

Michael J. Zevin || Curriculum Vitae

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

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

Academic Positions

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| 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

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| 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

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| ▷ 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
M. Zevin, S. Bavera 2022
 The Astrophysical Journal **933** 86
- Implications of Eccentric Observations on Binary Black Hole Formation Channels** ApJL
M. Zevin, I. Romero-Shaw, K. Kremer, E. Thrane, P. Lasky 2021
 The Astrophysical Journal Letters **921**, L43
- One Channel to Rule Them All? Constraining the Origins of Binary Black Holes using Multiple Formation Pathways** ApJ
M. Zevin, S. Bavera, C. Berry, V. Kalogera, T. Fragos, P. Marchant, C. Rodriguez, F. Antonini, D. Holz, C. Pankow 2021
 The Astrophysical Journal **910**, 152
- Forward Modeling of Double Neutron Stars: Insights from Highly-Offset Short Gamma-ray Bursts** ApJ
M. Zevin, L. Kelley, A. Nugent, W.-f. Fong, C. Berry, V. Kalogera 2020
 The Astrophysical Journal **904**, 190
- Exploring the Lower Mass Gap and Unequal Mass Regime in Compact Binary Evolution** ApJL
M. Zevin, M. Spera, C. Berry, V. Kalogera 2020
 The Astrophysical Journal Letters **899**, L1
- You Can't Always Get What You Want: The Impact of Prior Assumptions on Interpreting GW190412** ApJL
M. Zevin, C. Berry, S. Coughlin, K. Chatziioannou, S. Vitale 2020
 The Astrophysical Journal Letters **899**, L17
- Can Neutron-Star Mergers Explain the r-process Enrichment in Globular Clusters?** ApJ
M. Zevin, K. Kremer, D. M. Siegel, S. Coughlin, B. T.-H. Tsang, C. P. L. Berry, V. Kalogera 2019
 The Astrophysical Journal **886**, 1
- Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters** ApJ
M. Zevin, J. Samsing, C. L. Rodriguez, C. J. Haster, E. Ramirez-Ruiz 2019
 The Astrophysical Journal **871**, 91
 – Covered by AAS Nova
- Constraining Formation Models of Binary Black Holes with Gravitational-Wave Observations** ApJ
M. Zevin, C. Pankow, C. Rodriguez, L. Sampson, E. Chase, V. Kalogera, F. Rasio 2017

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

Consistent eccentricities for gravitational wave astronomy:

OJA

Resolving discrepancies between astrophysical simulations and waveform models

2024

A. Vijaykumar, A. Hanselman, M. Zevin

Open Journal of Astrophysics (submitted)

Advancing Glitch Classification in Gravity Spy: Multi-view Fusion with Attention-based

IS

Machine Learning for Advanced LIGO's Fourth Observing Run

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

ApJ

Gravitational-wave Population Analyses

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

A Farah, B. Edelman, M. Zevin, M. Fishbach, J. Ezquiaga, B. Farr, D. Holz

2023

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

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|---|------------------------|
| The population of merging compact binaries inferred using gravitational waves through GWTC-3 Physical Review X 13 , 011048 – M. Zevin : Astrophysical interpretation review lead, code reviewer for high-mass injection set | PRX 2023 |
| Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo Astronomy and Astrophysics 659 , A84 – M. Zevin : Reviewer for high-mass injection set | A&A 2022 |
| GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run Physical Review X (submitted), arxiv:2111.03634 – M. Zevin : Parameter estimation section review lead | 2021 |
| Properties and Astrophysical Implications of the 150 M_⊙ Binary Black Hole Merger GW190521 The Astrophysical Journal Letters 900 , L13 – M. Zevin : Astrophysical implications reviewer | ApJL 2020 |
| GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses 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 | PRD 2020 |
| GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object The Astrophysical Journal Letters 896 , L44 – M. Zevin : Astrophysical implications reviewer | ApJL 2020 |
| Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo The Astrophysical Journal Letters 882 , L24 – M. Zevin : Education and public outreach liaison, science summary writer | ApJL 2019 |
| On the Progenitor of Binary Neutron Star Merger GW170817 The Astrophysical Journal Letters 850 , L40 – M. Zevin : Chair of paper-writing team, analysis lead | ApJL 2017 |
| GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral Physical Review Letters 119 , 161101 – M. Zevin : Education and public outreach liaison | PRL 2017 |
| Observation of Gravitational Waves from a Binary Black Hole Merger Physical Review Letters 116 , 061102 – M. Zevin : Ran exploratory parameter estimation | PRL 2016 |

Contributed Papers

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| A Population of Short-duration Gamma-ray Bursts with Dwarf Host Galaxies <i>A. Nugent, W.-f. Fong, C. Castrejon, J. Leja, M. Zevin, A. Ji</i> The Astrophysical Journal (submitted) | 2023 |
| Data quality up to the third observing run of Advanced LIGO: Gravity Spy glitch classifications <i>J. Glanzer, S. Banagiri, S. Coughlin, S. Soni, C. Berry, M. Zevin, et al.</i> Classical and Quantum Gravity 40 , 065004 | CQG 2023 |
| POSDON: A General-Purpose Population Synthesis Code with Detailed Binary-Evolution Simulations <i>T. Fragos, J.J. Andrews, S.S. Bavera, . . . , M. Zevin</i> The Astrophysical Journal Supplements 264 , 45 | ApJS 2023 |
| Observational evidence for cosmological coupling of black holes and its implications for an astrophysical source of dark energy <i>D. Farrah, K. Croker, M. Zevin, et al.</i> | ApJL 2023 |

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| The Astrophysical Journal Letters 944 , L31 | |
| A Preferential Growth Channel for Supermassive Black Holes in Elliptical Galaxies at $z \approx 2$ <i>D. Farrah, S. Petty, K. Croker, G. Tarlé, M. Zevin, et al.</i> The Astrophysical Journal 943 , 133 | ApJ 2023 |
| Intermediate-mass Black Holes on the Run from Young Star Clusters <i>E. González, K. Kremer, G. Fragione, M. Martinez, N. Weatherford, M. Zevin, F. Rasio</i> The Astrophysical Journal 940 , 131 | ApJ 2022 |
| Discriminative Dimensionality Reduction using Deep Neural Networks for Clustering of LIGO Data <i>S. Baahadini, Y. Wu, S. Coughlin, M. Zevin, A. Katsaggelos</i> IEEE Transactions on Neural Networks and Learning Systems (submitted), arXiv: 2205.13672 | 2022 |
| Short GRB Host Galaxies II: A Legacy Sample of Redshifts, Stellar Population Properties, and Implications for their Neutron Star Merger Origins <i>A. Nugent, W.-f. Fong, Y. Dong, J. Leja, E. Berger, M. Zevin, et al.</i> The Astrophysical Journal 935 , 126 | ApJ 2022 |
| Black hole - black hole total merger mass and the origin of LIGO/Virgo sources <i>K. Belczynski, Z. Doctor, M. Zevin, A. Olejak, S. Banerjee, D. Chattopadhyay</i> The Astrophysical Journal 935 , 126 | ApJ 2022 |
| The $\chi_{\text{eff}} z$ correlation of field binary black hole mergers and how 3G gravitational-wave detectors can constrain it <i>S.S. Bavera, M. Fishbach, M. Zevin, E. Zapartas, T. Fragos</i> Astronomy & Astrophysics 665 , A59 | A&A 2022 |
| Stochastic gravitational-wave background as a tool to investigate multi-channel astrophysical and primordial black-hole mergers <i>S. Bavera, G. Franciolini, G. Cusin, A. Riotto, M. Zevin, T. Fragos</i> Astronomy & Astrophysics 660 , 26 | A&A 2022 |
| Probing the progenitors of spinning binary black-hole mergers with long gamma-ray bursts <i>S. Bavera, T. Fragos, E. Zapartas, E. Ramirez-Ruiz, P. Marchant, L. Kelley, M. Zevin, et al.</i> Astronomy & Astrophysics Letters 657 , L8 | A&A 2022 |
| Evidence for Hierarchical Black Hole Mergers in the Second LIGO–Virgo Gravitational-Wave Catalog <i>C. Kimball, C. Talbot, C. Berry, M. Zevin, E. Thrane, V. Kalogera, et al.</i> The Astrophysical Journal Letters 915 , L35 | ApJL 2020 |
| The Impact of Mass-Transfer Physics on the Observable Properties of Field Binary Black Hole Populations <i>S. Bavera, T. Fragos, M. Zevin, C. Berry, P. Marchant, J. Andrews, S. Coughlin, A. Dotter, et al.</i> Astronomy & Astrophysics 647 , 153 | A&A 2021 |
| Black hole genealogy: Identifying hierarchical mergers with gravitational waves <i>C. Kimball, C. Talbot, C. Berry, M. Carney, M. Zevin, E. Thrane, V. Kalogera</i> The Astrophysical Journal 900 , 177 | ApJ 2020 |
| Black Hole Mergers from Hierarchical Triples in Dense Star Clusters <i>M. Martinez, G. Fragione, K. Kremer, . . . , M. Zevin, S. Naoz, F. A. Rasio</i> The Astrophysical Journal 903 , 67 | ApJ 2020 |
| Teaching Citizen Scientists to Categorize Glitches using Machine Learning Guided Training <i>C. Jackson, C. Østerlund, K. Crowston, . . . , M. Zevin</i> Computers in Human Behavior 105 , 106198 | CHB 2020 |
| The Missing Link in Gravitational-Wave Astronomy: Discoveries waiting in the decihertz range <i>M. Arca Sedda, C. Berry, K. Jani, . . . , M. Zevin</i> Classical and Quantum Gravity 37 , 215011 (ESA's Voyage 2050 White Paper) | CQG 2020 |
| 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 |

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| 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

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| 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>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i> | <i>Virtual</i> June 2021 |
| Fermi Lab Cosmic Physics Center Seminar <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i> | <i>Virtual</i> May 2021 |

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

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| <i>implications for ground-based gravitational-wave detections</i> | |
| 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>Astrobits: 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.....

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| Gravity Spy <i>Researcher, Developer</i> | Citizen Science <i>2015–Present</i> |
| – 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.

Astrobits **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 **Invited Speaker**
Virtual **September 2020**

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| Astronomer Evenings <i>Northwestern University, Dearborn Observatory</i> – Presentations during public observing hours at the Dearborn Observatory | Lecture Series 2016–2019 |
| Chipping Norton Amateur Astronomy Group <i>Chipping Norton, UK</i> | Keynote Lecture February 2018 |
| Take Our Children to Work Day <i>Northwestern University</i> | Lecture April 2016, 2018 |
| Haven Midde School <i>Evanston, IL</i> | Invited Speaker April 2017, 2018 |
| Chicago Astronomical Society <i>Adler Planetarium</i> | Keynote Lecture May 2017 |
| Avery Coonley School <i>Downers Grove, IL</i> | Invited Speaker May 2017 |
| Seven Minutes of Science: An Interdisciplinary Symposium <i>Northwestern University</i> | Public Talk April 2017 |
| Highcrest Elementary <i>Wilmette, IL</i> | Invited Speaker March 2017 |
| 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 2015–2016 |
| Nettlehorst Elementary <i>Chicago, IL</i> | Invited Speaker February 2016 |

Publications

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| Astrobites <i>Authored over 20 blog posts on current research in astrophysics (Link)</i> | Blog 2014–2020 |
| 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 November 2018 October 2017 |
| LIGO Magazine <i>The Gravity Spy Project — Machine Learning and Citizen Science (Link)</i> | Magazine Article March 2017 |
| Helix Magazine <i>The Legacy of Scientific Discovery (Link)</i> | Magazine Article March 2017 |

Teaching & Work Experience

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| Illinois Institute of Technology <i>Undergraduate Level Observational Astrophysics</i> | Guest Lecturer 2023 |
| University of Chicago <i>Graduate Level Stellar Astrophysics, Graduate Level Space Physics</i> | Guest Lecturer 2022–Present |
| 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 2015–2017 |
| GK12 Fellowship <i>Reach for the Stars; Evanston, IL</i> – Co-taught astronomy classes at Evanston Township High School – Developed curriculum, coding-based lessons, and visualizations for high-school students | Teaching 2017–2018 |

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| Kids Science Labs <i>Lead Teacher</i> ; Chicago, IL | Teaching 2013–2015 |
| – Taught classes of 3–12 year old students in hands-on, experiential science classes | |
| – Designed curriculum for science summer camps | |
| Adler Planetarium <i>Mission Specialist, Science Leadership Corps Instructor</i> ; Chicago, IL | Museum Education 2012–2014 |
| – 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 | |

Students Mentored

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| Alex Hanselman <i>Self-consistent eccentricity definitions</i> ; University of Chicago Graduate Student | Graduate 2023–present |
| Ethan Payne <i>Measurability of spin and precession in hierarchical mergers</i> ; Caltech Graduate Student | Graduate 2022–present |
| April Cheng <i>Multi-channel model selection with GWTC-3</i> ; MIT Undergraduate Student | Undergraduate 2022–present |
| Aditya Vijaykumar <i>Evolution of binary neutron stars in cosmological simulations</i> ; KICP Visiting Graduate Student | Graduate 2022–present |
| Anya Nugent <i>Host demographics and progenitors of short GRBs</i> ; CIERA Graduate Student | Graduate 2021–present |
| Amanda Farah <i>Cosmology from evolving non-parametric mass distribution</i> ; University of Chicago Graduate Student | Graduate 2021–present |
| Camille Liotine <i>HMXB Progenitors to Binary Black Hole Mergers</i> ; CIERA Graduate Student | Graduate 2020–2023 |
| Simone Bavera <i>Isolated Evolution and Tidal Spin-up of Wolf-Rayet Stars</i> ; University of Geneva Graduate Student | Graduate 2019–2021 |
| Michael Kurkowski <i>Pair Instability Supernova Prescriptions in Binary Population Synthesis</i> ; CIERA REU Student | Undergraduate 2019 |
| Jared Machtinger <i>Population properties of binary black holes detected by LIGO</i> ; CIERA Summer Student | High School 2019 |
| Danai Avdela <i>Population properties of binary black holes detected by LIGO</i> ; CIERA Summer Student | High School 2019 |
| Isaac Rivera <i>Offset distributions of short gamma-ray bursts</i> ; CIERA REU Student | Undergraduate 2018 |
| Grace Kern <i>Optimization of Gravity Spy image retirement</i> ; CIERA Summer Student | High School 2018 |
| Hannah Stein <i>Optimization of Gravity Spy image retirement</i> ; CIERA Summer Student | High School 2018 |
| Yuqi Yun <i>Gaussian Process regression of black hole mass distributions</i> ; CIERA REU Student | Undergraduate 2016 |
| Sophie Haight <i>Gaussian Process regression of binary stellar evolution sequences</i> ; CIERA Summer Student | High School 2016 |

Affiliations & Leadership Positions

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| ▷ LSST Discovery Alliance : Institutional Representative | 2023–present |
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- ▷ **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
- ▷ **Astrobitess:** 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*