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Department of Astronomy & Astrophysics, and  
Kavli Institute for Cosmological Physics  
University of Chicago, Chicago IL 60637  
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## EDUCATION

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### **Princeton University**

A.B., Physics *cum laude*, Spring 1992

### **University of Chicago**

M.S., Physics, Fall 1994

Ph.D., Physics, Summer 1998

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## EXPERIENCE

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### **Professor** (2018—)

Enrico Fermi Institute, Department of Physics, Department of Astronomy & Astrophysics,  
and Kavli Institute for Cosmological Physics, University of Chicago

### **Associate Professor** (2015–2018)

Enrico Fermi Institute, Department of Physics, Department of Astronomy & Astrophysics,  
and Kavli Institute for Cosmological Physics, University of Chicago

### **Assistant Professor** (2011–2014)

Enrico Fermi Institute, Department of Physics, and Kavli Institute for Cosmological Physics,  
The University of Chicago

### **Staff Member** (2007–2011)

Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico

### **Feynman Fellow** (2004–2007)

Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico

### **Center Fellow** (2003–2004)

Center for Cosmological Physics, University of Chicago, Chicago, Illinois

### **KITP Fellow** (2000–2003)

Kavli Institute for Theoretical Physics, University of California, Santa Barbara, California

### **Postdoctoral Fellow** (1998–99)

Albert Einstein Institute, Max-Planck-Institut für Gravitationsphysik, Potsdam, Germany

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## FELLOWSHIPS AND AWARDS

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### **Fellow of the American Physical Society** (2017)

### **Kavli Fellow** (2017)

Frontiers of Science, National Academy of Sciences

### **Breakthrough Prize in Fundamental Physics** (2016)

awarded to the LIGO collaboration

### **Gruber Cosmology Prize** (2016)

awarded to the LIGO collaboration

### **Quantrell Award for Excellence in Undergraduate Teaching** (2015)

GRANTS

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**NSF Award PHY-2110507, PI**

From One to Many: Statistical Gravitational-Wave Astrophysics and Cosmology; 2021–2024

**NSF Award PHY-2006645, PI**

WoU-MMA: Gravitational Wave Cosmology with Tidal Love Numbers; 2020–2023

**NSF Award PHY-2011997, PI**

From Single to Statistical: The Dawn of GW Astrophysics and Cosmology; 2020–2021

**NSF Award PHY-1708081, PI**

From First Detections to Gravitational-Wave Astrophysics; 2017–2020

**NSF CAREER Award PHY-1151836, PI**

Hearing and Seeing the Universe Through Multi-Messenger Astronomy; 2012–2017

SERVICE/OUTREACH

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**Bulletin of the Atomic Scientists**

Co-Chair of the Science and Security Board of The Bulletin of the Atomic Scientists, which sets the time of the Doomsday Clock

**Chair-line, American Physical Society Division of Astrophysics (2020–2023)****Chair-line, American Physical Society Division of Gravitation (2012–2015)**

Highest elected position in the US general relativity community

**Committees/Panels**

National Academy Astro2020 Decadal Report, member of the

Panel on Compact Objects and Energetic Phenomena (2019–2020)

UChicago Provost Faculty Diversity Liason (2019–)

APS April Meeting Program Committee Chair (2016–17)

UChicago Physics Department Climate Committee Chair (2015–16)

UChicago Society of Women in Physics Faculty Advisor (2015–18)

UChicago Physical Sciences Teaching Committee (2013–2018)

UChicago KICP Fellows Lead (2011–2018)

UChicago Provost Faculty Working Group for African Institute for  
Mathematical Sciences (AIMS) (2015–16)

UChicago Computations in Science seminar series co-organizer (2013–2019)

APS Task Force on Meetings (2013–14)

NSF review panels (astronomy & gravity, 5 panels over last 10 years)

**Meetings/Conferences (principal organizer)**

Aspen Winter Conference, “Astrophysics with Gravitational-Wave Populations, Aspen 2019

KITP Program, “The New Era of GW Physics and Astrophysics”, Santa Barbara 2019

Aspen Winter Conference, “Dawning Era of Gravitational-Wave Astrophysics”, Aspen 2017

APS April Meeting, Chair of entire conference (> 1,200 talks), Washington D.C. 2017

KITP Rapid Response Workshop, “Astrophysics from LIGO’s first black holes”, KITP 2016

COSMO-14, Chicago 2014

LIGO GW-Astronomy LoI meeting, Chicago 2013

APS April Meeting, organized 23 sessions, Denver 2013

22nd Midwest Relativity Meeting, Chicago 2012

## SERVICE/OUTREACH (continued)

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### Miscellaneous Outreach

Media: NPR Science Friday, New York Times, WTTW television, Quanta, Nature, WGN, Science News, Symmetry Magazine, USA Today, Scientific American, UPI, WBEZ, Warrior-Scholar Project, UChicago STEM week principal organizer and lecturer (2021–), Public lectures including Life-Long Learning, Pint of Science, REU, Biblioteca Pública in the Azores, Mind Museum in Manila

TIME for Kids (2020)

STEM World conference plenary speaker (2020)

Afrofuturism Symposium, “Black quantum futurism and time travel” panel (2018)

PBS video: “Gravitational Waves 101: How to Hear the Universe” (2016)

“Conveying Gravity: Communicating the Discovery of Gravitational Waves”

APS News 25, 8 (The Back Page) (2016)

Public lecture at screenings of “Gravity” (2014), “Interstellar” (2015)

Public Dialog “Black Holes Whisper Sweet Somethings”, Aspen Center for Physics (2014)

cosmicvariance.com (2007–2011)

Heinz R. Pagels Memorial Public Lecture (2011), “Listening to the Universe with Gravitational Waves”, Aspen Center for Physics

Appearance on Stephen Hawking’s Universe, six episode BBC documentary

## STUDENTS/POSTDOCS

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Amanda Farah (2019–): UChicago graduate student in her 3rd year

Jose María Ezquiaga (2019–): Einstein Fellow at UChicago

Alexandra Hanselman (2020–): UChicago graduate student in her 2nd year

Mike Zevin (2020–): Hubble Fellow at UChicago

Sam Dyson (2021–): UChicago graduate student in his 1st year

Maya Fishbach (2015–2020): UChicago graduate student. Now Einstein Fellow at Northwestern

Reed Essick (2017–2020): KICP Fellow at UChicago. Now Perimeter Institute postdoc

Phil Landry (2017–2019): NSERC Fellow at UChicago. Now CITA Fellow

Zoheyr Doctor (2014–2019): UChicago graduate student. Now Board of Visitors  
Research Assistant Professor at Northwestern

Ben Farr (2014–2017): McCormick Postdoctoral Fellow. Now Assistant Professor at the  
University of Oregon

Hsin-Yu Chen (2010–2017): UChicago graduate student. Now Einstein Fellow at MIT

## TEACHING

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Are we doomed? (BPRO 258; Spring 2021), co-taught with James Evans

Gravitational Waves (ASTR 384; Winter 2021)

Cosmology (PHYS371; Spring 2012)

Spacetime and Black Holes (PHYS 264; Fall 2012, 2013, 2016)

Everyday Physics (PHSC 113; Winter 2013, co-taught with Bob Geroch)

Spacetime, Black holes, Gravitational Waves, & Cosmology

(PHYS 264/265; 2 quarter sequence 2014/15, 2015/16, 2019/20, 2021/22)

The Teaching & Learning of Physics (PHYS 300; Fall 2016)

Gravitational Waves (PHYS 460; Fall 2017)

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CITATIONS (as of 10/2021; excluding LIGO papers without significant contributions)

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**# of citations:** > 65,000

**h-index:** > 100

Only LIGO papers to which I have made significant contributions are included below.

[Click here](#) for complete list of all of publications.

[Click here](#) for all papers, *excluding* all LIGO collaboration papers.

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PUBLICATIONS (click on titles to link to articles)

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1. **Spin dynamics of the LAGEOS satellite in support of a measurement of the Earth's gravitomagnetism**  
S. Habib, D.E. Holz, A. Kheyfets, R.A. Matzner, W.A. Miller, & B.W. Tolman  
*Phys. Rev. D* **50**, 6068 (1994)
2. **The issue of time evolution in quantum gravity**  
A. Kheyfets, D.E. Holz, & W.A. Miller  
*Int. J. Mod. Phys. A* **11**, 2977 (1996)
3. **Photon statistics limits for Earth-based parallax measurements of MACHO events**  
D.E. Holz & R.M. Wald  
*Astrophys. J.* **471**, 64 (1996)
4. **A new method for determining cumulative gravitational lensing effects in inhomogeneous universes**  
D.E. Holz & R.M. Wald  
*Phys. Rev. D* **58**, 063501 (1998)
5. **Lensing and high- $z$  supernova surveys**  
D.E. Holz  
*Astrophys. J. Lett.* **506**, L1 (1998)
6. **Gravitational lensing limits on the average redshift of gamma-ray bursts**  
D.E. Holz, M.C. Miller, & J.M. Quashnock  
*Astrophys. J.* **510**, 54 (1999)
7. **Apparent horizons in simplicial Brill wave initial data**  
A.P. Gentle, D.E. Holz, W.A. Miller, & J.A. Wheeler  
*Class. Quant. Grav.* **16**, 1979 (1999)
8. **Limits on the density of compact objects from high redshift supernovae**  
U. Seljak & D.E. Holz  
*Astron. Astroph. Lett.* **351**, L10 (1999)
9. **Symmetry without symmetry: numerical simulation of axisymmetric systems using Cartesian grids**  
M. Alcubierre, S. Brandt, B. Bruegmann, D.E. Holz, E. Seidel, R. Takahashi, J. Thornburg  
*Int. J. Mod. Phys. D* **10**, 273 (2001)
10. **Constant crunch coordinates for black hole simulations**  
A.P. Gentle, D.E. Holz, A. Kheyfets, P. Laguna, W.A. Miller, & D.M. Shoemaker  
*Phys. Rev. D* **63**, 064024 (2001)
11. **Seeing double: strong gravitational lensing of high-redshift supernovae**  
D.E. Holz  
*Astrophys. J. Lett.* **556**, L71 (2001)

PUBLICATIONS (click on titles to link to articles)

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12. **Collisional dark matter and scalar phantoms**  
D.E. Holz & A. Zee  
*Phys. Lett.* **B517**, 239 (2001)
13. **Gravitational wave emission from core-collapse of massive stars**  
C.L. Fryer, D.E. Holz, & S.A. Hughes  
*Astrophys. J.* **565**, 430 (2002)
14. **Hydrostatic expansion and spin changes during Type I X-ray bursts**  
A. Cumming, S.M. Morsink, L. Bildsten, J.L. Friedman, & D.E. Holz  
*Astrophys. J.* **564**, 343 (2002)
15. **A universal probability distribution function for weak-lensing amplification**  
Y. Wang, D.E. Holz, & D. Munshi  
*Astrophys. J. Lett.* **572**, L15 (2002)
16. **Retro-MACHOs:  $\pi$  in the sky?**  
D.E. Holz & J.A. Wheeler  
*Astrophys. J.* **578**, 330 (2002)  
featured in *Nature*, *Science*, *New Scientist*, *Scientific American*, etc.
17. **On the remarkable spectrum of a non-Hermitian random matrix model**  
D.E. Holz, H. Orland, & A. Zee  
*J. Phys. A* **36**, 3385 (2003)
18. **Corrective lenses for high redshift supernovae**  
N. Dalal, D.E. Holz, X. Chen, & J.A. Frieman  
*Astrophys. J. Lett.* **585**, L11 (2003)
19. **How black holes get their kicks: gravitational radiation recoil revisited**  
M. Favata, S.A. Hughes, & D.E. Holz  
*Astrophys. J. Lett.* **607**, L5 (2004)
20. **Consequences of gravitational radiation recoil**  
D. Merritt, M. Milosavljević, M. Favata, S.A. Hughes, & D.E. Holz  
*Astrophys. J. Lett.* **607**, L9 (2004)
21. **Gravitational waves from stellar collapse: correlations to explosion asymmetries**  
C.L. Fryer, D.E. Holz, & S.A. Hughes  
*Astrophys. J.* **609**, 288 (2004)
22. **Using gravitational-wave standard sirens**  
D.E. Holz & S.A. Hughes  
*Astrophys. J.* **629**, 15 (2005)
23. **Safety in numbers: Gravitational lensing degradation of the luminosity distance-redshift relation**  
D.E. Holz & E.V. Linder  
*Astrophys. J.* **631**, 678 (2005)
24. **Precision determination of the mass function of dark matter halos**  
M.S. Warren, K. Abazajian, D.E. Holz, L. Teodoro  
*Astrophys. J.* **646**, 881 (2006)
25. **Cosmology from supernova magnification maps**  
A. Cooray, D.E. Holz, & D. Huterer  
*Astrophys. J. Lett.* **637**, L77 (2006)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

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26. **Problems with pencils: lensing covariance of supernova distance measurements**  
A. Cooray, D. Huterer, & D.E. Holz  
*Phys. Rev. Lett.* **96**, 021301 (2006)
  27. **Short GRB and binary black hole standard sirens as a probe of dark energy**  
N. Dalal, D.E. Holz, S.A. Hughes, B. Jain  
*Phys. Rev. D* **74**, 063006 (2006)
  28. **The clustering of massive halos**  
A.R. Wetzel, J.D. Cohn, M. White, D.E. Holz, & M.S. Warren  
*Astrophys. J.*, **656**, 139 (2007)
  29. **Direct reconstruction of the dark energy scalar-field potential**  
C. Li, D.E. Holz, & A. Cooray  
*Phys. Rev. D*, **75**, 103503 (2007)
  30. **A new population of high redshift short-duration gamma-ray bursts**  
E. Berger, D.B. Fox, P.A. Price, E. Nakar, A. Gal-Yam, D.E. Holz, et al.  
*Astrophys. J.* **664**, 1000 (2007)
  31. **Narrowing constraints with type Ia supernovae: converging on a cosmological constant**  
S. Sullivan, A. Cooray, & D.E. Holz  
*J. Cosmology Astropart. Phys.* **09**, 4 (2007)
  32. **CMB cluster lensing: Cosmography with the longest lever arm**  
W. Hu, D.E. Holz, & C. Vale  
*Phys. Rev. D* (Rapid Communications) **76**, 127301 (2007)
  33. **Lensing and supernovae: quantifying the bias on the dark energy equation of state**  
D. Sarkar, A. Amblard, D.E. Holz, & A. Cooray  
*Astrophys. J.* **678**, 1 (2008)
  34. **Close pairs as proxies for galaxy cluster mergers**  
A. R. Wetzel, A.E. Schulz, D.E. Holz, & M.S. Warren  
*Astrophys. J.* **683**, 1 (2008)
  35. **Beyond two dark energy parameters**  
D. Sarkar, S. Sullivan, S. Joudaki, A. Amblard, D.E. Holz, & A. Cooray  
*Phys. Rev. Lett.* **100**, 241302 (2008)
  36. **Toward a halo mass function for precision cosmology**  
J. Tinker, A. Kravtsov, A. Klypin, K. Abazajian, M. Warren, G. Yepes, S. Gottlober, D.E. Holz  
*Astrophys. J.* **688**, 709 (2008)
  37. **Implications of Two Type Ia Supernova Populations for Cosmological Measurements**  
D. Sarkar, A. Amblard, A. Cooray, D.E. Holz  
*Astrophys. J. Lett.* **684**, L13 (2008)
  38. **No evidence for dark energy dynamics from a global analysis of cosmological data**  
P. Serra, A. Cooray, D.E. Holz, A. Melchiorri, P. Stefania, & D. Sarkar  
*Phys. Rev. D* **80**, 121302 (2009)
  39. **Weak lensing and dark energy: the impact of dark energy on nonlinear dark matter clustering**  
S. Joudaki, A. Cooray, & D.E. Holz  
*Phys. Rev. D* **80**, 023003 (2009)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

- 
40. **Ultra-high precision cosmology from gravitational waves**  
C. Cutler & D.E. Holz  
*Phys. Rev. D* **80**, 104009 (2009)
  41. **On The Origin Of The Highest Redshift Gamma-Ray Bursts**  
K. Belczynski, D.E. Holz, C.L. Fryer, E. Berger, D.H. Hartmann, & B. O'Shea  
*Astrophys. J.* **708**, 117 (2010)
  42. **The effect of metallicity on the detection prospects for gravitational waves**  
K. Belczynski, M. Dominik, T. Bulik, R. O'Shaughnessy, C. Fryer, & D.E. Holz  
*Astrophys. J. Lett* **715**, 138 (2010)
  43. **Reducing the weak lensing noise for the gravitational wave Hubble diagram using the non-Gaussianity of the magnification distribution**  
C.M. Hirata, D.E. Holz, & C. Cutler  
*Phys. Rev. D* **81**, 124046 (2010)
  44. **Measuring dark energy spatial inhomogeneity with supernova data**  
A. Cooray, D.E. Holz, & R. Caldwell  
*JCAP* **11**, 015 (2010)
  45. **Exploring short gamma-ray bursts as gravitational-wave standard sirens**  
S. Nissanke, D.E. Holz, S.A. Hughes, N. Dalal, & J.L. Sievers  
*Astrophys. J.* **725**, 496 (2010)
  46. **Outflowing Galactic Winds in Post-starburst and AGN Host Galaxies at  $0.2 < z < 0.8$**   
A.L. Coil, B.J. Weiner, D.E. Holz, M.C. Cooper, R. Yan, & J. Aird  
*Astrophys. J.* **743**, 46 (2011)
  47. **Localizing compact binary inspirals on the sky using ground-based gravitational wave interferometers**  
S.M. Nissanke, J.L. Sievers, N. Dalal, & D.E. Holz  
*Astrophys. J.* **739**, 99 (2011)
  48. **Compact Remnant Mass Function: Dependence on the Explosion Mechanism and Metallicity**  
C.L. Fryer, K. Belczynski, G. Wiktorowicz, M. Dominik, V. Kalogera, & D.E. Holz  
*Astrophys. J.* **749**, 91 (2012)
  49. **Evidence for Type Ia Supernova Diversity from Ultraviolet Observations with the Hubble Space Telescope**  
X. Wang et al.  
*Astrophys. J.* **749**, 126 (2012)
  50. **Double Compact Objects I: The Significance Of The Common Envelope On Merger Rates**  
M. Dominik, K. Belczynski, C. Fryer, D.E. Holz, E. Berti, et al.  
*Astrophys. J.* **759** 52 (2012)
  51. **Missing Black Holes Unveil the Supernova Explosion Mechanism**  
K. Belczynski, G. Wiktorowicz, C. Fryer, D.E. Holz, & V. Kalogera  
*Astrophys. J.* **757**, 91 (2012)
  52. **The Most Massive Objects in the Universe**  
D.E. Holz & S. Perlmutter  
*Astrophys. J. Lett.* **755**, 36 (2012)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

- 
53. **Finding the First Cosmic Explosions I: Pair-Instability Supernovae**  
D.J. Whalen et al.  
*Astrophys. J.* **777**, 110 (2013)
  54. **Finding the First Cosmic Explosions II: Core-Collapse Supernovae**  
D.J. Whalen et al.  
*Astrophys. J.* **768**, 95 (2013)
  55. **Double Compact Objects II: Cosmological Merger Rates**  
M. Dominik, K. Belczynski, C. Fryer, D.E. Holz, E. Berti, et al.  
*Astrophys. J.* **779**, 72 (2013)
  56. **Seeing the First Supernovae at the Edge of the Universe with JWST**  
D.J. Whalen, C.L. Fryer, D.E. Holz, et al.  
*Astrophys. J. Lett.* **762**, L6 (2013)
  57. **Illuminating the Primeval Universe with Type II<sub>n</sub> Supernovae**  
D.J. Whalen et al.  
*Astrophys. J.* **768**, 195 (2013)
  58. **Supermassive Seeds for Supermassive Black Holes**  
J.L. Johnson, D.J. Whalen, H. Li, & D.E. Holz  
*Astrophys. J.* **771**, 116 (2013)
  59. **Detecting Ancient Supernovae at  $z \sim 5-12$  with CLASH**  
D.J. Whalen, J. Smidt, J.L. Johnson, D.E. Holz, M. Stiavelli, & C.L. Fryer  
arXiv:1312.6330 (2013)
  60. **Gamma-ray Burst Beaming and Gravitational-Wave Observations**  
H.-Y. Chen & D.E. Holz  
*Phys. Rev. Lett.* **111**, 181101 (2013)
  61. **Determining the Hubble Constant from Gravitational Wave Observations of Merging Compact Binaries**  
S. Nissanke, D.E. Holz, N. Dalal, S.A. Hughes, J.L. Sievers, & C.M. Hirata  
arXiv:1307.2638 (2013)
  62. **The Formation and Gravitational-Wave Detection of Massive Stellar Black Hole Binaries**  
K. Belczynski, A. Buonanno, M. Cantiello, C.L. Fryer, D.E. Holz, I. Mandel,  
M.C. Miller, & M. Walczak  
*Astrophys. J.* **789**, 120 (2014)
  63. **Dark Sky Simulations: Early Data Release**  
S.W. Skillman, M.S. Warren, M.J. Turk, R.H. Wechsler, D.E. Holz, & P.M. Sutter  
arXiv:1407.2600 (2014)
  64. **Double Compact Objects III: Gravitational Wave Detection Rates**  
M. Dominik, E. Berti, R. O'Shaughnessy, I. Mandel, K. Belczynski, C.L. Fryer,  
D.E. Holz, T. Bulik, & F. Pannarale  
*Astrophys. J.* **806**, 263 (2015)
  65. **The Loudest Gravitational Wave Events**  
H.-Y. Chen & D.E. Holz  
arXiv:1409.0522 (2015)

...publications continued next page...



## PUBLICATIONS (click on titles to link to articles)

- 
66. **Neutron Stars versus Black Holes: Probing the Mass Gap with LIGO/Virgo**  
T.B. Littenberg, B. Farr, S. Coughlin, V. Kalogera, & D.E. Holz  
*Astrophys. J. Lett.* **807** 24 (2015)
  67. **Cosmic variance in the nanohertz gravitational wave background**  
E. Roebber, G. Holder, D.E. Holz, & M. Warren  
*Astrophys. J.* **819** 163 (2016)
  68. **Compact Binary Merger Rates: Comparison with LIGO/Virgo Upper Limits**  
K. Belczynski, S. Repetto, D.E. Holz, et al.  
*Astrophys. J.* **819** 108 (2016)
  69. **Observation of Gravitational Waves from a Binary Black Hole Merger**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **116** 011102 (2016)
  70. **Astrophysical Implications of the Binary Black-hole Merger GW150914**  
B.P. Abbott et al.  
*Astrophys. J. Lett.* **818** 22 (2016)
  71. **GW150914: First results from the search for binary black hole coalescence with Advanced LIGO**  
B.P. Abbott et al.  
*Phys. Rev. D* **93** 122003 (2016)
  72. **Tests of General Relativity with GW150914**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **116** 1101 (2016)
  73. **Properties of the Binary Black Hole Merger GW150914**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **116** 241102 (2016)
  74. **The Rate of Binary Black Hole Mergers Inferred from Advanced LIGO Observations Surrounding GW150914**  
B.P. Abbott et al.  
*Astrophys. J. Lett.* **833** 1 (2016)
  75. **A Dark Energy Camera Search for an Optical Counterpart to the First Advanced LIGO Gravitational Wave Event GW150914**  
M. Soares-Santos et al.  
*Astrophys. J. Lett.* **823** 33 (2016)
  76. **A Dark Energy Camera Search for Missing Supergiants in the LMC After the Advanced LIGO Gravitational Wave Event GW150914**  
J. Annis et al.  
*Astrophys. J. Lett.* **823** 34 (2016)
  77. **Going the Distance: Mapping Host Galaxies of LIGO and Virgo Sources in Three Dimensions Using Local Cosmography and Targeted Follow-up**  
L.P. Singer, H.-Y. Chen, D.E. Holz, et al.  
*Astrophys. J. Lett.* **829** 15 (2016)
  78. **Localization and Broadband Follow-up of the Gravitational-wave Transient GW150914**  
B.P. Abbott et al.  
*Astrophys. J. Lett.* **826** 13 (2016)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

- 
79. **The origin and evolution of LIGO's first gravitational-wave source**  
K. Belczynski, D.E. Holz, T. Bulik, & R. O'Shaughnessy  
*Nature* **534** 512 (2016)
  80. **GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **116** 241103 (2016)
  81. **A DECAM Search for an Optical Counterpart to the LIGO Gravitational-wave Event GW151226**  
P.S. Cowperthwaite et al.  
*Astrophys. J. Lett* **826** 29 (2016)
  82. **The Effect of Pair-Instability Mass Loss on Black Hole Mergers**  
K. Belczynski et al.  
*Astron. Astrophys.* **594** 97 (2016)
  83. **Upper limits on the rates of binary neutron star and neutron-star–black-hole mergers from Advanced LIGO's first observing run**  
B.P. Abbott et al.  
*Astrophys. J. Lett.* **832** 21 (2016)
  84. **The basic physics of the binary black hole merger GW150914**  
B.P. Abbott et al.  
*Annalen der Physik* **529** 1600209 (2017)
  85. **Facilitating follow-up of LIGO-Virgo events using rapid sky localization**  
H.-Y. Chen & D.E. Holz  
*Astrophys. J.* **840** 88 (2017)
  86. **Observational Selection Effects with Ground-based Gravitational Wave Detectors**  
H.-Y. Chen, R. Essick, S. Vitale, & D.E. Holz  
*Astrophys. J.* **835** 31 (2017)
  87. **A Search for Kilonovae in the Dark Energy Survey**  
Z. Doctor, R. Kessler, H. Y. Chen, B. Farr, D. A. Finley, R. J. Foley,  
D. A. Goldstein, D. E. Holz, et al.  
*Astrophys. J.* **837** 1 (2017)
  88. **Are LIGO's Black Holes Made From Smaller Black Holes?**  
M. Fishbach, D.E. Holz, & B. Farr  
*Astrophys. J. Lett.* **840** L24 (2017)
  89. **GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence**  
B. P. Abbott et al.  
*Phys. Rev. Lett.* **119**, 141101 (2017)
  90. **Finding the One: Identifying the Host Galaxies of Gravitational-Wave Sources**  
H.-Y. Chen & D.E. Holz  
arXiv:1612.01471 (2017)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

91. **GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral**  
B. P. Abbott et al.  
*Phys. Rev. Lett.* **119**, 161101 (2017)
92. **Multi-messenger Observations of a Binary Neutron Star Merger**  
B. P. Abbott et al.  
*Astrophys. J. Lett.* **848**, L12 (2017)
93. **Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A**  
B. P. Abbott et al.  
*Astrophys. J. Lett.* **848**, L13 (2017)
94. **A gravitational-wave standard siren measurement of the Hubble constant**  
B. P. Abbott et al.  
*Nature* **551**, 85 (2017)
95. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. I. Discovery of the Optical Counterpart Using the Dark Energy Camera**  
M. Soares-Santos, D. E. Holz et al.  
*Astrophys. J. Lett.* **848**, L16 (2017)
96. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. II. UV, Optical, and Near-infrared Light Curves and Comparison to Kilonova Models**  
P. S. Cowperthwaite et al.  
*Astrophys. J. Lett.* **848**, L17 (2017)
97. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. III. Optical and UV Spectra of a Blue Kilonova from Fast Polar Ejecta**  
M. Nicholl et al.  
*Astrophys. J. Lett.* **848**, L18 (2017)
98. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. IV. Detection of Near-infrared Signatures of r-process Nucleosynthesis with Gemini-South**  
R. Chornock et al.  
*Astrophys. J. Lett.* **848**, L19 (2017)
99. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. V. Rising X-Ray Emission from an Off-axis Jet**  
R. Margutti et al.  
*Astrophys. J. Lett.* **848**, L20 (2017)
100. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. VI. Radio Constraints on a Relativistic Jet and Predictions for Late-time Emission from the Kilonova Ejecta**  
K. D. Alexander et al.  
*Astrophys. J. Lett.* **848**, L21 (2017)
101. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. VII. Properties of the Host Galaxy and Constraints on the Merger Timescale**  
P. K. Blanchard et al.  
*Astrophys. J. Lett.* **848**, L22 (2017)
102. **The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. VIII. A Comparison to Cosmological Short-duration Gamma-Ray Bursts**  
W. Fong et al.  
*Astrophys. J. Lett.* **848**, L23 (2017)

...publications continued next page...

PUBLICATIONS (click on titles to link to articles)

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103. **Where are LIGO's Big Black Holes?**  
M. Fishbach & D.E. Holz  
*Astrophys. J. Lett.* **851**, L25 (2017)
104. **Statistical Gravitational Waveform Models: What to Simulate Next?**  
Z. Doctor, B. Farr, D.E. Holz, & M. Pürrer  
*Phys. Rev.* **D96**, 123011 (2017)
105. **GW170608: Observation of a 19 Solar-mass Binary Black Hole Coalescence**  
B. P. Abbott et al.  
*Astrophys. J. Lett.* **851**, L35 (2017)
106. **Using spin to understand the formation of LIGO's black holes**  
B. Farr, D.E. Holz, & W. M. Farr  
*Astrophys. J. Lett.* **854**, L9 (2018)
107. **How Many Kilonovae Can Be Found in Past, Present, and Future Survey Data Sets?**  
D. Scolnic et al.  
*Astrophys. J. Lett.* **852**, L3 (2018)
108. **Explaining LIGO's observations via isolated binary evolution with natal kicks**  
D. Wysocki, D. Gerosa, R. O'Shaughnessy, K. Belczynski, W. Gladysz, E. Berti,  
M. Kesden, & D.E. Holz  
*Phys. Rev.* **D97**, 043014 (2018)
109. **A Precise Distance to the Host Galaxy of the Binary Neutron Star Merger GW170817 Using Surface Brightness Fluctuations**  
M. Cantiello et al.  
*Astrophys. J. Lett.* **854**, L31 (2018)
110. **Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817**  
B.P. Abbott et al.  
*Astroph. J. Lett.* **850**, L39 (2017)
111. **GW170817: Measurements of Neutron Star Radii and Equation of State**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **121**, 161101 (2018)
112. **Impact of inter-correlated initial binary parameters on double black hole/neutron star mergers**  
J. Klencki, M. Moe, W. Gladysz, M. Chruslinska, D.E. Holz, K. Belczynski  
*Astron. Astroph.* **619**, A77 (2018)
113. **The cosmological impact of future constraints on  $H_0$  from gravitational-wave standard sirens**  
E. Di Valentino, D.E. Holz, A. Melchiorri, F. Renzi  
*Phys. Rev.* **D98** 083523 (2018)
114. **Limits on the number of spacetime dimensions from GW170817**  
K. Pardo, M. Fishbach, D.E. Holz, & D.N. Spergel  
*JCAP* **7**, 48 (2018)
115. **Does the Black Hole Merger Rate Evolve with Redshift?**  
M. Fishbach, D.E. Holz, & W.M. Farr  
*Astrophys. J. Lett.* **863**, L41 (2018)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

- 
116. **A 2% Hubble constant measurement from standard sirens within 5 years**  
H.-Y. Chen, M. Fishbach, & D.E. Holz  
*Nature* **562**, 545 (2018)
  117. **A standard siren measurement of the Hubble constant from GW170817 without the electromagnetic counterpart**  
M. Fishbach et al.  
*Astrophys. J. Lett.* **871**, L13 (2019)
  118. **Standard sirens with a running Planck mass**  
M. Lagos, M. Fishbach, P. Landry, & D.E. Holz  
*Phys. Rev. D* **99**, 083504 (2019)
  119. **First Measurement of the Hubble Constant from a Dark Standard Siren using the Dark Energy Survey Galaxies and the LIGO/Virgo Binary-Black-hole Merger GW170814**  
M. Soares-Santos et al.  
*Astrophys. J. Lett.* **876**, L7 (2019)
  120. **Calibrating gravitational-wave detectors with GW170817**  
R. Essick & D.E. Holz  
*Class. Quant. Grav.* **36**, 125002 (2019)
  121. **Black hole shadows, photon rings, and lensing rings**  
S. Gralla, D.E. Holz, & R.M. Wald  
*Phys. Rev. D* **100**, 024018 (2019)
  122. **A Future Percent-level Measurement of the Hubble Expansion at Redshift 0.8 with Advanced LIGO**  
W.M. Farr, M. Fishbach, J. Ye, & D.E. Holz  
*Astroph. J. Lett.* **883**, L42 (2019)
  123. **Properties of the binary neutron star merger GW170817**  
B.P. Abbott et al.  
*Phys. Rev. X* **9**, 011001 (2019)
  124. **Tests of General Relativity with GW170817**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **123**, 011102 (2019)
  125. **GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs**  
B.P. Abbott et al.  
*Phys. Rev. X* **9**, 031040 (2019)
  126. **Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo**  
B.P. Abbott et al.  
*Astroph. J. Lett.* **882**, L24 (2019)
  127. **Search for Gravitational-wave Signals Associated with Gamma-Ray Bursts during the Second Observing Run of Advanced LIGO and Advanced Virgo**  
B.P. Abbott et al.  
*Astroph. J.* **886**, 75 (2019)
  128. **Constraining the  $p$ -Mode- $g$ -Mode Tidal Instability with GW170817**  
B.P. Abbott et al.  
*Phys. Rev. Lett.* **122**, 061104 (2019)

...publications continued next page...

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129. **Picky Partners: The Pairing of Component Masses in Binary Black Hole Mergers**  
M. Fishbach & D.E. Holz  
*Astroph. J. Lett.* **891**, L27 (2020)
  130. **The Most Massive Binary Black Hole Detections and the Identification of Population Outliers**  
M. Fishbach, W.M. Farr, & D.E. Holz  
*Astroph. J. Lett.* **891**, L31 (2020)
  131. **Nonparametric inference of neutron star composition, equation of state, and maximum mass with GW170817**  
R. Essick, P. Landry, & D.E. Holz  
*Phys. Rev. D* **101**, 063007 (2020)
  132. **Evolutionary roads leading to low effective spins, high black hole masses, and O1/O2 rates for LIGO/Virgo binary black holes**  
K. Belczynski et al.  
*Astron. Astrophys.* **636**, A104 (2020)
  133. **Black Hole Coagulation: Modeling Hierarchical Mergers in Black Hole Populations**  
Z. Doctor, D. Wysocki, R. O’Shaughnessy, D.E. Holz, & B. Farr  
*Astroph. J.* **893**, 35 (2020)
  134. **Counting on Short Gamma-Ray Bursts: Gravitational-wave Constraints of Jet Geometry**  
A. Farah, R. Essick, Z. Doctor, M. Fishbach & D.E. Holz  
*Astroph. J.* **895**, 108 (2020)
  135. **Shouts and Murmurs: Combining Individual Gravitational-wave Sources with the Stochastic Background to Measure the History of Binary Black Hole Mergers**  
T. Calliser, M. Fishbach, D.E. Holz, & W.M. Farr  
*Astroph. J. Lett.* **896**, L32 (2020)
  136. **Does Matter Matter? Using the Mass Distribution to Distinguish Neutron Stars and Black Holes**  
M. Fishbach, R. Essick, & D.E. Holz  
*Astroph. J. Lett.* **899**, L8 (2020)
  137. **The Origin of Inequality: Isolated Formation of a  $30 + 10 M_{\odot}$  Binary Black Hole Merger**  
A. Olejak, M. Fishbach, K. Belczynski, D.E. Holz, J.-P. Lasota, M.C. Miller, & T. Bulik  
*Astroph. J. Lett.* **901**, L39 (2020)
  138. **A Statistical Standard Siren Measurement of the Hubble Constant from the LIGO/Virgo Gravitational Wave Compact Object Merger GW190814 and Dark Energy Survey Galaxies**  
A. Palmese et al.  
*Astroph. J. Lett.* **900**, L33 (2020)
  139. **Direct astrophysical tests of chiral effective field theory at supranuclear densities**  
R. Essick, I. Tews, P. Landry, S. Reddy, & D.E. Holz  
*Phys. Rev. C* **102**, 055803 (2020)
  140. **Minding the Gap: GW190521 as a Straddling Binary**  
M. Fishbach & D.E. Holz  
*Astroph. J. Lett.* **904**, L26 (2020)
  141. **The Binary-Host Connection: Astrophysics of Gravitational-Wave Binaries from Host Galaxy Properties**  
S. Adhikari, M. Fishbach, D.E. Holz, R.H. Wechsler, & Z. Fang  
*Astroph. J.* **905**, 21 (2020)

...publications continued next page...

## PUBLICATIONS (click on titles to link to articles)

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142. **Prospects for observing and localizing gravitational-wave transients with Advanced LIGO, Advanced Virgo and KAGRA**  
B.P. Abbott et al.  
*Liv. Rev. Rel.* **23**, 3 (2020)
142. **GW190521: A Binary Black Hole Merger with a Total Mass of  $150 M_{\odot}$**   
R. Abbott et al.  
*Phys. Rev. Lett.* **125**, 101102 (2020)
143. **Properties and Astrophysical Implications of the  $150 M_{\odot}$  Binary Black Hole Merger GW190521**  
R. Abbott et al.  
*Astroph. J. Lett.* **900**, L13 (2020)
144. **GW190425: Observation of a Compact Binary Coalescence with Total Mass  $\sim 3.4 M_{\odot}$**   
B.P. Abbott et al.  
*Astroph. J. Lett.* **892**, L3 (2020)
145. **GW190814: Gravitational Waves from the Coalescence of a  $23 M_{\odot}$  Black Hole with a  $2.6 M_{\odot}$  Compact Object**  
R. Abbott et al.  
*Astroph. J. Lett.* **896**, L44 (2020)
146. **GW190412: Observation of a binary-black-hole coalescence with asymmetric masses**  
R. Abbott et al.  
*Phys. Rev. D* **102**, 043015 (2020)
147. **Jumping the Gap: Searching for LIGO's Biggest Black Holes**  
J.M. Ezquiaga & D.E. Holz  
*Astroph. J. Lett.* **909**, L23 (2021)
148. **Distance measures in gravitational-wave astrophysics and cosmology**  
H.-Y. Chen, D.E. Holz, J. Miller, M. Evans, S. Vitale, & J. Creighton  
*Class. Quant. Grav.* **38**, 055010 (2021)
149. **Phase effects from strong gravitational lensing of gravitational waves**  
J.M. Ezquiaga, D.E. Holz, W. Hu, M. Lagos, & R.M. Wald  
*Phys. Rev. D* **103**, 064047 (2021)
150. **One Channel to Rule Them All? Constraining the Origins of Binary Black Holes Using Multiple Formation Pathways**  
M. Zevin et al.  
*Astroph. J.* **910**, 152 (2021)
151. **When Are LIGO/Virgo's Big Black Hole Mergers?**  
M. Fishbach et al.  
*Astroph. J. Lett.* **912**, 98 (2021)
152. **The Gravity Collective: A Search for the Electromagnetic Counterpart to the Neutron Star-Black Hole Merger GW190814**  
C.D. Kilpatrick et al.  
arXiv:2106.06897 (2021)
153. **GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo during the First Half of the Third Observing Run**  
R. Abbott et al.  
*Phys. Rev. X* **11**, 2 (2021)

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PUBLICATIONS (click on titles to link to articles)

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154. **Black Hole Leftovers: The Remnant Population from Binary Black Hole Mergers**  
Z. Doctor, B. Farr, & D.E. Holz  
*Astroph. J. Lett.* **914**, L18 (2021)
155. **Cosmology with Love: Measuring the Hubble constant using neutron star universal relations**  
D. Chatterjee et al.  
*Phys. Rev. D* **104**, 083528 (2021)
156. **Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog**  
R. Abbott et al.  
*Astroph. J. Lett.* **913**, L7 (2021)
157. **A Gravitational-wave Measurement of the Hubble Constant Following the Second Observing Run of Advanced LIGO and Virgo**  
B.P. Abbott et al.  
*Astroph. J.* **909**, 218 (2021)
158. **Search for lensing signatures in the gravitational-wave observations from the first half of LIGO-Virgo's third observing run**  
R. Abbott  
arXiv:2105.06384 (2021)
159. **Observation of Gravitational Waves from Two Neutron Star-Black Hole Coalescences**  
R. Abbott et al.  
*Astroph. J. Lett.* **915**, L5 (2021)
160. **GWTC-2.1: Deep Extended Catalog of Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run**  
R. Abbott et al.  
arXiv:2108.01045 (2021)
161. **GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run**  
R. Abbott et al.  
arXiv:2111.03606 (2021)
162. **Tests of general relativity with binary black holes from the second LIGO-Virgo gravitational-wave transient catalog**  
R. Abbott et al.  
*Phys. Rev. D* **103**, 122002 (2021)
163. **Constraints on the cosmic expansion history from GWTC-3**  
R. Abbott et al.  
arXiv:2111.03604 (2021)
164. **The population of merging compact binaries inferred using GWs through GWTC-3**  
R. Abbott et al.  
arXiv:2111.03634 (2021)
165. **Please repeat: Strong lensing of gravitational waves as a probe of compact binary and galaxy populations**  
F. Xu, J.M. Ezquiaga, & D.E. Holz  
arXiv:2105.14390 (2021)

...publications continued next page...



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166. **Don't Leave One Out: Probing Extremal Gravitational-Wave Events with Coarse-Grained Likelihoods**  
R. Essick et al.  
arXiv:2109.00418 (2021)
167. **Bridging the Gap: Categorizing Gravitational-Wave Events at the Transition Between Neutron Stars and Black Holes**  
A.M. Farah, M. Fishbach, R. Essick, & D.E. Holz, & S. Galaudage  
arXiv:2111.03498 (2021)

**NOTE:**

Only LIGO papers to which I have made significant contributions are included above.  
[Click here](#) for complete list of all of publications.  
[Click here](#) for all papers, *excluding* all LIGO collaboration papers.

PROCEEDINGS/MISCELLANEOUS

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**Coalescence of primal gravity waves to make cosmological mass without matter**

D.E. Holz, W.A. Miller, M. Wakano, & J.A. Wheeler  
 in *Directions in General Relativity, Volume 2*  
 eds. B.L. Hu & T.A. Jacobson (Cambridge University Press: 1993)

**Physics in knots**

D.E. Holz, A. Kheifets, W.A. Miller, & J.A. Wheeler  
 in *Physical Origins of Time Asymmetry*  
 eds. J.J. Halliwell, J. Pérez-Mercader, & W.H. Zurek (Cambridge University Press: 1994)

**Shedding light on dark matter**

D.E. Holz  
*Nature* **400**, 819 (1999)

**SNAP and multiply-imaged supernovae**

D.E. Holz  
 invited contribution, *SNAP yellow book* (2001)

**Gravitational waves from core-collapse**

C.L. Fryer, M.S. Warren, D.E. Holz, S.A. Hughes, & R. Dupuis  
 in *Gravitational-Wave Detection*  
 SPIE, vol. 4856, eds. P. Saulson & M. Cruise (2002)

**Stellar collapse and gravitational waves**

C.L. Fryer, D.E. Holz, S.A. Hughes, & M.S. Warren  
 in *Stellar Collapse* (Astrophysics and Space Sciences)  
 ed. C.L. Fryer (Kluwer: 2004)

**An accelerated history of the Universe**

D.E. Holz  
 in *Seventh International Conference on Particles and Nuclei*  
 AIP conference proceedings, **842**, 741 (2006)

**Dark Cosmos: In Search of Our Universe's Missing Mass and Energy**

D.E. Holz  
 Book review in *Physics Today*, **60**, 62 (2007)

**Running after  $w(z)$ : Some stumbling blocks**

D. Sarkar et al.  
*Nuc. Phys. B* **194**, 307 (2009)

**Astro2010 Decadal Survey Whitepaper: Coordinated Science in the Gravitational and Electromagnetic Skies**

S. Bloom, D.E. Holz, S.A. Hughes, K. Menou et al. (2010)

**Astro2010 Decadal Survey Whitepaper: Precision Cosmology with Gravitational Waves**

C.J. Hogan, B.F. Schutz, C.J. Cutler, S.A. Hughes, & D.E. Holz (2010)

**The Gravitational Universe**

The eLISA Consortium; arXiv:1305.5720 (2013)

**Distance Probes of Dark Energy (Snowmass report)**

A. Kim, N. Padmanabhan et al. *Astropart. Phys.* (2014); arXiv:1309.5382

**Conveying gravity: Communicating the Discovery of Gravitational Waves**

J.S. Key, M. Hendry, & D.E. Holz; APS News "The Back Page" (August/September 2016)

**Measuring cosmic distances with standard sirens**

D.E. Holz, S.A. Hughes, & B.F. Schutz *Physics Today* **71**, 34 (2018)

INVITED TALKS (very abbreviated list)

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**Cosmology from gravitational-wave standard sirens**

ITC Colloquium, Harvard  
Cambridge, MA; April, 2011

**Cosmology with gravitational-waves**

Physics Colloquium, Stanford  
Palo Alto, CA; December, 2011

**Measuring the Hubble constant with gravitational waves**

Plenary talk, Gravitational Physics & Astrophysics conference (GWPAW)  
Hannover, Germany; June, 2012

**Multi-messenger astronomy panel convener**

“Science from the first gravitational-wave detections” workshop  
South Padre Island, TX; May, 2013

**Gravitational waves**

Course lecturer, Cosmology on the Beach  
Los Cabos, Mexico; January, 2014

**Gravitational wave astrophysics with LIGO**

ITC Colloquium, Harvard University  
Cambridge, MA; September, 2014

**Astrophysical sources of gravitational waves and electromagnetic counterparts**

Invited talk in special session “The Quest for Gravitational Waves, 100 years After Einstein”  
American Astronomical Society meeting; Seattle, WA; January, 2015

**Astrophysical implications of GW150914**

presentation of GW150914 companion paper on behalf of the LVC  
APS April meeting; Salt Lake City, UT; April, 2016

**Observation of Gravitational Waves from a Binary Black Hole Merger**

Physics Colloquia at FNAL, LBL/Berkeley, Madison, Stanford, UCLA  
Winter/Spring 2016

**How does the Universe make LIGO’s black holes?**

KITP Blackboard Talk; Santa Barbara, CA; August 2016

**Gravitational waves, black holes, and LIGO**

National Academy of Sciences/Kavli Frontiers of Science; Irvine, CA; February 2017

**Hearing and Seeing GW170817**

IAS/Princeton joint colloquium; Princeton, NJ; December 2017

**GW170817: Hearing and Seeing a Binary Neutron Star Merger**

UPenn Rittenhouse Lecture; Philadelphia, PA; December 2017

**Some recent results in gravitational-wave astrophysics**

Harvard Sackler Conference: Gravitational Wave Astrophysics; Boston, MA; May 2018

**Hearing and Seeing a Binary Neutron Star Merger**

Stanford Physics Colloquium; Stanford, CA; May 2018

**Cosmology with standard sirens and the Hubble tension**

The New Era of Gravitational-Wave Physics and Astrophysics; Santa Barbara, CA; June 2019

**Gravitational waves: binaries**

SLAC Summer Institute: The almost invisibles; Stanford (Virtual); April 2020

**Gravitational wave sources, detection, and interpretation**

Dirac Lectures: Gravitational Waves; Florida State University (Virtual); October 2020

**Recent results in gravitational-wave science**

COSMO-21 plenary; UIUC (Virtual); August 2021