

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

## Education

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

## Awards & Honors

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| ▷ 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 <sup>1</sup>        | 2018      |
| ▷ Illinois Space Grant Consortium Fellowship                                   | 2017–2020 |
| ▷ NSF GK12 Fellowship  | 2017–2018 |
| ▷ Kavli Summer Fellowship <sup>2</sup>   | 2017      |
| ▷ NSF IDEAS Fellowship   | 2016–2020 |
| ▷ National Science Foundation Graduate Research Fellowship (honorable mention) | 2016      |
| ▷ Gruber Cosmology Prize (as part of the LIGO-Virgo Collaboration)             | 2016      |

<sup>1</sup>Research Advisor: Dr. Chris Lintott (New College, University of Oxford)

<sup>2</sup>Research Advisor: Dr. Enrico Ramirez-Ruiz (University of California Santa Cruz)

- ▷ **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+  
2023  
*M. Zevin, C. Jackson, Z. Doctor, et al.*  
 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  
2022  
*M. Zevin, A. Nugent, S. Adhikari, W.-f. Fong, D. Holz, L. Kelley*  
 The Astrophysical Journal Letters **940** L18  
 Citations: 11
- Avoiding a Cluster Catastrophe: Retention Efficiency and the Binary Black Hole Mass Spectrum** ApJL  
2022  
*M. Zevin, D. Holz*  
 The Astrophysical Journal Letters **935** L20  
 Citations: 10
- 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  
 Citations: 29
- 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  
 Citations: 29
- 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  
 Citations: 179
- 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  
 Citations: 13
- 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  
 Citations: 104
- 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  
 Citations: 50
- 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  
 Citations: 32

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| <b>Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters</b><br><i>M. Zevin, J. Samsing, C. L. Rodriguez, C. J. Haster, E. Ramirez-Ruiz</i><br>The Astrophysical Journal <b>871</b> , 91<br>Citations: 155<br>– Covered by AAS Nova | <b>ApJ</b><br>2019     |
| <b>Constraining Formation Models of Binary Black Holes with Gravitational-Wave Observations</b><br><i>M. Zevin, C. Pankow, C. Rodriguez, L. Sampson, E. Chase, V. Kalogera, F. Rasio</i><br>The Astrophysical Journal <b>846</b> , 82<br>Citations: 134                 | <b>ApJ</b><br>2017     |
| <b>Gravity Spy: Integrating Advanced LIGO Detector Characterization, Machine Learning, and Citizen Science</b><br><i>M. Zevin, S. Coughlin, S. Bahaadini, et al.</i><br>Classical and Quantum Gravity <b>34</b> , 064003<br>Citations: 158<br>– Covered by AAS Press    | <b>CQG</b><br>2017     |
| <b>Highlighted Contributed Papers .....</b>   |                        |
| <b>What You Don't Know Can Hurt You: Use and Abuse of Astrophysical Models in Gravitational-wave Population Analyses</b><br><i>A.Q. Cheng, M. Zevin, S. Vitale</i><br>The Astrophysical Journal (submitted), arxiv:2307.03129   | 2023                   |
| <b>Things that might go bump in the night: Assessing structure in the binary black hole mass spectrum</b><br><i>A Farah, B. Edelman, M. Zevin, M. Fishbach, J. Ezquiaga, B. Farr, D. Holz</i><br>The Astrophysical Journal (submitted), arxiv:2301.00834                | 2022                   |
| <b>Inferring Interference: Identifying a Perturbing Tertiary with Eccentric Gravitational Wave Burst Timing</b><br><i>I. Romero-Shaw, N. Loutrel, M. Zevin</i><br>The Astrophysical Journal (accepted), arxiv:2211.07278  | 2022                   |
| <b>The Missing Link Between Black Holes in High-Mass X-ray Binaries and Gravitational-Wave Sources: Observational Selection Effects</b><br><i>C. Liotine, M. Zevin, C. Berry, Z. Doctor, V. Kalogera</i><br>The Astrophysical Journal <b>946</b> , 4                    | <b>ApJ</b><br>2023     |
| <b>Cosmologically coupled compact objects: a single parameter model for LIGO–Virgo mass and redshift distributions</b><br><i>K. Croker, M. Zevin, D. Farrah, K. Nishimura, G. Tarle</i><br>The Astrophysical Journal Letters <b>922</b> , L22                           | <b>ApJL</b><br>2021    |
| <b>The Impact of Mass-Transfer Physics on the Observable Properties of Field Binary Black Hole Populations</b><br><i>S. Bavera, T. Fragos, M. Zevin, et al.</i><br>Astronomy & Astrophysics <b>647</b> , 153  | <b>A&amp;A</b><br>2021 |
| <b>Approximations to the spin of close Black-hole–Wolf-Rayet binaries</b><br><i>S. Bavera, M. Zevin, T. Fragos</i><br>Research Notes of the American Astronomical Society <b>5</b> 127  | <b>RNAAS</b><br>2021   |
| <b>COSMIC Variance in Binary Population Synthesis</b><br><i>K. Breivik, S. Coughlin, M. Zevin, et al.</i><br>The Astrophysical Journal <b>898</b> , 71  | <b>ApJ</b><br>2019     |
| <b>Black Holes: The Next Generation</b><br><i>C. Rodriguez, M. Zevin, P. Amaro-Seoane, S. Chatterjee, K. Kremer, F. A. Rasio, C. S. Ye</i><br>Physical Review D <b>100</b> , 043027   | <b>PRD</b><br>2019     |
| <b>Illuminating Black Hole Binary Formation Channels with Spins in Advanced LIGO</b><br><i>C. Rodriguez, M. Zevin, C. Pankow, V. Kalogera, F. A. Rasio</i><br>The Astrophysical Journal Letters <b>832</b> , L2   | <b>ApJL</b><br>2016    |

## 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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|---|------------------------|
| <b>The population of merging compact binaries inferred using gravitational waves through GWTC-3</b><br>Physical Review X <b>13</b> , 011048<br>– <a href="#">M. Zevin</a> : Astrophysical interpretation review lead, code reviewer for high-mass injection set   | <b>PRX</b><br>2023     |
| <b>Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo</b><br>Astronomy and Astrophysics <b>659</b> , A84<br>– <a href="#">M. Zevin</a> : Reviewer for high-mass injection set  | <b>A&amp;A</b><br>2022 |
| <b>GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run</b><br>Physical Review X (submitted), arxiv:2111.03634<br>– <a href="#">M. Zevin</a> : Parameter estimation section review lead   | <br>2021               |
| <b>Properties and Astrophysical Implications of the 150 M<sub>⊙</sub> Binary Black Hole Merger GW190521</b><br>The Astrophysical Journal Letters <b>900</b> , L13<br>– <a href="#">M. Zevin</a> : Astrophysical implications reviewer   | <b>ApJL</b><br>2020    |
| <b>GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses</b><br>Physical Review D <b>102</b> , 043015<br>– <a href="#">M. Zevin</a> : Paper-writing team, populations and astrophysical implications lead, education and public outreach liaison, science summary writer, science case study team | <b>PRD</b><br>2020     |
| <b>GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object</b><br>The Astrophysical Journal Letters <b>896</b> , L44<br>– <a href="#">M. Zevin</a> : Astrophysical implications reviewer  | <b>ApJL</b><br>2020    |
| <b>Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo</b><br>The Astrophysical Journal Letters <b>882</b> , L24<br>– <a href="#">M. Zevin</a> : Education and public outreach liaison, science summary writer                                    | <b>ApJL</b><br>2019    |
| <b>On the Progenitor of Binary Neutron Star Merger GW170817</b><br>The Astrophysical Journal Letters <b>850</b> , L40<br>– <a href="#">M. Zevin</a> : Chair of paper-writing team, analysis lead  | <b>ApJL</b><br>2017    |
| <b>GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral</b><br>Physical Review Letters <b>119</b> , 161101<br>– <a href="#">M. Zevin</a> : Education and public outreach liaison  | <b>PRL</b><br>2017     |
| <b>Observation of Gravitational Waves from a Binary Black Hole Merger</b><br>Physical Review Letters <b>116</b> , 061102<br>– <a href="#">M. Zevin</a> : Ran exploratory parameter estimation   | <b>PRL</b><br>2016     |

## Contributed Papers .....

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| <b>Data quality up to the third observing run of Advanced LIGO: Gravity Spy glitch classifications</b><br><i>J. Glanzer, S. Banagiri, S. Coughlin, S. Soni, C. Berry, <a href="#">M. Zevin</a>, et al.</i><br>Classical and Quantum Gravity <b>40</b> , 065004 | <b>CQG</b><br>2023  |
| <b>POSDON: A General-Purpose Population Synthesis Code with Detailed Binary-Evolution Simulations</b><br><i>T. Fragos, J.J. Andrews, S.S. Bavera, . . . , <a href="#">M. Zevin</a></i><br>The Astrophysical Journal Supplements <b>264</b> , 45                | <b>ApJS</b><br>2023 |
| <b>Observational evidence for cosmological coupling of black holes and its implications for an astrophysical source of dark energy</b><br><i>D. Farrah, K. Croker, <a href="#">M. Zevin</a>, et al.</i><br>The Astrophysical Journal Letters <b>944</b> , L31  | <b>ApJL</b><br>2023 |

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| <b>A Preferential Growth Channel for Supermassive Black Holes in Elliptical Galaxies at <math>z \approx 2</math></b><br><i>D. Farrah, S. Petty, K. Croker, G. Tarlé, <a href="#">M. Zevin</a>, et al.</i><br>The Astrophysical Journal <b>943</b> , 133   | ApJ<br>2023      |
| <b>Intermediate-mass Black Holes on the Run from Young Star Clusters</b><br><i>E. Gonzalez, K. Kremer, G. Fragione, M. Martinez, N. Weatherford, <a href="#">M. Zevin</a>, F. Rasio</i><br>The Astrophysical Journal <b>940</b> , 131   | ApJ<br>2022      |
| <b>Discriminative Dimensionality Reduction using Deep Neural Networks for Clustering of LIGO Data</b><br><i>S. Baahadini, Y. Wu, S. Coughlin, <a href="#">M. Zevin</a>, A. Katsaggelos</i><br>IEEE Transactions on Neural Networks and Learning Systems (submitted), arXiv: 2205.13672              | 2022             |
| <b>Short GRB Host Galaxies II: A Legacy Sample of Redshifts, Stellar Population Properties, and Implications for their Neutron Star Merger Origins</b><br><i>A. Nugent, W.-f. Fong, Y. Dong, J. Leja, E. Berger, <a href="#">M. Zevin</a>, et al.</i><br>The Astrophysical Journal <b>935</b> , 126 | ApJ<br>2022      |
| <b>Black hole - black hole total merger mass and the origin of LIGO/Virgo sources</b><br><i>K. Belczynski, Z. Doctor, <a href="#">M. Zevin</a>, A. Olejak, S. Banerjee, D. Chattopadhyay</i><br>The Astrophysical Journal <b>935</b> , 126  | ApJ<br>2022      |
| <b>The <math>\chi_{\text{eff}} z</math> correlation of field binary black hole mergers and how 3G gravitational-wave detectors can constrain it</b><br><i>S.S. Bavera, M. Fishbach, <a href="#">M. Zevin</a>, E. Zapartas, T. Fragos</i><br>Astronomy & Astrophysics <b>665</b> , A59               | A&A<br>2022      |
| <b>Stochastic gravitational-wave background as a tool to investigate multi-channel astrophysical and primordial black-hole mergers</b><br><i>S. Bavera, G. Franciolini, G. Cusin, A. Riotto, <a href="#">M. Zevin</a>, T. Fragos</i><br>Astronomy & Astrophysics <b>660</b> , 26                    | A&A<br>2022      |
| <b>Probing the progenitors of spinning binary black-hole mergers with long gamma-ray bursts</b><br><i>S. Bavera, T. Fragos, E. Zapartas, E. Ramirez-Ruiz, P. Marchant, L. Kelley, <a href="#">M. Zevin</a>, et al.</i><br>Astronomy & Astrophysics Letters <b>657</b> , L8                          | A&A<br>2022      |
| <b>Evidence for Hierarchical Black Hole Mergers in the Second LIGO–Virgo Gravitational-Wave Catalog</b><br><i>C. Kimball, C. Talbot, C. Berry, <a href="#">M. Zevin</a>, E. Thrane, V. Kalogera, et al.</i><br>The Astrophysical Journal Letters <b>915</b> , L35                                   | ApJL<br>2020     |
| <b>The Impact of Mass-Transfer Physics on the Observable Properties of Field Binary Black Hole Populations</b><br><i>S. Bavera, T. Fragos, <a href="#">M. Zevin</a>, C. Berry, P. Marchant, J. Andrews, S. Coughlin, A. Dotter, et al.</i><br>Astronomy & Astrophysics <b>647</b> , 153             | A&A<br>2021      |
| <b>Black hole genealogy: Identifying hierarchical mergers with gravitational waves</b><br><i>C. Kimball, C. Talbot, C. Berry, M. Carney, <a href="#">M. Zevin</a>, E. Thrane, V. Kalogera</i><br>The Astrophysical Journal <b>900</b> , 177   | ApJ<br>2020      |
| <b>Black Hole Mergers from Hierarchical Triples in Dense Star Clusters</b><br><i>M. Martinez, G. Fragione, K. Kremer, . . . , <a href="#">M. Zevin</a>, S. Naoz, F. A. Rasio</i><br>The Astrophysical Journal <b>903</b> , 67   | ApJ<br>2020      |
| <b>Teaching Citizen Scientists to Categorize Glitches using Machine Learning Guided Training</b><br><i>C. Jackson, C. Østerlund, K. Crowston, . . . , <a href="#">M. Zevin</a></i><br>Computers in Human Behavior <b>105</b> , 106198   | CHB<br>2020      |
| <b>The Missing Link in Gravitational-Wave Astronomy: Discoveries waiting in the decihertz range</b><br><i>M. Arca Sedda, C. Berry, K. Jani, . . . , <a href="#">M. Zevin</a></i><br>Classical and Quantum Gravity <b>37</b> , 215011 (ESA's Voyage 2050 White Paper)                                | CQG<br>2020      |
| <b>Knowledge Tracing to Model Learning in Online Citizen Science Projects</b><br><i>K. Crowston, C. Østerlund, T. Lee, . . . , <a href="#">M. Zevin</a></i><br>IEEE Transactions on Learning Technologies <b>13</b> , 1   | IEEE TLT<br>2019 |

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

## Presentations

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| <b>Invited Talks</b> .....   |                                  |
| <b>Caltech TAPIR Seminar</b><br><i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>                   | Pasadena, CA<br>May 2023         |
| <b>CITA Seminar</b><br><i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>                            | Toronto, Canada<br>November 2022 |
| <b>AAS HEAD Meeting</b><br><i>One Channel to Rule Them All? Deciphering the Formation Pathways of Compact Object Mergers</i>                   | Pittsburgh, PA<br>March 2022     |
| <b>Caltech/MIT LIGO–GRITTS Seminar</b><br><i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>         | Virtual<br>June 2021             |
| <b>Fermi Lab Cosmic Physics Center Seminar</b><br><i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i> | Virtual<br>May 2021              |
| <b>Yale Astronomy Colloquium</b><br><i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>               | Virtual<br>April 2021            |
| <b>University of Chicago Astro Lunch Seminar</b><br><i>Unveiling the Lives and Deaths of Stars through Compact Object Mergers</i>              | Virtual<br>January 2021          |



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| <b>Zooniverse Transient Workshop</b><br><i>Gravity Spy: Leveling Up &amp; Training Volunteers using Machine Learning</i>  | Virtual<br>November 2020           |
| <b>Cosmic Explorer Panel</b><br><i>Binary Formation, panelist</i>   | Virtual<br>October 2020            |
| <b>Perimeter Institute Strong Gravity Seminar</b><br><i>Deciphering the Landscape of Compact Binary Formation Channels</i>  | Waterloo, ON<br>December 2019      |
| <b>AEI Seminar</b><br><i>Deciphering the Landscape of Compact Binary Formation Channels</i>   | Postdam, DE<br>December 2019       |
| <b>Caltech TAPIR Seminar</b><br><i>Deciphering the Landscape of Compact Binary Formation Channels</i>   | Pasadena, CA<br>November 2019      |
| <b>UCLA Lunch Talk</b><br><i>Deciphering the Landscape of Compact Binary Formation Channels</i>   | Los Angeles, CA<br>November 2019   |
| <b>UCSC FLASH Seminar</b><br><i>Deciphering the Landscape of Compact Binary Formation Channels</i>  | Santa Cruz, CA<br>November 2019    |
| <b>UCSB Astro Lunch</b><br><i>Deciphering the Landscape of Binary Black Hole Formation Channels</i>   | Santa Barbara, CA<br>November 2019 |
| <b>Colombia Astronomy Seminar</b><br><i>Getting the boot: Lonely GRBs, enigmatic r-process, and the birth of neutron stars</i>  | New York, NY<br>October 2019       |
| <b>MIT GRITTS Seminar</b><br><i>Unveiling the Lives and Deaths of Stars through Compact Object Mergers</i>  | Cambridge, MA<br>October 2019      |
| <b>CfA High Energy Astrophysics Seminar</b><br><i>Deciphering the Landscape of Binary Black Hole Formation Channels</i>   | Cambridge, MA<br>October 2019      |
| <b>CGCA Seminar</b><br><i>Unveiling the Lives and Deaths of Stars through Compact Object Mergers</i>  | Milwaukee, WI<br>March 2019        |
| <b>IGC Seminar</b><br><i>From the Detected to the Detectors: Using Gravitational Waves to Enable Insights from the Stellar Graveyard &amp; the Next Generation of Citizen Science</i>     | Portsmouth, UK<br>March 2018       |
| <b>SPI-MAX Seminar</b><br><i>From the Detected to the Detectors: Using Gravitational Waves to Enable Insights from the Stellar Graveyard &amp; the Next Generation of Citizen Science</i> | Oxford, UK<br>February 2018        |

## Contributed Talks, Panels, & Posters .....

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| <b>APS April Meeting (Talk)</b><br><i>Astrophysical Implications of Eccentric Black Hole Mergers</i>   | Minneapolis, MN<br>April 2023         |
| <b>GWPAW (Panel)</b><br><i>Panel discussion chair, Scientific Organizing Committee</i>   | Melbourne, Australia<br>December 2022 |
| <b>NHFP Symposium (Talk)</b><br><i>Lessons learned from the galactic hosts of short gamma-ray bursts</i>   | Baltimore, MD<br>September 2022       |
| <b>Post-PAX Meeting (Talk)</b><br><i>Formation Channels of Binary Black Holes: Open Questions</i>  | Cambridge, MA<br>August 2022          |
| <b>Intermediate-Mass Black Holes: New Science from Stellar Evolution to Cosmology (Talk)</b><br><i>The growth of intermediate-mass black holes through hierarchical mergers: implications for ground-based gravitational-wave detections</i> | San Juan, PR<br>April 2022            |
| <b>APS April Meeting (Talk)</b><br><i>Lessons learned from the galactic hosts of short gamma-ray bursts</i>  | New York, NY<br>April 2022            |
| <b>Aspen Winter Conference (Talk)</b><br><i>Growing Black Holes: The Impact of Retention Efficiency on Hierarchical Mergers and the BBH Mass Spectrum</i>  | Aspen, CO<br>January 2022             |

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| <b>NHFP Symposium (Talk)</b><br><i>Constraining dynamical formation channels of binary black holes with eccentric observations</i>   | Virtual<br>September 2021        |
| <b>Amaldi 14 (Talk)</b><br><i>Constraining dynamical formation channels of binary black holes with eccentric observations</i>  | Virtual<br>July 2021             |
| <b>NHFP Symposium (Talk)</b><br><i>Research Overview</i>   | Virtual<br>September 2020        |
| <b>Aspen Winter Conference (Talk)</b><br><i>Eccentric Black Hole Mergers in Dense Star Clusters: Post-Newtonian Effects<br/>&amp; Higher Multiplicity Encounters</i>                                       | Aspen, CO<br>February 2019       |
| <b>AAS 233 (Talk)</b><br><i>Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters</i>  | Seattle, WA<br>January 2019      |
| <b>NSF Research Traineeship Annual Meeting (Poster)</b><br><i>Gravity Spy: Integrating Gravitational-Wave Astrophysics, Machine Learning,<br/>and Citizen Sciences</i>                                     | Washington, DC<br>September 2018 |
| <b>MODEST-18 (Talk)</b><br><i>The Role of Binary-Binary Interactions in Inducing Eccentric Black Hole Mergers</i>  | Santorini, Greece<br>June 2018   |
| <b>APS April Meeting (Talk)</b><br><i>On the Progenitor of Binary Neutron Star Merger GW170817</i>   | Columbus, OH<br>April 2018       |
| <b>Detecting the Unexpected: Discovery in the Era of Astronomically Big Data (Talk)</b><br><i>The Future of Citizen Science: Coupling Crowdsourcing and Machine Learning</i>                               | Baltimore, MD<br>March 2017      |
| <b>APS April Meeting (Talk)</b><br><i>Discriminating Formation Channels of Binary Black Hole Systems with Advanced LIGO</i>  | Washington, DC<br>January 2017   |
| <b>AAS 229 (Talk)</b><br><i>Discriminating Formation Channels of Binary Black Hole Systems with Advanced LIGO</i>  | Grapevine, TX<br>January 2017    |
| <b>AAS 229 (Workshop &amp; Poster)</b><br><i>Astrobites: Engaging Undergraduate Science Majors with Current Astrophysical Research</i>   | Grapevine, TX<br>January 2017    |
| <b>AAS 228 (Talk)</b><br><i>Gravity Spy: Integrating aLIGO detector characterization, machine learning, and citizen science</i>  | San Diego, CA<br>June 2016       |
| <b>Northwestern Computational Research Exposition (Poster)</b><br><i>Integrating aLIGO detector characterization, machine learning, and citizen science</i><br>– Awarded first prize in poster competition | Evanston, IL<br>April 2016       |
| <b>Midwest Relativity Meeting (Talk)</b><br><i>LIGO glitch classification through the combination of machine learning and citizen science</i>  | Evanston, IL<br>September 2015   |

## Outreach & Public Engagement

### Science Communication & Outreach .....

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| <b>Gravity Spy</b><br><i>Researcher, Developer</i>  | <b>Citizen Science</b><br><i>2015–Present</i> |
| <ul style="list-style-type: none"> <li>– 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</li> <li>– Led construction of user interface on the Zooniverse Lab platform, point person for communication between the Zooniverse volunteers and science team</li> <li>– Project has accumulated over 7,000,000 classifications from over 30,000 registered users (January 2022)</li> </ul> |   |
| <b>Lifelong Learning</b><br><i>Organizer</i>  | <b>Talk Series</b><br><i>2021–2022</i>        |
| <ul style="list-style-type: none"> <li>– Public talk series for seniors, based in public libraries and senior centers in the Chicago-land area.</li> </ul>  |   |



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| <b>Astrobiters</b><br><i>Author, Administrator, &amp; Leadership Team</i>   | <b>Blog</b><br>2014–2020                 |
| <ul style="list-style-type: none"> <li>– Astronomy blog partnered with the AAS, provides daily summaries of recent astronomy research articles</li> <li>– Initiated the “Beyond” series, which covers topics on career advice, graduate school applications, and diversity, equity, and inclusivity in astronomy</li> </ul> |  |
| <b>ComSciCon</b><br><i>Organizer, Attendee</i>  | <b>Workshop</b><br>2017–2020             |
| <ul style="list-style-type: none"> <li>– National graduate-student run science communication workshop for graduate students in STEM fields</li> </ul>   |  |
| <b>Astronomy on Tap</b><br><i>Co-founder, organizer, host, speaker</i>  | <b>Public Event</b><br>2015–2020         |
| <ul style="list-style-type: none"> <li>– 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</li> </ul>  |  |
| <b>Rapid Fire Research</b><br><i>Founder, Chair</i>   | <b>Departmental Event</b><br>2016–2019   |
| <ul style="list-style-type: none"> <li>– Annual research presentation event for graduate and undergraduate students in Northwestern Department of Physics and Astronomy</li> </ul>  |  |
| <b>Machine Learning Meetups</b><br><i>Organizer, Host</i>   | <b>Public Event</b><br>2016–2018         |
| <ul style="list-style-type: none"> <li>– Quarterly interdisciplinary colloquia on data science and machine learning topics</li> </ul>   |  |
| <b>Chicagoland Science Penpals</b><br><i>Participant</i>  | <b>Event</b><br>2017                     |
| <ul style="list-style-type: none"> <li>– Correspondence with students in Chicago public schools about scientific research and science as a profession, using handwritten letters</li> </ul>   |  |
| <b>Public Talks &amp; Lectures</b> .....  |  |
| <b>Astronomer Conversations</b><br><i>Adler Planetarium, Space Visualization Laboratory</i>   | <b>Lecture Series</b><br>2014–2020       |
| <ul style="list-style-type: none"> <li>– Public presentations at the Adler Planetarium for museum guests</li> </ul>   |  |
| <b>Lifelong Learning: JWST</b><br><i>Remote</i>   | <b>Lecture Series</b><br>November 2022   |
| <b>Art of Science</b><br><i>Chicago, IL</i>   | <b>Invited Speaker</b><br>October 2022   |
| <b>Hinsdale Social Studies Circle: Uncovering the Universe’s Symphony</b><br><i>Virtual</i>   | <b>Invited Speaker</b><br>January 2022   |
| <b>Finding Genius Podcast</b><br><i>Virtual</i>   | <b>Invited Speaker</b><br>December 2021  |
| <b>Lifelong Learning: Gravitational Waves</b><br><i>Remote</i>  | <b>Lecture Series</b><br>November 2021   |
| <b>Lifelong Learning: Gravitational Waves</b><br><i>Remote</i>  | <b>Lecture Series</b><br>March 2021      |
| <b>UBS Investment Banking: Gravity Spy and LIGO</b><br><i>Virtual</i>   | <b>Invited Speaker</b><br>September 2020 |
| <b>Astronomer Evenings</b><br><i>Northwestern University, Dearborn Observatory</i>  | <b>Lecture Series</b><br>2016–2019       |
| <ul style="list-style-type: none"> <li>– Presentations during public observing hours at the Dearborn Observatory</li> </ul>   |  |
| <b>Chipping Norton Amateur Astronomy Group</b><br><i>Chipping Norton, UK</i>  | <b>Keynote Lecture</b><br>February 2018  |
| <b>Take Our Children to Work Day</b><br><i>Northwestern University</i>  | <b>Lecture</b><br>April 2016, 2018       |

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| <b>Haven Midde School</b><br><i>Evanston, IL</i>   | <b>Invited Speaker</b><br><i>April 2017, 2018</i> |
| <b>Chicago Astronomical Society</b><br><i>Adler Planetarium</i>  | <b>Keynote Lecture</b><br><i>May 2017</i>         |
| <b>Avery Coonley School</b><br><i>Downers Grove, IL</i>  | <b>Invited Speaker</b><br><i>May 2017</i>         |
| <b>Seven Minutes of Science: An Interdisciplinary Symposium</b><br><i>Northwestern University</i>  | <b>Public Talk</b><br><i>April 2017</i>           |
| <b>Highcrest Elementary</b><br><i>Wilmette, IL</i>   | <b>Invited Speaker</b><br><i>March 2017</i>       |
| <b>Einstein Evenings</b><br><i>Northwestern University, Dearborn Observatory</i><br>– Monthly presentations during observing hours on LIGO discoveries in celebration of the 100th anniversary of General Relativity | <b>Lecture Series</b><br><i>2015–2016</i>         |
| <b>Nettlehorst Elementary</b><br><i>Chicago, IL</i>  | <b>Invited Speaker</b><br><i>February 2016</i>    |

## Publications .....

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

## Teaching & Work Experience

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|--|--|
| <b>University of Chicago</b><br><i>Graduate Level Stellar Astrophysics, Graduate Level Space Physics</i>   | <b>Guest Lecturer</b><br><i>2022–Present</i> |
| <b>Northwestern University</b><br><i>Introduction to Astronomy, Stellar Astrophysics, Data-Driven Research in Astronomy</i><br>– Guest lectured, developed assignments, graded, and ran telescope observing sessions   | <b>Lecturer/TA</b><br><i>2015–2017</i>       |
| <b>GK12 Fellowship</b><br><i>Reach for the Stars; Evanston, IL</i><br>– Co-taught astronomy classes at Evanston Township High School<br>– Developed curriculum, coding-based lessons, and visualizations for high-school students  | <b>Teaching</b><br><i>2017–2018</i>          |
| <b>Kids Science Labs</b><br><i>Lead Teacher; Chicago, IL</i><br>– Taught classes of 3–12 year old students in hands-on, experiential science classes<br>– Designed curriculum for science summer camps   | <b>Teaching</b><br><i>2013–2015</i>          |
| <b>Adler Planetarium</b><br><i>Mission Specialist, Science Leadership Corps Instructor; Chicago, IL</i><br>– Facilitated exhibits, performed experiments, and gave astronomy talks to the public<br>– Designed educational programming<br>– Led under-represented students in designing experiments for high-altitude balloon launches | <b>Museum Education</b><br><i>2012–2014</i>  |

## Students Mentored.....

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

## Affiliations & Leadership Positions

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|--|--------------|
| ▷ <b>GWPAW Conference:</b> Scientific Organizing Committee                     | 2022         |
| ▷ <b>NHFP Symposium:</b> Scientific Organizing Committee                       | 2022         |
| ▷ <b>Lifelong Learning:</b> Organizer  | 2021–2022    |
| ▷ <b>NHFP DEI Working Group:</b> Statistics Co-Lead                            | 2020–2022    |
| ▷ <b>ComSciCon National:</b> Organizer   | 2017–2020    |
| ▷ <b>American Astronomical Society:</b> Member                                 | 2016–Present |
| ▷ <b>American Physical Society:</b> Member                                     | 2016–Present |
| ▷ <b>American Astronomical Society, Media Intern</b>                           | 2016         |
| ▷ <b>Physics and Astronomy Graduate Student Council:</b> Quality of Life Chair | 2016–2018    |

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| ▷ <b>Rapid Fire Research:</b> Founder, chair                     | 2016–2018    |
| ▷ <b>LIGO Scientific Collaboration:</b> Member                   | 2015–Present |
| ▷ <b>Astrobites:</b> Administrator, Author                       | 2014–2020    |
| ▷ <b>Chicago Metropolitan Symphony Orchestra:</b> Double Bassist | 2014–2020    |

## Service Work

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| <b>Served on NSF panel</b> | 2021 |
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| <b>Peer Reviewer for:</b> | 2017–Present |
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- *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*