

# MAYA FISHBACH

NASA Einstein Fellow  $\diamond$  CIERA  $\diamond$  Northwestern University

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## EDUCATION

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**University of Chicago** *August 2020*  
PhD, Astronomy & Astrophysics  
**Yale University** *May 2015*  
B.S. Physics (Intensive); Mathematics *cum laude*

## AWARDS AND FELLOWSHIPS

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**CIERA Fellowship** *2020-2025*  
Northwestern University  
**Einstein Fellowship** *2020-2023*  
NASA Hubble Fellowship Program  
**William Rainey Harper Dissertation Fellowship** *2019-2020*  
University of Chicago  
**Gravitational-Wave Astrophysics Award** *February 2019*  
Aspen Winter Conference  
**Blue Apple (Best Student Presentation) Award** *October 2018*  
APS DGRAV Midwest Relativity Meeting  
**NSF Graduate Research Fellowship** *2017-2020*  
National Science Foundation  
**McCormick Graduate Fellowship** *2015-2017*  
University of Chicago  
**Howard L. Schultz Prize** *May 2015*  
Yale University Department of Physics

## PUBLIC OUTREACH

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**Guest Lecture for Undergraduate Astronomy Course** *March 2021*  
University of Illinois at Chicago  
**Ask-a-Scientist Speaker** *November 2019*  
Fermilab  
**Astronomy Conversations Presenter** *2016- 2020*  
Adler Planetarium, Chicago  
**Soapbox Science Speaker** *July 2018*  
Navy Pier, Chicago  
**Life Long Learning Presenter** *2016-2017*  
Retirement homes and libraries around Chicago  
**Science Tutor** *2016-2017*  
Upward Bound, University of Chicago Office of Special Programs

## TEACHING

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**Co-Instructor**, Northwestern University *Winter-Spring 2021*  
DATA SCI 401: Data-Driven Research in Physics, Geophysics, and Astronomy  
**Co-Instructor**, University of Chicago *Fall 2018*  
Reading Seminar: Computational Methods for Gravitational-Wave Astrophysics  
**Grader**, University of Chicago *Spring 2017*  
ASTR 182: Origin and Evolution of the Universe

Teaching Assistant, University of Chicago  
ASTR 241: Physics of Stars and Stellar Systems

Fall 2016

Teaching Assistant, University of Chicago

Fall 2015-Spring 2016

PHSC 12600-12620: Matter, Energy, Space and Time/ Black Holes/ The Big Bang

## INVITED TALKS

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<b>GMT Community Science Meeting</b> (Sedona)	September 1-3, 2021
<b>Amaldi Conference on Gravitational Waves</b> (virtual) <i>Plenary talk, Astrophysics with Gravitational Waves</i>	July 19-23, 2021
<b>EAS2021 Session: Birth, Life, and Death of Black Holes</b> (virtual) <i>Review talk, Black Hole Spin Measurements</i>	June 28-29, 2021
<b>APS April Meeting</b> (virtual) Cecilia Payne-Gaposchkin Doctoral Dissertation Award Finalist	April 17-20, 2021
<b>Astronomy Colloquium</b> (Royal Observatory, Edinburgh)	February 24, 2021
<b>Princeton Gravity Initiative Seminar</b>	February 22, 2021
<b>ITC Colloquium</b> (Harvard)	February 18, 2021
<b>Strong Gravity Seminar</b> (Perimeter Institute)	January 28, 2021
<b>Miami 2020 Conference</b> <i>Invited talk, Astrophysical Lessons from the Second Gravitational-Wave Transient Catalog</i>	December 16, 2020
<b>LIGO/Virgo Paper Webinar</b> Population properties of Compact Objects from the Second Gravitational-Wave Transient Catalog	November 12, 2020
<b>Statistical Methods for the Detection, Classification, and Inference of Relativistic Objects</b> (ICERM)	November 16-20 2020
<b>First Cosmic Explorer Conference</b> <i>Invited panelist, Compact Binary Formation and Evolution</i>	October 26-30, 2020
<b>Theoretical Astrophysics Seminar</b> (University of Florida)	October 14, 2020
<b>Astronomy Seminar</b> (JILA)	September 4, 2020
<b>ICG Colloquium</b> (University of Portsmouth)	September 3, 2020
<b>APS April Meeting</b> (Washington, D.C.) <i>Invited talk, Astrophysical Lessons from LIGO/Virgo's Black Holes</i>	April 18-21, 2020
<b>CGCA Seminar</b> (University of Wisconsin - Milwaukee)	Nov 8 2019
<b>ITC Lunch, Galaxies &amp; Cosmology Lunch</b> (Harvard)	Nov 12-15 2019
<b>Cosmic Controversies</b> (KICP, Chicago) <i>Invited talk, Cosmology with Gravitational-Wave Standard Sirens</i>	Oct 5-8, 2019
<b>AEI Relativistic Astrophysics seminar</b> (Albert Einstein Institute, Potsdam)	Sep 18, 2019
<b>Merging Visions: Exploring Compact-Object Binaries with Gravity and Light</b> (KITP, Santa Barbara) <i>Invited talk, Measurements of <math>H_0</math> with GW170817</i>	Jun 24-27, 2019
<b>Recontres de Moriond - Gravitation</b> (La Thuille, Italy) <i>Invited talk, Binary Black Hole Population Properties Inferred from the O1 and O2 Observations</i>	Mar 24-30, 2019
<b>TAPIR seminar</b> (Caltech)	Dec 14, 2018
<b>Seminar</b> (UC Santa Cruz)	Oct 25, 2018
<b>Deep Learning for Multi-Messenger Astrophysics</b> (NCSA, UIUC) <i>Invited panelist, Signal-processing Algorithms to Enable Real-time Gravitational Wave Discovery</i>	Oct 17-19, 2018
<b>Physics and Astrophysics at the eXtreme III</b> (Penn State) <i>Invited panelist, Hubble Parameter</i>	Feb 5-7, 2018

## PRESS

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Quanta Magazine

February 2021

<https://www.quantamagazine.org/new-black-holes-offer-physicists-a-radical-probe-of-the-cosmos-20210217/>

Symmetry Magazine *December 2020*  
<https://www.symmetrymagazine.org/article/physics-at-tiniest-scale-could-explain-impossible-black-holes>

Sky & Telescope *November 2020*  
<https://skyandtelescope.org/astronomy-news/big-black-holes-dominate-new-gravitational-wave-catalog/>

Science Magazine *October 2020*  
<https://www.sciencemag.org/news/2020/10/universe-teems-weird-black-holes-gravitational-wave-hunters-find>

Nature.com *October 2020*  
<https://www.nature.com/articles/d41586-020-03047-0>

APS News *June 2020*  
<https://www.aps.org/publications/apsnews/202006/blackholes.cfm>

AAS Nova *April 2020*  
<https://aasnova.org/2020/04/10/merger-partners-maybe/>

APS News *June 2019*  
<https://www.aps.org/publications/apsnews/201906/wave.cfm>

UChicago News *October 2018*  
<https://news.uchicago.edu/story/gravitational-waves-could-soon-provide-measure-universes-expansion>

UChicago News *September 2018*  
<https://news.uchicago.edu/story/gravitational-waves-provide-dose-reality-about-extra-dimensions>

AAS Nova *September 2018*  
<https://aasnova.org/2018/09/07/black-hole-mergers-through-cosmic-time/>

The Daily Beast *February 2018*  
<https://www.thedailybeast.com/are-we-closer-to-finding-a-fifth-dimension>

Astrobites *September 2017*  
<https://astrobites.org/2017/09/28/where-are-ligos-big-black-holes/>

Sky & Telescope *June 2017*  
<http://www.skyandtelescope.com/astronomy-news/ligo-detects-third-black-hole-merger-0106201723>

AAS Nova *May 2017*  
<http://aasnova.org/2017/05/12/are-ligos-black-holes-made-from-smaller-black-holes/>

Science News *January 2017*  
<https://www.sciencenews.org/article/spin-may-reveal-black-hole-history>

## PUBLICATIONS

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### Short author list publications

\* indicates student project I advised

1. Palmese, A., **Fishbach, M.**, Burke, C. J., Annis, J. T., Liu, X. “Do LIGO/Virgo black hole mergers produce AGN flares? The case of GW190521 and prospects for reaching a confident association,” arXiv:2103.16069
- \* 2 Christine, Y., **Fishbach, M.** “Cosmology with Standard Sirens at Cosmic Noon,” arXiv:2103.14038
3. **Fishbach, M.**, Doctor, Z., Callister, C., Edelman, B., Ye, J., Essick, R., Farr, W.M., Farr, B., Holz, D.E. “When are LIGO/Virgo’s Big Black Hole Mergers?” arXiv:2101.07699, ApJ accepted
4. **Fishbach, M.**, Holz, D.E. “Minding the Gap: GW190521 as a straddling binary,” ApJL 904 L26 (2020)
5. **Fishbach, M.**, Essick, R., Holz, D.E. “Does Matter Matter? Using the mass distribution to distinguish neutron stars and black holes,” ApJL 899 L8 (2020)

6. Olejak, A., **Fishbach, M.**, Belczynski, K., Holz, D. E., Lasota, J. -P., Miller, M. C., Bulik, T. “The Origin of Inequality: isolated formation of a 30+10  $M_{\odot}$  binary black-hole merger,” ApJL 901 L39 (2020)
7. Farmer, R. and Renzo, M. and de Mink, S. and **Fishbach, M.** and Justham, S. “Constraints from gravitational wave detections of binary black hole mergers on the  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  rate,” ApJL 902 L36 (2020)
8. Farah, A., Essick, R., Doctor, Z., **Fishbach, M.**, Holz, D.E. “Counting on Short Gamma-Ray Bursts: Gravitational-wave Constraints of Jet Geometry,” ApJ 895 108 (2020)
9. Callister, T., **Fishbach, M.**, Holz, D.E., Farr, W.M. “Shouts and Murmurs: Combining Individual Gravitational-Wave Sources with the Stochastic Background to Measure the History of Binary Black Hole Mergers,” ApJL 896 L32 (2020)
10. Adhikari, S., **Fishbach, M.**, Holz, D.E., Wechsler, R.H., Fang, Z. “The binary-host connection: astrophysics of gravitational wave binaries from their host galaxy properties,” ApJ 905 21 (2020)
11. **Fishbach, M.**, Farr, W.M., Holz, D.E. “The Most Massive Binary Black Hole Detections and the Identification of Population Outliers,” ApJL 891 L31 (2020)
12. **Fishbach, M.**, Holz, D.E. “Picky Partners: The Pairing of Component Masses in Binary Black Hole Mergers,” ApJL 891 L27 (2020)
13. Farr, W.M., **Fishbach, M.**, Ye, J., Holz, D.E. “A Future Percent-Level Measurement of the Hubble Expansion at Redshift 0.8 With Advanced LIGO,” ApJL 883 L2 (2019)
14. Lagos, M., **Fishbach, M.**, Landry, P., Holz, D.E. “Standard sirens with a running Planck mass,” Phys. Rev. D 99, 083504 (2019)
15. **Fishbach, M.**, et al. “A standard siren measurement of the Hubble constant from GW170817 without the electromagnetic counterpart,” ApJL 871 L13 (2019)
16. **Fishbach, M.**, Holz, D.E., Farr, W.M. “Does the Black Hole Merger Rate Evolve with Redshift?” ApJL 863 L41 (2018)
17. Pardo, K., **Fishbach, M.**, Holz, D.E., and Spergel, D. N. “Limits on the Number of Spacetime Dimensions from GW170817,” JCAP 07 048 (2018)
18. Chen, H.-Y., **Fishbach, M.**, Holz, D.E. “A 2 per cent Hubble constant measurement from standard sirens within 5 years,” Nature 562 545-547 (2018)
19. **Fishbach, M.**, Holz, D.E. “Where are LIGO’s Big Black Holes?” ApJL 851 L25 (2017)
20. **Fishbach, M.**, Holz, D.E. Farr, B. “Are LIGO’s Black Holes Made From Smaller Black Holes?” ApJL 840 L24 (2017)

### **LIGO-Virgo publications to which I contributed significantly**

1. Abbott, R. et al. “Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog,” arXiv:2010.14533
2. Abbott, R. et al. “GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses,” Phys. Rev. D 102, 043015 (2020).
3. Abbott, B.P. et al. “A gravitational-wave measurement of the Hubble constant following the second observing run of Advanced LIGO and Virgo,” arXiv:1908.06060
4. Abbott, B.P. et al. “Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo,” ApJL 882 L24 (2019)

5. Abbott, B.P. et al. “Tests of General Relativity with GW170817,” Phys. Rev. Lett. 123, 011102 (2019)
6. Abbott, B.P. et al. “Properties of the Binary Neutron Star Merger GW170817,” Phys. Rev. X Physical Review X, 9, 011001 (2019)
7. Abbott, B.P. et al. “GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral,” Phys. Rev. Lett. 119, 161101 (2017)
8. Abbott, B.P. et al. “Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A,” ApJL 848, L13 (2017)
9. Abbott, B.P. et al. “A gravitational-wave standard siren measurement of the Hubble constant,” Nature 551, 8588 (2017)

## REFERENCES

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**Daniel Holz** (Ph.D. Supervisor)  
University of Chicago  
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**Will Farr**  
Stony Brook University; Flatiron Institute  
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