

Michael J. Zevin || *Curriculum Vitae*

Adler Planetarium — 1300 South DuSable Lake Shore Drive, — Chicago, IL 60605

✉ michael.j.zevin@gmail.com • 🌐 www.michaelzevin.com

Astrophysicist at the Adler Planetarium with research interests in gravitational waves, compact objects, high-energy transients, stellar evolution, and citizen science.

Academic Positions

Adler Planetarium Astronomer	Chicago, IL 2023–Present
Northwestern University CIERA Visiting Scholar	Evanston, IL 2023–Present
University of Chicago NASA Hubble Fellowship Program: Hubble Postdoctoral Fellow Zhengtong/Enrico Fermi Postdoctoral Fellow KICP Fellow	Chicago, IL 2020–2023

Education

Northwestern University <i>Ph.D. in Physics and Astronomy</i> <ul style="list-style-type: none">▷ Thesis: Unveiling the Lives and Deaths of Stars through Compact Object Mergers▷ Advisor: Vicky Kalogera▷ Additional Certificates: Integrated Data Science	Evanston, IL August 2020
<i>Master of Science in Physics and Astronomy</i>	December 2016
University of Illinois <i>Bachelor of Science</i> <ul style="list-style-type: none">▷ Double Major in Astronomy and Physics▷ Minor in Music Performance	Champaign, IL May 2012

Awards & Honors

▷ IOP Publishing Top Cited Paper Award ¹	2023
▷ NASA Hubble Fellowship Program: Hubble Postdoctoral Fellow	2020–2023
▷ Zhengtong/Enrico Fermi Postdoctoral Fellow	2020–2023
▷ KICP Postdoctoral Fellow	2020–2023
▷ Oxford Centre for Cosmological Studies Balzan Fellowship ²	2018
▷ Illinois Space Grant Consortium Fellowship	2017–2020
▷ NSF GK12 Fellowship	2017–2018
▷ Kavli Summer Fellowship ³	2017
▷ NSF IDEAS Fellowship	2016–2020

¹Zevin et al. 2020a & Zevin et al. 2021a both in the top 1% of most-cited articles in IOP Journals between 2020-2022

²Research Advisor: Dr. Chris Lintott (New College, University of Oxford)

³Research Advisor: Dr. Enrico Ramirez-Ruiz (University of California Santa Cruz)

- ▷ **National Science Foundation Graduate Research Fellowship** (*honorable mention*) 2016
- ▷ **Gruber Cosmology Prize** (*as part of the LIGO-Virgo Collaboration*) 2016
- ▷ **Breakthrough Prize in Fundamental Physics** (*as part of the LIGO-Virgo Collaboration*) 2016
- ▷ **First Place in Poster Competition** (*Computational Research Day, Northwestern University*) 2016
- ▷ **High Distinction in Physics** (*University of Illinois Urbana-Champaign*) 2012

Publications

all paper titles are hyperlinked to their ADS entries

First Author Papers

<https://ui.adsabs.harvard.edu/abs/2023arXiv230815530Z/abstract> EPJ+
M. Zevin, C. Jackson, Z. Doctor, et al. 2023
 The European Physical Journal Plus (submitted)
 Invited article for focus issue on citizen science for physics

Observational Inference on the Delay Time Distribution of Short Gamma-ray Bursts ApJL
M. Zevin, A. Nugent, S. Adhikari, W.-f. Fong, D. Holz, L. Kelley 2022
 The Astrophysical Journal Letters **940** L18

Avoiding a Cluster Catastrophe: Retention Efficiency and the Binary Black Hole Mass Spectrum ApJL
M. Zevin, D. Holz 2022
 The Astrophysical Journal Letters **935** L20

Suspicious Siblings: The Distribution of Mass and Spin Across Component Black Holes in Isolated Binary Evolution ApJ
2022
M. Zevin, S. Bavera
 The Astrophysical Journal **933** 86

Implications of Eccentric Observations on Binary Black Hole Formation Channels ApJL
2021
M. Zevin, I. Romero-Shaw, K. Kremer, E. Thrane, P. Lasky
 The Astrophysical Journal Letters **921**, L43

One Channel to Rule Them All? Constraining the Origins of Binary Black Holes using Multiple Formation Pathways ApJ
2021
M. Zevin, S. Bavera, C. Berry, V. Kalogera, T. Fragos, P. Marchant, C. Rodriguez, F. Antonini, D. Holz, C. Pankow
 The Astrophysical Journal **910**, 152

Forward Modeling of Double Neutron Stars: Insights from Highly-Offset Short Gamma-ray Bursts ApJ
2020
M. Zevin, L. Kelley, A. Nugent, W.-f. Fong, C. Berry, V. Kalogera
 The Astrophysical Journal **904**, 190

Exploring the Lower Mass Gap and Unequal Mass Regime in Compact Binary Evolution ApJL
2020
M. Zevin, M. Spera, C. Berry, V. Kalogera
 The Astrophysical Journal Letters **899**, L1

You Can't Always Get What You Want: The Impact of Prior Assumptions on Interpreting GW190412 ApJL
2020
M. Zevin, C. Berry, S. Coughlin, K. Chatziioannou, S. Vitale
 The Astrophysical Journal Letters **899**, L17

Can Neutron-Star Mergers Explain the r-process Enrichment in Globular Clusters? ApJ
2019
M. Zevin, K. Kremer, D. M. Siegel, S. Coughlin, B. T.-H. Tsang, C. P. L. Berry, V. Kalogera
 The Astrophysical Journal **886**, 1

Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters ApJ
2019
M. Zevin, J. Samsing, C. L. Rodriguez, C. J. Haster, E. Ramirez-Ruiz
 The Astrophysical Journal **871**, 91
 – Covered by AAS Nova

Constraining Formation Models of Binary Black Holes with Gravitational-Wave Observations ApJ
2017
M. Zevin, C. Pankow, C. Rodriguez, L. Sampson, E. Chase, V. Kalogera, F. Rasio

The Astrophysical Journal 846, 82

Gravity Spy: Integrating Advanced LIGO Detector Characterization, Machine Learning, and Citizen Science CQG
2017
M. Zevin, S. Coughlin, S. Bahaadini, et al.
Classical and Quantum Gravity 34, 064003
– Covered by AAS Press

Highlighted Contributed Papers

Spin Doctors: How to diagnose a hierarchical merger origin ApJL
2024
E. Payne, K. Kremer, M. Zevin
The Astrophysical Journal Letters (submitted)

**Consistent eccentricities for gravitational wave astronomy:
Resolving discrepancies between astrophysical simulations and waveform models** OJA
2024
A. Vijaykumar, A. Hanselman, M. Zevin
Open Journal of Astrophysics (submitted)

Advancing Glitch Classification in Gravity Spy: Multi-view Fusion with Attention-based Machine Learning for Advanced LIGO’s Fourth Observing Run IS
2024
Y. Wu, M. Zevin, C.P.L. Berry, et al.
Information Sciences (submitted)

What You Don’t Know Can Hurt You: Use and Abuse of Astrophysical Models in Gravitational-wave Population Analyses ApJ
2023
A.Q. Cheng, M. Zevin, S. Vitale
The Astrophysical Journal 955, 127

Things that might go bump in the night: Assessing structure in the binary black hole mass spectrum ApJ
2023
A Farah, B. Edelman, M. Zevin, M. Fishbach, J. Ezquiaga, B. Farr, D. Holz
The Astrophysical Journal 955, 107

Inferring Interference: Identifying a Perturbing Tertiary with Eccentric Gravitational Wave Burst Timing PRD
2023
I. Romero-Shaw, N. Loutrel, M. Zevin
The Astrophysical Journal 107, 122001

The Missing Link Between Black Holes in High-Mass X-ray Binaries and Gravitational-Wave Sources: Observational Selection Effects ApJ
2023
C. Liotine, M. Zevin, C. Berry, Z. Doctor, V. Kalogera
The Astrophysical Journal 946, 4

Cosmologically coupled compact objects: a single parameter model for LIGO–Virgo mass and redshift distributions ApJL
2021
K. Croker, M. Zevin, D. Farrah, K. Nishimura, G. Tarle
The Astrophysical Journal Letters 922, L22

The Impact of Mass-Transfer Physics on the Observable Properties of Field Binary Black Hole Populations A&A
2021
S. Bavera, T. Fragos, M. Zevin, et al.
Astronomy & Astrophysics 647, 153

Approximations to the spin of close Black-hole–Wolf-Rayet binaries RNAAS
2021
S. Bavera, M. Zevin, T. Fragos
Research Notes of the American Astronomical Society 5 127

COSMIC Variance in Binary Population Synthesis ApJ
2019
K. Breivik, S. Coughlin, M. Zevin, et al.
The Astrophysical Journal 898, 71

Black Holes: The Next Generation PRD
2019
C. Rodriguez, M. Zevin, P. Amaro-Seoane, S. Chatterjee, K. Kremer, F. A. Rasio, C. S. Ye
Physical Review D 100, 043027

Illuminating Black Hole Binary Formation Channels with Spins in Advanced LIGO ApJL
2016
C. Rodriguez, M. Zevin, C. Pankow, V. Kalogera, F. A. Rasio
 The Astrophysical Journal Letters **832**, L2

Collaboration Papers as part of the LIGO Scientific Collaboration (2015–Present)
 only papers with significant contributions from M. Zevin are listed, click here for full list

The population of merging compact binaries inferred using gravitational waves through GWTC-3 PRX
2023
 Physical Review X **13**, 011048
 – [M. Zevin](#): Astrophysical interpretation review lead, code reviewer for high-mass injection set

Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo A&A
2022
 Astronomy and Astrophysics **659**, A84
 – [M. Zevin](#): Reviewer for high-mass injection set

GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run 2021
 Physical Review X (submitted), arxiv:2111.03634
 – [M. Zevin](#): Parameter estimation section review lead

Properties and Astrophysical Implications of the 150 M_{\odot} Binary Black Hole Merger GW190521 ApJL
2020
 The Astrophysical Journal Letters **900**, L13
 – [M. Zevin](#): Astrophysical implications reviewer

GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses PRD
2020
 Physical Review D **102**, 043015
 – [M. Zevin](#): Paper-writing team, populations and astrophysical implications lead, education and public outreach liaison, science summary writer, science case study team

GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object ApJL
2020
 The Astrophysical Journal Letters **896**, L44
 – [M. Zevin](#): Astrophysical implications reviewer

Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo ApJL
2019
 The Astrophysical Journal Letters **882**, L24
 – [M. Zevin](#): Education and public outreach liaison, science summary writer

On the Progenitor of Binary Neutron Star Merger GW170817 ApJL
2017
 The Astrophysical Journal Letters **850**, L40
 – [M. Zevin](#): Chair of paper-writing team, analysis lead

GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral PRL
2017
 Physical Review Letters **119**, 161101
 – [M. Zevin](#): Education and public outreach liaison

Observation of Gravitational Waves from a Binary Black Hole Merger PRL
2016
 Physical Review Letters **116**, 061102
 – [M. Zevin](#): Ran exploratory parameter estimation

Contributed Papers

A Population of Short-duration Gamma-ray Bursts with Dwarf Host Galaxies 2023
A. Nugent, W.-f. Fong, C. Castrejon, J. Leja, M. Zevin, A. Ji
 The Astrophysical Journal (submitted)

Data quality up to the third observing run of Advanced LIGO: Gravity Spy glitch classifications CQG
2023
J. Glanzer, S. Banagiri, S. Coughlin, S. Soni, C. Berry, M. Zevin, et al.
 Classical and Quantum Gravity **40**, 065004

POSDON: A General-Purpose Population Synthesis Code with Detailed Binary-Evolution Simulations ApJS
2023
T. Fragos, J.J. Andrews, S.S. Bavera, . . . , M. Zevin

The Astrophysical Journal Supplements **264**, 45

Observational evidence for cosmological coupling of black holes and its implications for an astrophysical source of dark energy ApJL
2023
D. Farrah, K. Croker, M. Zevin, et al.
The Astrophysical Journal Letters **944**, L31

A Preferential Growth Channel for Supermassive Black Holes in Elliptical Galaxies at $z \approx 2$ ApJ
2023
D. Farrah, S. Petty, K. Croker, G. Tarlé, M. Zevin, et al.
The Astrophysical Journal **943**, 133

Intermediate-mass Black Holes on the Run from Young Star Clusters ApJ
2022
E. Gonzalez, K. Kremer, G. Fragione, M. Martinez, N. Weatherford, M. Zevin, F. Rasio
The Astrophysical Journal **940**, 131

Discriminative Dimensionality Reduction using Deep Neural Networks for Clustering of LIGO Data 2022
S. Baahadini, Y. Wu, S. Coughlin, M. Zevin, A. Katsaggelos
IEEE Transactions on Neural Networks and Learning Systems (submitted), arXiv: 2205.13672

Short GRB Host Galaxies II: A Legacy Sample of Redshifts, Stellar Population Properties, and Implications for their Neutron Star Merger Origins ApJ
2022
A. Nugent, W.-f. Fong, Y. Dong, J. Leja, E. Berger, M. Zevin, et al.
The Astrophysical Journal **935**, 126

Black hole - black hole total merger mass and the origin of LIGO/Virgo sources ApJ
2022
K. Belczynski, Z. Doctor, M. Zevin, A. Olejak, S. Banerjee, D. Chattopadhyay
The Astrophysical Journal **935**, 126

The χ_{eff}^z correlation of field binary black hole mergers and how 3G gravitational-wave detectors can constrain it A&A
2022
S.S. Bavera, M. Fishbach, M. Zevin, E. Zapartas, T. Fragos
Astronomy & Astrophysics **665**, A59

Stochastic gravitational-wave background as a tool to investigate multi-channel astrophysical and primordial black-hole mergers A&A
2022
S. Bavera, G. Franciolini, G. Cusin, A. Riotto, M. Zevin, T. Fragos
Astronomy & Astrophysics **660**, 26

Probing the progenitors of spinning binary black-hole mergers with long gamma-ray bursts A&A
2022
S. Bavera, T. Fragos, E. Zapartas, E. Ramirez-Ruiz, P. Marchant, L. Kelley, M. Zevin, et al.
Astronomy & Astrophysics Letters **657**, L8

Evidence for Hierarchical Black Hole Mergers in the Second LIGO–Virgo Gravitational-Wave Catalog ApJL
2020
C. Kimball, C. Talbot, C. Berry, M. Zevin, E. Thrane, V. Kalogera, et al.
The Astrophysical Journal Letters **915**, L35

The Impact of Mass-Transfer Physics on the Observable Properties of Field Binary Black Hole Populations A&A
2021
S. Bavera, T. Fragos, M. Zevin, C. Berry, P. Marchant, J. Andrews, S. Coughlin, A. Dotter, et al.
Astronomy & Astrophysics **647**, 153

Black hole genealogy: Identifying hierarchical mergers with gravitational waves ApJ
2020
C. Kimball, C. Talbot, C. Berry, M. Carney, M. Zevin, E. Thrane, V. Kalogera
The Astrophysical Journal **900**, 177

Black Hole Mergers from Hierarchical Triples in Dense Star Clusters ApJ
2020
M. Martinez, G. Fragione, K. Kremer, . . . , M. Zevin, S. Naoz, F. A. Rasio
The Astrophysical Journal **903**, 67

Teaching Citizen Scientists to Categorize Glitches using Machine Learning Guided Training CHB
2020
C. Jackson, C. Østerlund, K. Crowston, . . . , M. Zevin
Computers in Human Behavior **105**, 106198

The Missing Link in Gravitational-Wave Astronomy: Discoveries waiting in the decihertz range CQG
2020
M. Arca Sedda, C. Berry, K. Jani, . . . , M. Zevin
Classical and Quantum Gravity **37**, 215011 (ESA's Voyage 2050 White Paper)

Knowledge Tracing to Model Learning in Online Citizen Science Projects <i>K. Crowston, C. Østerlund, T. Lee, . . . , M. Zevin</i> IEEE Transactions on Learning Technologies 13 , 1	IEEE TLT 2019
Classifying the Unknown: Discovering Novel Gravitational-Wave Detector Glitches using Similarity Learning <i>S. Coughlin, S. Bahaadini, N. Rohani, M. Zevin, et al.</i> Physical Review D 99 , 082002	PRD 2019
Post-Newtonian Dynamics in Dense Star Clusters: Binary Black Holes in the LISA Band <i>K. Kremer, C. L. Rodriguez, . . . , M. Zevin</i> Physical Review D 99 , 063003	PRD 2019
Post-Newtonian Dynamics in Dense Star Clusters: Formation, Masses, and Merger Rates of Highly-Eccentric Black Hole Binaries <i>C. L. Rodriguez, P. Amaro-Seoane, S. Chatterjee, K. Kremer, F. A. Rasio, J. Samsing, C. S. Ye, M. Zevin</i> Physical Review D 98 , 123005	PRD 2018
DIRECT: Deep Discriminative Embedding for Clustering of LIGO Data <i>S. Bahaadini, V. Noroozi, N. Rohani, S. Coughlin, M. Zevin, V. Kalogera, A. K. Katsaggelos</i> 25th IEEE International Conference on Image Processing Proceedings	ICIP 2018
Machine Learning for Gravity Spy: Glitch Classification and Dataset <i>S. Bahaadini, V. Noroozi, N. Rohani, S. Coughlin, M. Zevin, J. R. Smith, V. Kalogera, A. K. Katsaggelos</i> Information Sciences Journal 444 , 172	ISJ 2018
Improvements in Gravitational-wave Sky Localization with Expanded Networks of Interferometers <i>C. Pankow, E. A. Chase, S. Coughlin, M. Zevin, V. Kalogera</i> The Astrophysical Journal Letters 854 , L25	ApJL 2018
Deep Multi-view Models for Glitch Classification <i>S. Bahaadini, N. Rohani, S. Coughlin, M. Zevin, V. Kalogera, A. K. Katsaggelos</i> IEEE International Conference on Acoustics, Speech, and Signal Processing Proceedings	ICASSP 2018
Incorporating Current Research into Formal Higher Education Settings using Astrobites <i>N. E. Sanders, S. Kohler, C. Faesi, A. Villar, M. Zevin</i> American Journal of Physics 85 , 741	AJP 2017
Astrophysical Prior Information and Gravitational-Wave Parameter Estimation <i>C. Pankow, L. Sampson, L. Perri, E. A. Chase, S. Coughlin, M. Zevin, V. Kalogera</i> The Astrophysical Journal 834 , 154	APJ 2017

Presentations

Invited Talks

University of Illinois Astrophysics, Gravitational, and Cosmology Seminar <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>Urbana, IL</i> January 2024
Notre Dame Astrophysics Seminar <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>South Bend, IN</i> November 2023
Caltech TAPIR Seminar <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>Pasadena, CA</i> May 2023
CITA Seminar <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>Toronto, Canada</i> November 2022
AAS HEAD Meeting <i>One Channel to Rule Them All? Deciphering the Formation Pathways of Compact Object Mergers</i>	<i>Pittsburgh, PA</i> March 2022
Caltech/MIT LIGO–GRITTS Seminar	<i>Virtual</i>

<i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	June 2021
Fermi Lab Cosmic Physics Center Seminar	<i>Virtual</i>
<i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	May 2021
Yale Astronomy Colloquium	<i>Virtual</i>
<i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	April 2021
University of Chicago Astro Lunch Seminar	<i>Virtual</i>
<i>Unveiling the Lives and Deaths of Stars through Compact Object Mergers</i>	January 2021
Zooniverse Transient Workshop	<i>Virtual</i>
<i>Gravity Spy: Leveling Up & Training Volunteers using Machine Learning</i>	November 2020
Cosmic Explorer Panel	<i>Virtual</i>
<i>Binary Formation, panelist</i>	October 2020
Perimeter Institute Strong Gravity Seminar	<i>Waterloo, ON</i>
<i>Deciphering the Landscape of Compact Binary Formation Channels</i>	December 2019
AEI Seminar	<i>Postdam, DE</i>
<i>Deciphering the Landscape of Compact Binary Formation Channels</i>	December 2019
Caltech TAPIR Seminar	<i>Pasadena, CA</i>
<i>Deciphering the Landscape of Compact Binary Formation Channels</i>	November 2019
UCLA Lunch Talk	<i>Los Angeles, CA</i>
<i>Deciphering the Landscape of Compact Binary Formation Channels</i>	November 2019
UCSC FLASH Seminar	<i>Santa Cruz, CA</i>
<i>Deciphering the Landscape of Compact Binary Formation Channels</i>	November 2019
UCSB Astro Lunch	<i>Santa Barbara, CA</i>
<i>Deciphering the Landscape of Binary Black Hole Formation Channels</i>	November 2019
Colombia Astronomy Seminar	<i>New York, NY</i>
<i>Getting the boot: Lonely GRBs, enigmatic r-process, and the birth of neutron stars</i>	October 2019
MIT GRITTS Seminar	<i>Cambridge, MA</i>
<i>Unveiling the Lives and Deaths of Stars through Compact Object Mergers</i>	October 2019
CfA High Energy Astrophysics Seminar	<i>Cambridge, MA</i>
<i>Deciphering the Landscape of Binary Black Hole Formation Channels</i>	October 2019
CGCA Seminar	<i>Milwaukee, WI</i>
<i>Unveiling the Lives and Deaths of Stars through Compact Object Mergers</i>	March 2019
IGC Seminar	<i>Portsmouth, UK</i>
<i>From the Detected to the Detectors: Using Gravitational Waves to Enable Insights from the Stellar Graveyard & the Next Generation of Citizen Science</i>	March 2018
SPI-MAX Seminar	<i>Oxford, UK</i>
<i>From the Detected to the Detectors: Using Gravitational Waves to Enable Insights from the Stellar Graveyard & the Next Generation of Citizen Science</i>	February 2018
Contributed Talks, Panels, & Posters	
AAS Winder Meeting (Talk)	<i>New Orleans, LA</i>
<i>Use and Abuse of Astrophysical Models in Gravitational-wave Population Analyses</i>	January 2024
APS April Meeting (Talk)	<i>Minneapolis, MN</i>
<i>Astrophysical Implications of Eccentric Black Hole Mergers</i>	April 2023
GWPAW (Panel)	<i>Melbourne, Australia</i>
<i>Panel discussion chair, Scientific Organizing Committee</i>	December 2022
NHFP Symposium (Talk)	<i>Baltimore, MD</i>
<i>Lessons learned from the galactic hosts of short gamma-ray bursts</i>	September 2022
Post-PAX Meeting (Talk)	<i>Cambridge, MA</i>

<i>Formation Channels of Binary Black Holes: Open Questions</i>	August 2022
Intermediate-Mass Black Holes: New Science from Stellar Evolution to Cosmology (Talk) <i>The growth of intermediate-mass black holes through hierarchical mergers: implications for ground-based gravitational-wave detections</i>	San Juan, PR April 2022
APS April Meeting (Talk) <i>Lessons learned from the galactic hosts of short gamma-ray bursts</i>	New York, NY April 2022
Aspen Winter Conference (Talk) <i>Growing Black Holes: The Impact of Retention Efficiency on Hierarchical Mergers and the BBH Mass Spectrum</i>	Aspen, CO January 2022
NHFP Symposium (Talk) <i>Constraining dynamical formation channels of binary black holes with eccentric observations</i>	Virtual September 2021
Amaldi 14 (Talk) <i>Constraining dynamical formation channels of binary black holes with eccentric observations</i>	Virtual July 2021
NHFP Symposium (Talk) <i>Research Overview</i>	Virtual September 2020
Aspen Winter Conference (Talk) <i>Eccentric Black Hole Mergers in Dense Star Clusters: Post-Newtonian Effects & Higher Multiplicity Encounters</i>	Aspen, CO February 2019
AAS 233 (Talk) <i>Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters</i>	Seattle, WA January 2019
NSF Research Traineeship Annual Meeting (Poster) <i>Gravity Spy: Integrating Gravitational-Wave Astrophysics, Machine Learning, and Citizen Sciences</i>	Washington, DC September 2018
MODEST-18 (Talk) <i>The Role of Binary-Binary Interactions in Inducing Eccentric Black Hole Mergers</i>	Santorini, Greece June 2018
APS April Meeting (Talk) <i>On the Progenitor of Binary Neutron Star Merger GW170817</i>	Columbus, OH April 2018
Detecting the Unexpected: Discovery in the Era of Astronomically Big Data (Talk) <i>The Future of Citizen Science: Coupling Crowdsourcing and Machine Learning</i>	Baltimore, MD March 2017
APS April Meeting (Talk) <i>Discriminating Formation Channels of Binary Black Hole Systems with Advanced LIGO</i>	Washington, DC January 2017
AAS 229 (Talk) <i>Discriminating Formation Channels of Binary Black Hole Systems with Advanced LIGO</i>	Grapevine, TX January 2017
AAS 229 (Workshop & Poster) <i>Astrobiters: Engaging Undergraduate Science Majors with Current Astrophysical Research</i>	Grapevine, TX January 2017
AAS 228 (Talk) <i>Gravity Spy: Integrating aLIGO detector characterization, machine learning, and citizen science</i>	San Diego, CA June 2016
Northwestern Computational Research Exposition (Poster) <i>Integrating aLIGO detector characterization, machine learning, and citizen science</i> – Awarded first prize in poster competition	Evanston, IL April 2016
Midwest Relativity Meeting (Talk) <i>LIGO glitch classification through the combination of machine learning and citizen science</i>	Evanston, IL September 2015

Outreach & Public Engagement

Science Communication & Outreach

Gravity Spy

Citizen Science

Researcher, Developer *2015–Present*
 – Developed Zooniverse citizen science project to classify and characterize LIGO–Virgo detector data, as part of a team of gravitational wave, machine learning, Zooniverse, and social scientists
 – Led construction of user interface on the Zooniverse Lab platform, point person for communication between the Zooniverse volunteers and science team
 – Project has accumulated over 7,000,000 classifications from over 30,000 registered users (January 2022)

Lifelong Learning **Talk Series**
Organizer *2021–2022*
 – Public talk series for seniors, based in public libraries and senior centers in the Chicago-land area.

Astrobiters **Blog**
Author, Administrator, & Leadership Team *2014–2020*
 – Astronomy blog partnered with the AAS, provides daily summaries of recent astronomy research articles
 – Initiated the “Beyond” series, which covers topics on career advice, graduate school applications, and diversity, equity, and inclusivity in astronomy

ComSciCon **Workshop**
Organizer, Attendee *2017–2020*
 – National graduate-student run science communication workshop for graduate students in STEM fields

Astronomy on Tap **Public Event**
Co-founder, organizer, host, speaker *2015–2020*
 – Co-founded the Chicago branch of Astronomy on Tap, which hosts astronomy talks and space-based trivia at bars and breweries in the Chicago-land area

Rapid Fire Research **Departmental Event**
Founder, Chair *2016–2019*
 – Annual research presentation event for graduate and undergraduate students in Northwestern Department of Physics and Astronomy

Machine Learning Meetups **Public Event**
Organizer, Host *2016–2018*
 – Quarterly interdisciplinary colloquia on data science and machine learning topics

Chicagoland Science Penpals **Event**
Participant *2017*
 – Correspondence with students in Chicago public schools about scientific research and science as a profession, using handwritten letters

Public Talks & Lectures

Astronomer Conversations **Lecture Series**
Adler Planetarium, Space Visualization Laboratory *2014–present*
 – Public presentations at the Adler Planetarium for museum guests

Astronomy on Tap **Invited Speaker**
Chicago, IL *December 2023*

Lifelong Learning: JWST **Lecture Series**
Remote *November 2022*

Art of Science **Invited Speaker**
Chicago, IL *October 2022*

Hinsdale Social Studies Circle: Uncovering the Universe’s Symphony **Invited Speaker**
Virtual *January 2022*

Finding Genius Podcast **Invited Speaker**
Virtual *December 2021*

Lifelong Learning: Gravitational Waves **Lecture Series**
Remote *November 2021*

Lifelong Learning: Gravitational Waves **Lecture Series**
Remote *March 2021*

UBS Investment Banking: Gravity Spy and LIGO <i>Virtual</i>	Invited Speaker <i>September 2020</i>
Astronomer Evenings <i>Northwestern University, Dearborn Observatory</i> – Presentations during public observing hours at the Dearborn Observatory	Lecture Series <i>2016–2019</i>
Chipping Norton Amateur Astronomy Group <i>Chipping Norton, UK</i>	Keynote Lecture <i>February 2018</i>
Take Our Children to Work Day <i>Northwestern University</i>	Lecture <i>April 2016, 2018</i>
Haven Midde School <i>Evanston, IL</i>	Invited Speaker <i>April 2017, 2018</i>
Chicago Astronomical Society <i>Adler Planetarium</i>	Keynote Lecture <i>May 2017</i>
Avery Coonley School <i>Downers Grove, IL</i>	Invited Speaker <i>May 2017</i>
Seven Minutes of Science: An Interdisciplinary Symposium <i>Northwestern University</i>	Public Talk <i>April 2017</i>
Highcrest Elementary <i>Wilmette, IL</i>	Invited Speaker <i>March 2017</i>
Einstein Evenings <i>Northwestern University, Dearborn Observatory</i> – Monthly presentations during observing hours on LIGO discoveries in celebration of the 100th anniversary of General Relativity	Lecture Series <i>2015–2016</i>
Nettlehorst Elementary <i>Chicago, IL</i>	Invited Speaker <i>February 2016</i>

Publications

Astrobit.es <i>Authored over 20 blog posts on current research in astrophysics (Link)</i>	Blog <i>2014–2020</i>
LIGO Science Summary <i>Companion science summary to the LIGO–Virgo O2 Populations paper (Link)</i> <i>Companion science summary to the GW170817 Detection paper (Link)</i>	Article <i>November 2018</i> <i>October 2017</i>
LIGO Magazine <i>The Gravity Spy Project — Machine Learning and Citizen Science (Link)</i>	Magazine Article <i>March 2017</i>
Helix Magazine <i>The Legacy of Scientific Discovery (Link)</i>	Magazine Article <i>March 2017</i>

Teaching & Work Experience

Illinois Institute of Technology <i>Undergraduate Level Observational Astrophysics</i>	Guest Lecturer <i>2023</i>
University of Chicago <i>Graduate Level Stellar Astrophysics, Graduate Level Space Physics</i>	Guest Lecturer <i>2022–Present</i>
Northwestern University <i>Introduction to Astronomy, Stellar Astrophysics, Data-Driven Research in Astronomy</i> – Guest lectured, developed assignments, graded, and ran telescope observing sessions	Lecturer/TA <i>2015–2017</i>
GK12 Fellowship <i>Reach for the Stars; Evanston, IL</i>	Teaching <i>2017–2018</i>

- Co-taught astronomy classes at Evanston Township High School
- Developed curriculum, coding-based lessons, and visualizations for high-school students

Kids Science Labs

Lead Teacher; Chicago, IL

- Taught classes of 3–12 year old students in hands-on, experiential science classes
- Designed curriculum for science summer camps

Teaching
2013–2015

Adler Planetarium

Mission Specialist, Science Leadership Corps Instructor; Chicago, IL

- Facilitated exhibits, performed experiments, and gave astronomy talks to the public
- Designed educational programming
- Led under-represented students in designing experiments for high-altitude balloon launches

Museum Education
2012–2014

Students Mentored

Alex Hanselman

Self-consistent eccentricity definitions; University of Chicago Graduate Student

Graduate
2023–present

Ethan Payne

Measurability of spin and precession in hierarchical mergers; Caltech Graduate Student

Graduate
2022–present

April Cheng

Multi-channel model selection with GWTC-3; MIT Undergraduate Student

Undergraduate
2022–present

Aditya Vijaykumar

Evolution of binary neutron stars in cosmological simulations; KICP Visiting Graduate Student

Graduate
2022–present

Anya Nugent

Host demographics and progenitors of short GRBs; CIERA Graduate Student

Graduate
2021–present

Amanda Farah

Cosmology from evolving non-parametric mass distribution; University of Chicago Graduate Student

Graduate
2021–present

Camille Liotine

HMXB Progenitors to Binary Black Hole Mergers; CIERA Graduate Student

Graduate
2020–2023

Simone Bavera

Isolated Evolution and Tidal Spin-up of Wolf-Rayet Stars; University of Geneva Graduate Student

Graduate
2019–2021

Michael Kurkowski

Pair Instability Supernova Prescriptions in Binary Population Synthesis; CIERA REU Student

Undergraduate
2019

Jared Machtinger

Population properties of binary black holes detected by LIGO; CIERA Summer Student

High School
2019

Danai Avdela

Population properties of binary black holes detected by LIGO; CIERA Summer Student

High School
2019

Isaac Rivera

Offset distributions of short gamma-ray bursts; CIERA REU Student

Undergraduate
2018

Grace Kern

Optimization of Gravity Spy image retirement; CIERA Summer Student

High School
2018

Hannah Stein

Optimization of Gravity Spy image retirement; CIERA Summer Student

High School
2018

Yuqi Yun

Gaussian Process regression of black hole mass distributions; CIERA REU Student

Undergraduate
2016

Sophie Haight

Gaussian Process regression of binary stellar evolution sequences; CIERA Summer Student

High School
2016

Affiliations & Leadership Positions

- ▷ **LSST Discovery Alliance:** Institutional Representative 2023–present
- ▷ **GWPAW Conference:** Scientific Organizing Committee 2022
- ▷ **NHFP Symposium:** Scientific Organizing Committee 2022
- ▷ **Lifelong Learning:** Organizer 2021–2022
- ▷ **NHFP DEI Working Group:** Statistics Co-Lead 2020–2022
- ▷ **ComSciCon National:** Organizer 2017–2020
- ▷ **American Astronomical Society:** Member 2016–Present
- ▷ **American Physical Society:** Member 2016–Present
- ▷ **American Astronomical Society, Media Intern** 2016
- ▷ **Physics and Astronomy Graduate Student Council:** Quality of Life Chair 2016–2018
- ▷ **Rapid Fire Research:** Founder, chair 2016–2018
- ▷ **LIGO Scientific Collaboration:** Member 2015–Present
- ▷ **Astrobiters:** Administrator, Author 2014–2020
- ▷ **Chicago Metropolitan Symphony Orchestra:** Double Bassist 2014–2020

Service Work

- Served on NSF panel** 2021
- Peer Reviewer for:** 2017–Present
 - *Astronomy and Astrophysics*
 - *The Astrophysical Journal*
 - *The Astrophysical Journal Letters*
 - *Monthly Notices of the Royal Astronomical Society*
 - *Nature Astronomy*
 - *Physical Review D*
 - *Physical Review Letters*