017 - 2019

Met bi-weekly to discuss issues of diversity and inclusion in astronomy, and take steps to increase the inclusivity of UChicago Astronomy and Physics Departments.

SERVICE**LIGO-Virgo Rates and Populations Subgroup Co-Chair**

Oct 2019 -

Oversee group within LIGO-Virgo collaboration that estimates the population properties of merging black holes and neutron stars.

PUBLIC TALKS, PRESENTATIONS, AND MEDIA APPEARANCES**Hands-on Workshop: Exploring Sound and Music with Arduinos**

National Science Teachers Association Meeting, Atlanta, March, 2018

A Tour of the Philosophy of Science

Life-long Learning Series, Montgomery Place, Chicago, June 2017

The Detection of Gravitational Waves: 100 Years in the Making

Horizon Science Academy, May 2019 Life-long Learning Series, Renaissance Center, Nov 2016

Chicago Waldorf School, Oct 2016

Life-long Learning Series, Atlas Senior Center, July 2016

Life-long Learning Series, Conrad Sulzer Library, May 2016

Life-long Learning Series, Harbor Point Apartments, May 2016

OTHER PUBLICATIONS**Active Learning for Computationally Efficient Distribution of Binary Evolution Simulations**K. A. Rocha, J. J. Andrews, C. P. L. B., Z. Doctor, P. Marchant, et al
arXiv:2203.16683, submitted to ApJ**Transient Glitch Mitigation in Advanced LIGO Data with *glitschen***

J. Merritt, B. Farr, R. Hur, B. Edelman, Z. Doctor

arXiv:2108.12044, accepted to PRD

Observation of Gravitational Waves from Two Neutron Star Black Hole Coalescences

LIGO Scientific Collaboration, Virgo Collaboration, KAGRA Collaboration

Phys. Rev. X 11, 021053, 2021

Properties and Astrophysical Implications of the 150 M_{\odot} Binary Black Hole Merger GW190521

LIGO Scientific Collaboration, Virgo Collaboration

The Astrophysical Journal Letters, Volume 900, L13, 2020

GW190521: A Binary Black Hole Merger with a Total Mass of 150 M_{\odot}

LIGO Scientific Collaboration, Virgo Collaboration

Phys. Rev. Lett. 125, 101102, 2020

GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object

LIGO Scientific Collaboration, Virgo Collaboration
The Astrophysical Journal Letters, Volume 896, L44, 2020

GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses

LIGO Scientific Collaboration, Virgo Collaboration
Phys. Rev. D 102, 043015, 2020

GW190425: Observation of a Compact Binary Coalescence with Total Mass $\sim 3.4 M_{\odot}$

LIGO Scientific Collaboration, Virgo Collaboration
The Astrophysical Journal Letters, Volume 892, Issue 1, 2020

First Measurement of the Hubble Constant from a Dark Standard Siren using the Dark Energy Survey Galaxies and the LIGO-Virgo Binary-Black-Hole Merger GW170814

M. Soares-Santos, A. Palmese, J. Annis, et al.
arXiv:1901.01540, submitted to *The Astrophysical Journal Letters* Dec 19, 2018.

How Many Kilonovae Can Be Found in Past, Present, and Future Survey Data Sets?

D. Scolnic, R. Kessler, D. Brout, et al.
The Astrophysical Journal Letters, Volume 852, L3, 2017

The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. II. UV, Optical, and Near-infrared Light Curves and Comparison to Kilonova Models

P. S. Cowperthwaite, E. Berger, V. A. Villar, et al.
The Astrophysical Journal Letters, Volume 848, L17, 2017

The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. I. Discovery of the Optical Counterpart Using the Dark Energy Camera

M. Soares-Santos, D. E. Holz, J. Annis, et al.
The Astrophysical Journal Letters, Volume 848, L16, 2017

A Gravitational-Wave Standard Siren Measurement of the Hubble Constant

LIGO, Virgo, 1M2H, DECam GW-EM / DES, DLT40, LCO, VINROUGE, and MASTER Collaborations
Nature, 551, 85, 2017

Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB170817A

LIGO Scientific Collaboration and Virgo Collaboration
The Astrophysical Journal Letters, Volume 848, L13, 2017

Multi-Messenger Observations of a Binary Neutron Star Merger

LIGO Scientific Collaboration, Virgo Collaboration
The Astrophysical Journal Letters, Volume 848, L12, 2017

GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral

LIGO Scientific Collaboration and Virgo Collaboration
Physical Review Letters, 119, 161101, 2017

GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence

LIGO Scientific Collaboration and Virgo Collaboration
Physical Review Letters, 119, 141101, 2017

GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2

LIGO Scientific Collaboration and Virgo Collaboration
Physical Review Letters, 118, 221101, 2017

A DECam Search for an Optical Counterpart to the LIGO Gravitational Wave Event GW151226

P. .S. Cowperthwaite, E. Berger, M. Soares-Santos, et al.
The Astrophysical Journal Letters, Volume 826, L29, 2016

A Dark Energy Camera Search for An Optical Counterpart to the First Advanced LIGO Gravitational Wave Event 150914

M. Soares-Santos, R. Kessler, E. Berger, et al.
The Astrophysical Journal Letters, Volume 823, Number 2, 2016

SCIENTIFIC TALKS AND PRESENTATIONS**Population Properties of Compact Object Mergers in the Third LIGO-Virgo-KAGRA Gravitational Wave Transient Catalog**

Moore Workshop on Gravitational Wave Constraints on Dark Compact Objects, May 2022

GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run

AAS 238 Invited Talk, Jun 2021
LIGO-Virgo Paper Release Webinar, Nov 2020
The University of Oregon IFS Seminar, Nov 2020

Black Hole Coagulation: Modeling Hierarchical Mergers in Black Hole Populations

APS April Meeting, Apr 2020

Connecting LIGO Compact-Binary Coalescences and Optical Observations

University of Oregon Physics of the Universe Seminar, Apr 2019
AAS Dissertation Talk, Jan 2019
UC Santa Cruz FLASH Talk, Oct 2018

Constraining Neutron-Star-Merger and Kilonova Properties with Radiative-Transfer and Numerical-Relativity Simulations

Midwest Relativity Meeting, Oct 2018

A Search for Optical Emission from GW170814 Using the Dark Energy Camera

American Physical Society April Meeting, Apr 2018

Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817

American Astronomical Society Meeting, Jan 2018

Constraining Population Synthesis Simulations using Supernova Observations

Kavli Summer Program in Astrophysics, Copenhagen, Aug 2017

Statistical Gravitational Waveforms: What to Simulate Next?

Midwest Relativity Meeting, Oct 2017
Perimeter Institute, June 2017
American Physical Society April Meeting, Jan 2017
Midwest Relativity Meeting, Oct 2016

Search for Kilonovae in the Dark Energy Survey

American Physical Society April Meeting, Apr 2016
Midwest Relativity Meeting, Oct 2015
DES Chicagoland Meeting, Sep 2015