

# 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

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

## Education

<b>Northwestern University</b> <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 August 2020
<i>Master of Science in Physics and Astronomy</i>	December 2016
<b>University of Illinois</b> <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 May 2012

## Awards & Honors

▷ IOP Publishing Top Cited Paper Award <sup>1</sup>	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 <sup>2</sup>	2018
▷ Illinois Space Grant Consortium Fellowship	2017–2020
▷ NSF GK12 Fellowship	2017–2018
▷ Kavli Summer Fellowship <sup>3</sup>	2017
▷ NSF IDEAS Fellowship	2016–2020

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

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

<sup>3</sup>Research 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+  
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
- 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  
 Citations: 155  
 – 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  
 Citations: 134
- 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  
 Citations: 158  
 – Covered by AAS Press
- Highlighted Contributed Papers** .....
- What You Don't Know Can Hurt You: Use and Abuse of Astrophysical Models in Gravitational-wave Population Analyses** 2023  
*A.Q. Cheng, M. Zevin, S. Vitale*  
 The Astrophysical Journal (submitted), arxiv:2307.03129
- Things that might go bump in the night: Assessing structure in the binary black hole mass spectrum** 2022  
*A Farah, B. Edelman, M. Zevin, M. Fishbach, J. Ezquiaga, B. Farr, D. Holz*  
 The Astrophysical Journal (submitted), arxiv:2301.00834
- Inferring Interference: Identifying a Perturbing Tertiary with Eccentric Gravitational Wave Burst Timing** 2022  
*I. Romero-Shaw, N. Loutrel, M. Zevin*  
 The Astrophysical Journal (accepted), arxiv:2211.07278
- 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

<b>Black Holes: The Next Generation</b> <i>C. Rodriguez, <a href="#">M. Zevin</a>, P. Amaro-Seoane, S. Chatterjee, K. Kremer, F. A. Rasio, C. S. Ye</i> Physical Review D <b>100</b> , 043027	<b>PRD</b> 2019
<b>Illuminating Black Hole Binary Formation Channels with Spins in Advanced LIGO</b> <i>C. Rodriguez, <a href="#">M. Zevin</a>, C. Pankow, V. Kalogera, F. A. Rasio</i> The Astrophysical Journal Letters <b>832</b> , L2	<b>ApJL</b> 2016
<b>Collaboration Papers as part of the LIGO Scientific Collaboration (2015–Present) .....</b> only papers with significant contributions from M. Zevin are listed, click here for full list	
<b>The population of merging compact binaries inferred using gravitational waves through GWTC-3</b> Physical Review X <b>13</b> , 011048 – <a href="#">M. Zevin</a> : Astrophysical interpretation review lead, code reviewer for high-mass injection set	<b>PRX</b> 2023
<b>Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo</b> Astronomy and Astrophysics <b>659</b> , A84 – <a href="#">M. Zevin</a> : Reviewer for high-mass injection set	<b>A&amp;A</b> 2022
<b>GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run</b> Physical Review X (submitted), arxiv:2111.03634 – <a href="#">M. Zevin</a> : Parameter estimation section review lead	 2021
<b>Properties and Astrophysical Implications of the 150 <math>M_{\odot}</math> Binary Black Hole Merger GW190521</b> The Astrophysical Journal Letters <b>900</b> , L13 – <a href="#">M. Zevin</a> : Astrophysical implications reviewer	<b>ApJL</b> 2020
<b>GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses</b> Physical Review D <b>102</b> , 043015 – <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> 2020
<b>GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object</b> The Astrophysical Journal Letters <b>896</b> , L44 – <a href="#">M. Zevin</a> : Astrophysical implications reviewer	<b>ApJL</b> 2020
<b>Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo</b> The Astrophysical Journal Letters <b>882</b> , L24 – <a href="#">M. Zevin</a> : Education and public outreach liaison, science summary writer	<b>ApJL</b> 2019
<b>On the Progenitor of Binary Neutron Star Merger GW170817</b> The Astrophysical Journal Letters <b>850</b> , L40 – <a href="#">M. Zevin</a> : Chair of paper-writing team, analysis lead	<b>ApJL</b> 2017
<b>GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral</b> Physical Review Letters <b>119</b> , 161101 – <a href="#">M. Zevin</a> : Education and public outreach liaison	<b>PRL</b> 2017
<b>Observation of Gravitational Waves from a Binary Black Hole Merger</b> Physical Review Letters <b>116</b> , 061102 – <a href="#">M. Zevin</a> : Ran exploratory parameter estimation	<b>PRL</b> 2016
<b>Contributed Papers .....</b>	
<b>Data quality up to the third observing run of Advanced LIGO: Gravity Spy glitch classifications</b> <i>J. Glanzer, S. Banagiri, S. Coughlin, S. Soni, C. Berry, <a href="#">M. Zevin</a>, et al.</i> Classical and Quantum Gravity <b>40</b> , 065004	<b>CQG</b> 2023

<b>POSDON: A General-Purpose Population Synthesis Code with Detailed Binary-Evolution Simulations</b> <i>T. Fragos, J.J. Andrews, S.S. Bavera, . . . , M. Zevin</i> The Astrophysical Journal Supplements <b>264</b> , 45	<b>ApJS</b> 2023
<b>Observational evidence for cosmological coupling of black holes and its implications for an astrophysical source of dark energy</b> <i>D. Farrah, K. Croker, M. Zevin, et al.</i> The Astrophysical Journal Letters <b>944</b> , L31	<b>ApJL</b> 2023
<b>A Preferential Growth Channel for Supermassive Black Holes in Elliptical Galaxies at <math>z \geq 2</math></b> <i>D. Farrah, S. Petty, K. Croker, G. Tarlé, M. Zevin, et al.</i> The Astrophysical Journal <b>943</b> , 133	<b>ApJ</b> 2023
<b>Intermediate-mass Black Holes on the Run from Young Star Clusters</b> <i>E. Gonzalez, K. Kremer, G. Fragione, M. Martinez, N. Weatherford, M. Zevin, F. Rasio</i> The Astrophysical Journal <b>940</b> , 131	<b>ApJ</b> 2022
<b>Discriminative Dimensionality Reduction using Deep Neural Networks for Clustering of LIGO Data</b> <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
<b>Short GRB Host Galaxies II: A Legacy Sample of Redshifts, Stellar Population Properties, and Implications for their Neutron Star Merger Origins</b> <i>A. Nugent, W.-f. Fong, Y. Dong, J. Leja, E. Berger, M. Zevin, et al.</i> The Astrophysical Journal <b>935</b> , 126	<b>ApJ</b> 2022
<b>Black hole - black hole total merger mass and the origin of LIGO/Virgo sources</b> <i>K. Belczynski, Z. Doctor, M. Zevin, A. Olejak, S. Banerjee, D. Chattopadhyay</i> The Astrophysical Journal <b>935</b> , 126	<b>ApJ</b> 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> <i>S.S. Bavera, M. Fishbach, M. Zevin, E. Zapartas, T. Fragos</i> Astronomy & Astrophysics <b>665</b> , A59	<b>A&amp;A</b> 2022
<b>Stochastic gravitational-wave background as a tool to investigate multi-channel astrophysical and primordial black-hole mergers</b> <i>S. Bavera, G. Franciolini, G. Cusin, A. Riotto, M. Zevin, T. Fragos</i> Astronomy & Astrophysics <b>660</b> , 26	<b>A&amp;A</b> 2022
<b>Probing the progenitors of spinning binary black-hole mergers with long gamma-ray bursts</b> <i>S. Bavera, T. Fragos, E. Zapartas, E. Ramirez-Ruiz, P. Marchant, L. Kelley, M. Zevin, et al.</i> Astronomy & Astrophysics Letters <b>657</b> , L8	<b>A&amp;A</b> 2022
<b>Evidence for Hierarchical Black Hole Mergers in the Second LIGO–Virgo Gravitational-Wave Catalog</b> <i>C. Kimball, C. Talbot, C. Berry, M. Zevin, E. Thrane, V. Kalogera, et al.</i> The Astrophysical Journal Letters <b>915</b> , L35	<b>ApJL</b> 2020
<b>The Impact of Mass-Transfer Physics on the Observable Properties of Field Binary Black Hole Populations</b> <i>S. Bavera, T. Fragos, M. Zevin, C. Berry, P. Marchant, J. Andrews, S. Coughlin, A. Dotter, et al.</i> Astronomy & Astrophysics <b>647</b> , 153	<b>A&amp;A</b> 2021
<b>Black hole genealogy: Identifying hierarchical mergers with gravitational waves</b> <i>C. Kimball, C. Talbot, C. Berry, M. Carney, M. Zevin, E. Thrane, V. Kalogera</i> The Astrophysical Journal <b>900</b> , 177	<b>ApJ</b> 2020
<b>Black Hole Mergers from Hierarchical Triples in Dense Star Clusters</b> <i>M. Martinez, G. Fragione, K. Kremer, . . . , M. Zevin, S. Naoz, F. A. Rasio</i> The Astrophysical Journal <b>903</b> , 67	<b>ApJ</b> 2020
<b>Teaching Citizen Scientists to Categorize Glitches using Machine Learning Guided Training</b> <i>C. Jackson, C. Østerlund, K. Crowston, . . . , M. Zevin</i> Computers in Human Behavior <b>105</b> , 106198	<b>CHB</b> 2020

<b>The Missing Link in Gravitational-Wave Astronomy: Discoveries waiting in the decihertz range</b> <i>M. Arca Sedda, C. Berry, K. Jani, . . . , <a href="#">M. Zevin</a></i> Classical and Quantum Gravity <b>37</b> , 215011 (ESA's Voyage 2050 White Paper)	<b>CQG</b> 2020
<b>Knowledge Tracing to Model Learning in Online Citizen Science Projects</b> <i>K. Crowston, C. Østerlund, T. Lee, . . . , <a href="#">M. Zevin</a></i> IEEE Transactions on Learning Technologies <b>13</b> , 1	<b>IEEE TLT</b> 2019
<b>Classifying the Unknown: Discovering Novel Gravitational-Wave Detector Glitches using Similarity Learning</b> <i>S. Coughlin, S. Bahaadini, N. Rohani, <a href="#">M. Zevin</a>, et al.</i> Physical Review D <b>99</b> , 082002	<b>PRD</b> 2019
<b>Post-Newtonian Dynamics in Dense Star Clusters: Binary Black Holes in the LISA Band</b> <i>K. Kremer, C. L. Rodriguez, . . . , <a href="#">M. Zevin</a></i> Physical Review D <b>99</b> , 063003	<b>PRD</b> 2019
<b>Post-Newtonian Dynamics in Dense Star Clusters: Formation, Masses, and Merger Rates of Highly-Eccentric Black Hole Binaries</b> <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> Physical Review D <b>98</b> , 123005	<b>PRD</b> 2018
<b>DIRECT: Deep Discriminative Embedding for Clustering of LIGO Data</b> <i>S. Bahaadini, V. Noroozi, N. Rohani, S. Coughlin, <a href="#">M. Zevin</a>, V. Kalogera, A. K. Katsaggelos</i> 25th IEEE International Conference on Image Processing Proceedings	<b>ICIP</b> 2018
<b>Machine Learning for Gravity Spy: Glitch Classification and Dataset</b> <i>S. Bahaadini, V. Noroozi, N. Rohani, S. Coughlin, <a href="#">M. Zevin</a>, J. R. Smith, V. Kalogera, A. K. Katsaggelos</i> Information Sciences Journal <b>444</b> , 172	<b>ISJ</b> 2018
<b>Improvements in Gravitational-wave Sky Localization with Expanded Networks of Interferometers</b> <i>C. Pankow, E. A. Chase, S. Coughlin, <a href="#">M. Zevin</a>, V. Kalogera</i> The Astrophysical Journal Letters <b>854</b> , L25	<b>ApJL</b> 2018
<b>Deep Multi-view Models for Glitch Classification</b> <i>S. Bahaadini, N. Rohani, S. Coughlin, <a href="#">M. Zevin</a>, V. Kalogera, A. K. Katsaggelos</i> IEEE International Conference on Acoustics, Speech, and Signal Processing Proceedings	<b>ICASSP</b> 2018
<b>Incorporating Current Research into Formal Higher Education Settings using Astrobites</b> <i>N. E. Sanders, S. Kohler, C. Faesi, A. Villar, <a href="#">M. Zevin</a></i> American Journal of Physics <b>85</b> , 741	<b>AJP</b> 2017
<b>Astrophysical Prior Information and Gravitational-Wave Parameter Estimation</b> <i>C. Pankow, L. Sampson, L. Perri, E. A. Chase, S. Coughlin, <a href="#">M. Zevin</a>, V. Kalogera</i> The Astrophysical Journal <b>834</b> , 154	<b>APJ</b> 2017

## Presentations

<b>Invited Talks</b> .....	
<b>Notre Dame Astrophysics Seminar</b> <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>South Bend, IN</i> November 2023
<b>Caltech TAPIR Seminar</b> <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>Pasadena, CA</i> May 2023
<b>CITA Seminar</b> <i>Deciphering the Biography of Massive Stars: Compact Object Mergers as a Rosetta Stone</i>	<i>Toronto, Canada</i> November 2022
<b>AAS HEAD Meeting</b> <i>One Channel to Rule Them All? Deciphering the Formation Pathways of Compact Object Mergers</i>	<i>Pittsburgh, PA</i> March 2022



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

<b>Intermediate-Mass Black Holes: New Science from Stellar Evolution to Cosmology (Talk)</b> <i>The growth of intermediate-mass black holes through hierarchical mergers: implications for ground-based gravitational-wave detections</i>	San Juan, PR April 2022
<b>APS April Meeting (Talk)</b> <i>Lessons learned from the galactic hosts of short gamma-ray bursts</i>	New York, NY April 2022
<b>Aspen Winter Conference (Talk)</b> <i>Growing Black Holes: The Impact of Retention Efficiency on Hierarchical Mergers and the BBH Mass Spectrum</i>	Aspen, CO January 2022
<b>NHFP Symposium (Talk)</b> <i>Constraining dynamical formation channels of binary black holes with eccentric observations</i>	Virtual September 2021
<b>Amaldi 14 (Talk)</b> <i>Constraining dynamical formation channels of binary black holes with eccentric observations</i>	Virtual July 2021
<b>NHFP Symposium (Talk)</b> <i>Research Overview</i>	Virtual September 2020
<b>Aspen Winter Conference (Talk)</b> <i>Eccentric Black Hole Mergers in Dense Star Clusters: Post-Newtonian Effects &amp; Higher Multiplicity Encounters</i>	Aspen, CO February 2019
<b>AAS 233 (Talk)</b> <i>Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters</i>	Seattle, WA January 2019
<b>NSF Research Traineeship Annual Meeting (Poster)</b> <i>Gravity Spy: Integrating Gravitational-Wave Astrophysics, Machine Learning, and Citizen Sciences</i>	Washington, DC September 2018
<b>MODEST-18 (Talk)</b> <i>The Role of Binary-Binary Interactions in Inducing Eccentric Black Hole Mergers</i>	Santorini, Greece June 2018
<b>APS April Meeting (Talk)</b> <i>On the Progenitor of Binary Neutron Star Merger GW170817</i>	Columbus, OH April 2018
<b>Detecting the Unexpected: Discovery in the Era of Astronomically Big Data (Talk)</b> <i>The Future of Citizen Science: Coupling Crowdsourcing and Machine Learning</i>	Baltimore, MD March 2017
<b>APS April Meeting (Talk)</b> <i>Discriminating Formation Channels of Binary Black Hole Systems with Advanced LIGO</i>	Washington, DC January 2017
<b>AAS 229 (Talk)</b> <i>Discriminating Formation Channels of Binary Black Hole Systems with Advanced LIGO</i>	Grapevine, TX January 2017
<b>AAS 229 (Workshop &amp; Poster)</b> <i>Astrobiters: Engaging Undergraduate Science Majors with Current Astrophysical Research</i>	Grapevine, TX January 2017
<b>AAS 228 (Talk)</b> <i>Gravity Spy: Integrating aLIGO detector characterization, machine learning, and citizen science</i>	San Diego, CA June 2016
<b>Northwestern Computational Research Exposition (Poster)</b> <i>Integrating aLIGO detector characterization, machine learning, and citizen science</i> – Awarded first prize in poster competition	Evanston, IL April 2016
<b>Midwest Relativity Meeting (Talk)</b> <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.
- 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* *2014–2020*  
 – Public presentations at the Adler Planetarium for museum guests
- 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*

<b>Lifelong Learning: Gravitational Waves</b> <i>Remote</i>	<b>Lecture Series</b> <i>November 2021</i>
<b>Lifelong Learning: Gravitational Waves</b> <i>Remote</i>	<b>Lecture Series</b> <i>March 2021</i>
<b>UBS Investment Banking: Gravity Spy and LIGO</b> <i>Virtual</i>	<b>Invited Speaker</b> <i>September 2020</i>
<b>Astronomer Evenings</b> <i>Northwestern University, Dearborn Observatory</i> – Presentations during public observing hours at the Dearborn Observatory	<b>Lecture Series</b> <i>2016–2019</i>
<b>Chipping Norton Amateur Astronomy Group</b> <i>Chipping Norton, UK</i>	<b>Keynote Lecture</b> <i>February 2018</i>
<b>Take Our Children to Work Day</b> <i>Northwestern University</i>	<b>Lecture</b> <i>April 2016, 2018</i>
<b>Haven Midde School</b> <i>Evanston, IL</i>	<b>Invited Speaker</b> <i>April 2017, 2018</i>
<b>Chicago Astronomical Society</b> <i>Adler Planetarium</i>	<b>Keynote Lecture</b> <i>May 2017</i>
<b>Avery Coonley School</b> <i>Downers Grove, IL</i>	<b>Invited Speaker</b> <i>May 2017</i>
<b>Seven Minutes of Science: An Interdisciplinary Symposium</b> <i>Northwestern University</i>	<b>Public Talk</b> <i>April 2017</i>
<b>Highcrest Elementary</b> <i>Wilmette, IL</i>	<b>Invited Speaker</b> <i>March 2017</i>
<b>Einstein Evenings</b> <i>Northwestern University, Dearborn Observatory</i> – Monthly presentations during observing hours on LIGO discoveries in celebration of the 100th anniversary of General Relativity	<b>Lecture Series</b> <i>2015–2016</i>
<b>Nettlehorst Elementary</b> <i>Chicago, IL</i>	<b>Invited Speaker</b> <i>February 2016</i>

## Publications .....

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

## Teaching & Work Experience

<b>University of Chicago</b> <i>Graduate Level Stellar Astrophysics, Graduate Level Space Physics</i>	<b>Guest Lecturer</b> <i>2022–Present</i>
<b>Northwestern University</b> <i>Introduction to Astronomy, Stellar Astrophysics, Data-Driven Research in Astronomy</i> – Guest lectured, developed assignments, graded, and ran telescope observing sessions	<b>Lecturer/TA</b> <i>2015–2017</i>

<b>GK12 Fellowship</b> <i>Reach for the Stars</i> ; Evanston, IL	<b>Teaching</b> 2017–2018
– Co-taught astronomy classes at Evanston Township High School	
– Developed curriculum, coding-based lessons, and visualizations for high-school students	
<b>Kids Science Labs</b> <i>Lead Teacher</i> ; Chicago, IL	<b>Teaching</b> 2013–2015
– Taught classes of 3–12 year old students in hands-on, experiential science classes	
– Designed curriculum for science summer camps	
<b>Adler Planetarium</b> <i>Mission Specialist, Science Leadership Corps Instructor</i> ; Chicago, IL	<b>Museum Education</b> 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	
<b>Students Mentored</b> .....	
<b>Alex Hanselman</b> <i>Self-consistent eccentricity definitions</i> ; University of Chicago Graduate Student	<b>Graduate</b> 2023–present
<b>Ethan Payne</b> <i>Measurability of spin and precession in hierarchical mergers</i> ; Caltech Graduate Student	<b>Graduate</b> 2022–present
<b>April Cheng</b> <i>Multi-channel model selection with GWTC-3</i> ; MIT Undergraduate Student	<b>Undergraduate</b> 2022–present
<b>Aditya Vijaykumar</b> <i>Evolution of binary neutron stars in cosmological simulations</i> ; KICP Visiting Graduate Student	<b>Graduate</b> 2022–present
<b>Anyu Nugent</b> <i>Host demographics and progenitors of short GRBs</i> ; CIERA Graduate Student	<b>Graduate</b> 2021–present
<b>Amanda Farah</b> <i>Cosmology from evolving non-parametric mass distribution</i> ; University of Chicago Graduate Student	<b>Graduate</b> 2021–present
<b>Camille Liotine</b> <i>HMXB Progenitors to Binary Black Hole Mergers</i> ; CIERA Graduate Student	<b>Graduate</b> 2020–2023
<b>Simone Bavera</b> <i>Isolated Evolution and Tidal Spin-up of Wolf-Rayet Stars</i> ; University of Geneva Graduate Student	<b>Graduate</b> 2019–2021
<b>Michael Kurkowski</b> <i>Pair Instability Supernova Prescriptions in Binary Population Synthesis</i> ; CIERA REU Student	<b>Undergraduate</b> 2019
<b>Jared Machtinger</b> <i>Population properties of binary black holes detected by LIGO</i> ; CIERA Summer Student	<b>High School</b> 2019
<b>Danai Avdela</b> <i>Population properties of binary black holes detected by LIGO</i> ; CIERA Summer Student	<b>High School</b> 2019
<b>Isaac Rivera</b> <i>Offset distributions of short gamma-ray bursts</i> ; CIERA REU Student	<b>Undergraduate</b> 2018
<b>Grace Kern</b> <i>Optimization of Gravity Spy image retirement</i> ; CIERA Summer Student	<b>High School</b> 2018
<b>Hannah Stein</b> <i>Optimization of Gravity Spy image retirement</i> ; CIERA Summer Student	<b>High School</b> 2018
<b>Yuqi Yun</b> <i>Gaussian Process regression of black hole mass distributions</i> ; CIERA REU Student	<b>Undergraduate</b> 2016
<b>Sophie Haight</b> <i>Gaussian Process regression of binary stellar evolution sequences</i> ; CIERA Summer Student	<b>High School</b> 2016

## Affiliations & Leadership Positions

▷ <b>LSST Discovery Alliance:</b> Institutional Representative	2023–present
▷ <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
▷ <b>Rapid Fire Research:</b> Founder, chair	2016–2018
▷ <b>LIGO Scientific Collaboration:</b> Member	2015–Present
▷ <b>Astrobiters:</b> Administrator, Author	2014–2020
▷ <b>Chicago Metropolitan Symphony Orchestra:</b> Double Bassist	2014–2020

## Service Work

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