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Education

Ph.D., Physics *California Institute of Technology (Caltech)* 06/2012
- Ph.D. thesis supervisor: Prof. Yanbei Chen

M.S., Physics *California Institute of Technology (Caltech)* 06/2008
B.A., Math and Physics *Claremont McKenna College* 05/2006
- Valedictorian, *summa cum laude*, honors in both degrees

Academic Positions

Assistant Professor of Physics *University of Virginia* 08/2019–present
Senior Postdoctoral Researcher *University of Amsterdam* 07/2018–07/2019
- Postdoctoral supervisor: Prof. Samaya Nissanke

Postdoctoral Researcher *Radboud University* 09/2016–06/2018
- Postdoctoral supervisor: Prof. Samaya Nissanke

Postdoctoral Associate *Cornell University* 09/2012–08/2016
- Postdoctoral supervisor: Prof. Éanna É. Flanagan

Postdoctoral Researcher *Caltech* 06/2012–08/2012
- Postdoctoral supervisor: Prof. Yanbei Chen

Courses Taught and Guest Lectures

Courses Taught

Classical Mechanics (PHYS 3210) *University of Virginia* Spring 2021
Advanced General Relativity (PHYS 8240) *University of Virginia* Fall 2019–2021
Computational Physics (co-taught) *Cornell University* Spring 2015
Quantum Mechanics *Claremont McKenna College* Spring 2011

Guest Lectures

Astroparticle Physics *Amsterdam University College* 05/2019
General Relativity *University of Amsterdam* 04/2017

Selected Awards, Honors, and Fellowships

- David and Barbara Groce Graduate Fellowship, 2009–2010
- Rose Hills Foundation Graduate Fellowship, 2006–2007
- Barry M. Goldwater Scholarship, 2004–2006
- GGR Travel Grant, 2009, 2010, 2012
- Phi Beta Kappa, 2005

Research Interests

Compact binaries, gravitational waves, gravitational-wave memory, asymptotic spacetime symmetries, electromagnetic counterparts of gravitational-wave sources, gravitational-wave tests of general relativity, black-hole perturbation theory, post-Newtonian theory, numerical relativity, black-hole physics.

Professional Activities

Advising

Ph.D. Students

Arwa Elhashash *University of Virginia* 07/2019–present
Benjamin Wade *University of Virginia* 02/2021–present

M.S. Students

Oliver Boersma (co-advised) *Radboud University* 01/2018–01/2020
Andris Dorozsmai (co-advised) *Radboud University* 01/2017–07/2018

Senior Thesis Students

Andrew Tuma *University of Virginia* 09/2019–05/2020
Yara Yousef *University of Virginia* 09/2019–05/2020

Scientific Collaboration Memberships

Athena Mission, *Multimessenger Science Working Group* 02/2021–present
Cosmic Explorer Consortium, 12/2020–present
LISA Consortium, *University of Amsterdam and Virginia groups*, 01/2019–present
Virgo Collaboration, *Radboud and Nikhef groups*, 09/2016–09/2019
GROWTH Collaboration, *Radboud University group*, 09/2017–09/2018
LIGO Scientific Collaboration, *Caltech Relativity Theory*, 09/2015–09/2016

Conference and Seminar Organization

UVA Gravity Seminar Series, Committee chair, 01/2021–present
GRAPPA Colloquium Series, Organizing committee, 09/2018–07/2019
UvA GW seminars, Organizing committee, 09/2018–07/2019
72nd Netherlands Astronomy Conference, Organizing committees, 05/2017

Peer Reviewing

Journals: Physical Review Letters, Physical Review D, Journal of High Energy Physics, Classical and Quantum Gravity, General Relativity and Gravitation, Nature Communications, The Astrophysical Journal, Proceedings of the Royal Society A, Journal of Cosmology and Astroparticle Physics, International Journal of Modern Physics D, European Physical Journal C

Funding Agencies: Science and Technologies Facilities Council (STFC), Comisión Nacional de Investigación Científico y Tecnológico (CONICYT)

Publications

Short-Author-List Pre-prints

2. A. M. Grant and D. A. Nichols, "Persistent gravitational wave observables: Curve deviation in asymptotically flat spacetimes," (2021), arXiv:2109.03832 [gr-qc]
1. A. Coogan, G. Bertone, D. Gaggero, B. J. Kavanagh, and **D. A. Nichols**, "Measuring the dark matter environments of black hole binaries with gravitational waves," (2021), arXiv:2108.04154 [gr-qc]

Short-Author-List, Peer-Reviewed Articles

28. S. Tahura, **D. A. Nichols**, and K. Yagi, "Gravitational-wave memory effects in Brans-Dicke theory: Waveforms and effects in the post-Newtonian approximation," (2021), (Accepted for publication in Phys. Rev. D), arXiv:2107.02208 [gr-qc]
27. A. Elhashash and **D. A. Nichols**, "Definitions of (super) angular momentum in asymptotically flat spacetimes: Properties and applications to compact-binary mergers," Phys. Rev. D **104**, 024020 (2021), arXiv:2101.12228 [gr-qc]
26. S. Tahura, **D. A. Nichols**, A. Saffer, L. C. Stein, and K. Yagi, "Brans-Dicke theory in Bondi-Sachs form: Asymptotically flat solutions, asymptotic symmetries and gravitational-wave memory effects," Phys. Rev. D **103**, 104026 (2021), arXiv:2007.13799 [gr-qc]
25. B. J. Kavanagh, **D. A. Nichols**, G. Bertone, and D. Gaggero, "Detecting dark matter around black holes with gravitational waves: Effects of dark-matter dynamics on the gravitational waveform," Phys. Rev. D **102**, 083006 (2020), arXiv:2002.12811 [gr-qc]
24. O. M. Boersma, **D. A. Nichols**, and P. Schmidt, "Forecasts for detecting the gravitational-wave memory effect with Advanced LIGO and Virgo," Phys. Rev. D **101**, 083026 (2020), arXiv:2002.01821 [astro-ph.HE]
23. É. É. Flanagan, A. M. Grant, A. I. Harte, and **D. A. Nichols**, "Persistent gravitational wave observables: Nonlinear plane wave spacetimes," Phys. Rev. D **101**, 104033 (2020), arXiv:1912.13449 [gr-qc]
22. É. É. Flanagan, A. M. Grant, A. I. Harte, and **D. A. Nichols**, "Persistent gravitational wave observables: general framework," Phys. Rev. D **99**, 084044 (2019), arXiv:1901.00021 [gr-qc]
21. T. Hinderer, S. Nissanke, F. Foucart, K. Hotokezaka, T. Vincent, M. Kasliwal, P. Schmidt, A. R. Williamson, **D. A. Nichols**, M. Duez, L. E. Kidder, H. P. Pfeiffer, and M. A. Scheel, "Distinguishing the nature of comparable-mass neutron star binary systems with multimessenger observations: GW170817 case study," Phys. Rev. D **100**, 063021 (2019), arXiv:1808.03836 [astro-ph.HE]
20. **D. A. Nichols**, "Center-of-mass angular momentum and memory effect in asymptotically flat spacetimes," Phys. Rev. D **98**, 064032 (2018), arXiv:1807.08767 [gr-qc]

19. **D. A. Nichols**, "Spin memory effect for compact binaries in the post-Newtonian approximation," Phys. Rev. D **95**, 084048 (2017), arXiv:1702.03300 [gr-qc]
18. A. Ghosh, A. Ghosh, N. Johnson-McDaniel, C. K. Mitra, P. Ajith, W. Del Pozzo, **D. A. Nichols**, Y. Chen, A. B. Nielsen, C. P. L. Berry, and L. London, "Testing general relativity using golden black-hole binaries," Phys. Rev. D **94**, 021101 (2016), arXiv:1602.02453 [gr-qc]
17. É. É. Flanagan, **D. A. Nichols**, L. C. Stein, and J. Vines, "Prescriptions for measuring and transporting local angular momenta in general relativity," Phys. Rev. D **93**, 104007 (2016), arXiv:1602.01847 [gr-qc]
16. É. É. Flanagan and **D. A. Nichols**, "Conserved charges of the extended Bondi-Metzner-Sachs algebra," Phys. Rev. D **95**, 044002 (2017), arXiv:1510.03386 [hep-th]
15. J. Vines and **D. A. Nichols**, "Properties of an affine transport equation and its holonomy," Gen. Rel. Grav. **48**, 127 (2016), arXiv:1412.4077 [gr-qc]
14. É. É. Flanagan and **D. A. Nichols**, "Observer dependence of angular momentum in general relativity and its relationship to the gravitational-wave memory effect," Phys. Rev. D **92**, 084057 (2015), arXiv:1411.4599 [gr-qc]
13. R. H. Price, J. W. Belcher, and **D. A. Nichols**, "Comparison of electromagnetic and gravitational radiation: What we can learn about each from the other," Am. J. Phys. **81**, 575 (2013), arXiv:1212.4730 [gr-qc]
12. H. Yang, F. Zhang, A. Zimmerman, **D. A. Nichols**, E. Berti, and Y. Chen, "Branching of quasinormal modes for nearly extremal Kerr black holes," Phys. Rev. D **87**, 041502 (2013), arXiv:1212.3271 [gr-qc]
11. **D. A. Nichols**, A. Zimmerman, Y. Chen, G. Lovelace, K. D. Matthews, R. Owen, F. Zhang, and K. S. Thorne, "Visualizing Spacetime Curvature via Frame-Drag Vortexes and Tidal Tendexes III. Quasinormal Pulsations of Schwarzschild and Kerr Black Holes," Phys. Rev. D **86**, 104028 (2012), arXiv:1208.3038 [gr-qc]
10. F. Zhang, A. Zimmerman, **D. A. Nichols**, Y. Chen, G. Lovelace, K. D. Matthews, R. Owen, and K. S. Thorne, "Visualizing Spacetime Curvature via Frame-Drag Vortexes and Tidal Tendexes II. Stationary Black Holes," Phys. Rev. D **86**, 084049 (2012), arXiv:1208.3034 [gr-qc]
9. H. Yang, **D. A. Nichols**, F. Zhang, A. Zimmerman, Z. Zhang, and Y. Chen, "Quasinormal-mode spectrum of Kerr black holes and its geometric interpretation," Phys. Rev. D **86**, 104006 (2012), arXiv:1207.4253 [gr-qc]
8. **D. A. Nichols** and Y. Chen, "Hybrid method for understanding black-hole mergers: Inspiralling case," Phys. Rev. D **85**, 044035 (2012), arXiv:1109.0081 [gr-qc]
7. **D. A. Nichols**., R. Owen, F. Zhang, A. Zimmermann, J. Brink, Y. Chen, G. Lovelace, K. D. Matthews, M. A. Scheel, and K. S. Thorne, "Visualizing Spacetime Curvature via Frame-Drag Vortexes and Tidal Tendexes I. General Theory and Weak-Gravity Applications," Phys. Rev. D **84**, 124014 (2011), arXiv:1108.5486 [gr-qc]
6. A. Zimmerman, **D. A. Nichols**, and F. Zhang, "Classifying the Isolated Zeros of Asymptotic Gravitational Radiation by Tendex and Vortex Lines," Phys. Rev. D **84**, 044037 (2011), arXiv:1107.2959 [gr-qc]
5. R. Owen, J. Brink, Y. Chen, J. D. Kaplan, G. Lovelace, K. D. Matthews, **D. A. Nichols**, M. A. Scheel, F. Zhang, A. Zimmerman, and K. S. Thorne, "Frame-Dragging Vortexes and Tidal Tendexes Attached to Colliding Black Holes: Visualizing the Curvature of Spacetime," Phys. Rev. Lett. **106**, 151101 (2011), arXiv:1012.4869 [gr-qc]
4. **D. A. Nichols** and Y. Chen, "A hybrid method for understanding black-hole mergers: head-on case," Phys. Rev. D **82**, 104020 (2010), arXiv:1007.2024 [gr-qc]
3. G. Lovelace, Y. Chen, M. Cohen, J. D. Kaplan, D. Keppel, K. D. Matthews, **D. A. Nichols**,

M. A. Scheel, and U. Sperhake, "Momentum flow in black-hole binaries. II. Numerical simulations of equal-mass, head-on mergers with antiparallel spins," Phys. Rev. D **82**, 064031 (2010), arXiv:0907.0869 [gr-qc]

2. D. Keppel, **D. A. Nichols**, Y. Chen, and K. S. Thorne, "Momentum Flow in Black Hole Binaries. I. Post-Newtonian Analysis of the Inspiral and Spin-Induced Bobbing," Phys. Rev. D **80**, 124015 (2009), arXiv:0902.4077 [gr-qc]
1. J. D. Kaplan, **D. A. Nichols**, and K. S. Thorne, "Post-Newtonian Approximation in Maxwell-Like Form," Phys. Rev. D **80**, 124014 (2009), arXiv:0808.2510 [gr-qc]

Papers and Pre-prints as Part of Scientific Collaborations

71. R. Abbott *et al.* (LIGO Scientific, Virgo), "Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO-Virgo Run O3a," Astrophys. J. **915**, 86 (2021), arXiv:2010.14550 [astro-ph.HE]
70. R. Abbott *et al.* (LIGO Scientific, Virgo), "Properties and Astrophysical Implications of the 150 $M_\odot$ Binary Black Hole Merger GW190521," Astrophys. J. **900**, L13 (2020), arXiv:2009.01190 [astro-ph.HE]
69. R. Abbott *et al.* (LIGO Scientific, Virgo), "GW190521: A Binary Black Hole Merger with a Total Mass of 150 M$\odot$," Phys. Rev. Lett. **125**, 101102 (2020), arXiv:2009.01075 [gr-qc]
68. R. Abbott *et al.* (LIGO Scientific, Virgo), "GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object," Astrophys. J. Lett. **896**, L44 (2020), arXiv:2006.12611 [astro-ph.HE]
67. R. Abbott *et al.* (LIGO Scientific, Virgo), "GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses," Phys. Rev. D **102**, 043015 (2020), arXiv:2004.08342 [astro-ph.HE]
66. J. Broderick *et al.*, "LOFAR 144-MHz follow-up observations of GW170817," Mon. Not. Roy. Astron. Soc. **494**, 5110 (2020), arXiv:2004.01726 [astro-ph.HE]
65. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW190425: Observation of a Compact Binary Coalescence with Total Mass $\sim 3.4 M_\odot$," Astrophys. J. Lett. **892**, L3 (2020), arXiv:2001.01761 [astro-ph.HE]
64. R. Hamburg *et al.* (Fermi Gamma-ray Burst Monitor Team, LIGO Scientific, Virgo), "A Joint Fermi-GBM and LIGO/Virgo Analysis of Compact Binary Mergers From the First and Second Gravitational-wave Observing Runs," Astrophys. J. **893**, 100 (2020), arXiv:2001.00923 [astro-ph.HE]
63. F. Acernese *et al.* (Virgo), "The advanced Virgo longitudinal control system for the O2 observing run," Astropart. Phys. **116**, 102386 (2020)
62. F. Acernese *et al.* (Virgo), "Increasing the Astrophysical Reach of the Advanced Virgo Detector via the Application of Squeezed Vacuum States of Light," Phys. Rev. Lett. **123**, 231108 (2019)
61. R. Abbott *et al.* (LIGO Scientific, Virgo), "Open data from the first and second observing runs of Advanced LIGO and Advanced Virgo," SoftwareX **13**, 100658 (2021), arXiv:1912.11716 [gr-qc]
60. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "A guide to LIGO-Virgo detector noise and extraction of transient gravitational-wave signals," Classical Quantum Gravity **37**, 055002 (2020), arXiv:1908.11170 [gr-qc]
59. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "A gravitational-wave measurement of the Hubble constant following the second observing run of Advanced LIGO and Virgo," Astrophys. J. **909**, 218 (2021), arXiv:1908.06060 [astro-ph.CO]

58. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "An Optically Targeted Search for Gravitational Waves emitted by Core-Collapse Supernovae during the First and Second Observing Runs of Advanced LIGO and Advanced Virgo," Phys. Rev. D **101**, 084002 (2020), arXiv:1908.03584 [astro-ph.HE]
57. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Model comparison from LIGO-Virgo data on GW170817's binary components and consequences for the merger remnant," Classical Quantum Gravity **37**, 045006 (2020), arXiv:1908.01012 [gr-qc]
56. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for Eccentric Binary Black Hole Mergers with Advanced LIGO and Advanced Virgo during their First and Second Observing Runs," Astrophys. J. **883**, 149 (2019), arXiv:1907.09384 [astro-ph.HE]
55. B. P. Abbott *et al.* (LIGO Scientific, Virgo, IPN), "Search for gravitational-wave signals associated with gamma-ray bursts during the second observing run of Advanced LIGO and Advanced Virgo," Astrophys. J. **886**, 75 (2019), arXiv:1907.01443 [astro-ph.HE]
54. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for gravitational waves from Scorpius X-1 in the second Advanced LIGO observing run with an improved hidden Markov model," Phys. Rev. D **100**, 122002 (2019), arXiv:1906.12040 [gr-qc]
53. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for intermediate mass black hole binaries in the first and second observing runs of the Advanced LIGO and Virgo network," Phys. Rev. D **100**, 064064 (2019), arXiv:1906.08000 [gr-qc]
52. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "All-sky search for short gravitational-wave bursts in the second Advanced LIGO and Advanced Virgo run," Phys. Rev. D **100**, 024017 (2019), arXiv:1905.03457 [gr-qc]
51. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for sub-solar mass ultracompact binaries in Advanced LIGO's second observing run," Phys. Rev. Lett. **123**, 161102 (2019), arXiv:1904.08976 [astro-ph.CO]
50. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "All-sky search for long-duration gravitational-wave transients in the second Advanced LIGO observing run," Phys. Rev. D **99**, 104033 (2019), arXiv:1903.12015 [gr-qc]
49. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Directional limits on persistent gravitational waves using data from Advanced LIGO's first two observing runs," Phys. Rev. D **100**, 062001 (2019), arXiv:1903.08844 [gr-qc]
48. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Tests of General Relativity with the Binary Black Hole Signals from the LIGO-Virgo Catalog GWTC-1," Phys. Rev. D **100**, 104036 (2019), arXiv:1903.04467 [gr-qc]
47. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "A search for the isotropic stochastic background using data from Advanced LIGO's second observing run," Phys. Rev. D **100**, 061101 (2019), arXiv:1903.02886 [gr-qc]
46. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO O2 data," Phys. Rev. D **100**, 024004 (2019), arXiv:1903.01901 [astro-ph.HE]
45. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Searches for Gravitational Waves from Known Pulsars at Two Harmonics in 2015-2017 LIGO Data," Astrophys. J. **879**, 10 (2019), arXiv:1902.08507 [astro-ph.HE]
44. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Narrow-band search for gravitational waves from known pulsars using the second LIGO observing run," Phys. Rev. D **99**, 122002 (2019), arXiv:1902.08442 [gr-qc]
43. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for Transient Gravitational-wave Signals Associated with Magnetar Bursts during Advanced LIGO's Second Observing Run,"

Astrophys. J. **874**, 163 (2019), arXiv:1902.01557 [astro-ph.HE]

42. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Low-latency Gravitational-wave Alerts for Multimessenger Astronomy during the Second Advanced LIGO and Virgo Observing Run," Astrophys. J. **875**, 161 (2019), arXiv:1901.03310 [astro-ph.HE]
41. M. Soares-Santos *et al.* (DES, LIGO Scientific, Virgo), "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," Astrophys. J. **876**, L7 (2019), arXiv:1901.01540 [astro-ph.CO]
40. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Searches for Continuous Gravitational Waves from 15 Supernova Remnants and Fomalhaut b with Advanced LIGO," Astrophys. J. **875**, 122 (2019), arXiv:1812.11656 [astro-ph.HE]
39. F. Acernese *et al.* (Virgo), "Status of Advanced Virgo," *Proceedings, 6th International Conference on New Frontiers in Physics (ICNFP 2017): Crete, Greece, August 17-29, 2017*, EPJ Web Conf. **182**, 02003 (2018)
38. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs," Phys. Rev. X **9**, 031040 (2019), arXiv:1811.12907 [astro-ph.HE]
37. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo," Astrophys. J. **882**, L24 (2019), arXiv:1811.12940 [astro-ph.HE]
36. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Tests of General Relativity with GW170817," Phys. Rev. Lett. **123**, 011102 (2019), arXiv:1811.00364 [gr-qc]
35. A. Albert *et al.* (ANTARES, IceCube, LIGO Scientific, Virgo), "Search for Multi-messenger Sources of Gravitational Waves and High-energy Neutrinos with Advanced LIGO during its first Observing Run, ANTARES and IceCube," Astrophys. J. **870**, 134 (2019), arXiv:1810.10693 [astro-ph.HE]
34. E. Burns *et al.* (Fermi Gamma-ray Burst Monitor Team, LIGO Scientific, Virgo), "A Fermi Gamma-ray Burst Monitor Search for Electromagnetic Signals Coincident with Gravitational-Wave Candidates in Advanced LIGO's First Observing Run," Astrophys. J. **871**, 90 (2019), arXiv:1810.02764 [astro-ph.HE]
33. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for gravitational waves from a long-lived remnant of the binary neutron star merger GW170817," Astrophys. J. **875**, 160 (2019), arXiv:1810.02581 [gr-qc]
32. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Constraining the p-mode–g-mode tidal instability with GW170817," Phys. Rev. Lett. **122**, 061104 (2019), arXiv:1808.08676 [astro-ph.HE]
31. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for sub-solar mass ultracompact binaries in Advanced LIGO's first observing run," Phys. Rev. Lett. **121**, 231103 (2018), arXiv:1808.04771 [astro-ph.CO]
30. F. Acernese *et al.* (Virgo), "Calibration of Advanced Virgo and Reconstruction of the Gravitational Wave Signal h(t) during the Science Run O2," Classical Quantum Gravity **35**, 205004 (2018), arXiv:1807.03275 [gr-qc]
29. L. Barack *et al.* (GWverse), "Black holes, gravitational waves and fundamental physics: a roadmap," Classical Quantum Gravity **36**, 143001 (2019), arXiv:1806.05195 [gr-qc]
28. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Properties of the binary neutron star merger GW170817," Phys. Rev. X **9**, 011001 (2019), arXiv:1805.11579 [gr-qc]
27. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW170817: Measurements of neutron star radii and equation of state," Phys. Rev. Lett. **121**, 161101 (2018), arXiv:1805.11581 [gr-qc]
26. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "A Search for Tensor, Vector, and Scalar Po-

larizations in the Stochastic Gravitational-Wave Background," Phys. Rev. Lett. **120**, 201102 (2018), arXiv:1802.10194 [gr-qc]

25. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Full Band All-sky Search for Periodic Gravitational Waves in the O1 LIGO Data," Phys. Rev. D **97**, 102003 (2018), arXiv:1802.05241 [gr-qc]
24. F. Acernese *et al.* (Virgo), "Status of the Advanced Virgo Gravitational Wave Detector," in *Proceedings, International Conference on Cosmology, Gravitational Waves and Particles: Singapore, Singapore, February 6-10, 2017* (2018) pp. 1–12
23. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Constraints on cosmic strings using data from the first Advanced LIGO observing run," Phys. Rev. D **97**, 102002 (2018), arXiv:1712.01168 [gr-qc]
22. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW170608: Observation of a 19-solar-mass Binary Black Hole Coalescence," Astrophys. J. **851**, L35 (2017), arXiv:1711.05578 [astro-ph.HE]
21. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for post-merger gravitational waves from the remnant of the binary neutron star merger GW170817," Astrophys. J. **851**, L16 (2017), arXiv:1710.09320 [astro-ph.HE]
20. M. M. Kasliwal *et al.* (GROWTH), "Illuminating Gravitational Waves: A Concordant Picture of Photons from a Neutron Star Merger," Science **358**, 1579 (2017), arXiv:1710.05436 [astro-ph.HE]
19. G. Hallinan *et al.* (GROWTH), "A Radio Counterpart to a Neutron Star Merger," Science **358**, 1559 (2017), arXiv:1710.05435 [astro-ph.HE]
18. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral," Phys. Rev. Lett. **119**, 161101 (2017), arXiv:1710.05832 [gr-qc]
17. B. P. Abbott *et al.* (LIGO Scientific, Virgo, GROND, SALT Group, OzGrav, DFN, INTEGRAL, Insight-Hxmt, MAXI Team, Fermi-LAT, J-GEM, RATIR, ATLAS, IceCube, CAASTRO, LWA, ePESSTO, GRAWITA, RIMAS, SKA South Africa/MeerKAT, H.E.S.S., 1M2H Team, IKI-GW Follow-up, Fermi GBM, Pi of Sky, DWF (Deeper Wider Faster Program), Dark Energy Survey, MASTER, AstroSat Cadmium Zinc Telluride Imager Team, Swift, Pierre Auger, ASKAP, VINROUGE, JAGWAR, Chandra Team at McGill University, TTU-NRAO, GROWTH, AGILE Team, MWA, ATCA, AST3, TOROS, Pan-STARRS, NuSTAR, BOOTES, CaltechNRAO, High Time Resolution Universe Survey, Nordic Optical Telescope, Las Cumbres Observatory Group, TZAC Consortium, LOFAR, IPN, DLT40, Texas Tech University, HAWC, ANTARES, KU, Dark Energy Camera GW-EM, CALET, Euro VLBI Team, ALMA), "Multi-messenger Observations of a Binary Neutron Star Merger," Astrophys. J. **848**, L12 (2017), arXiv:1710.05833 [astro-ph.HE]
16. B. P. Abbott *et al.* (LIGO Scientific, Virgo, Fermi-GBM, INTEGRAL), "Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A," Astrophys. J. **848**, L13 (2017), arXiv:1710.05834 [astro-ph.HE]
15. B. P. Abbott *et al.* (LIGO Scientific, Virgo, VINROUGE, Las Cumbres Observatory, DLT40, 1M2H, MASTER, Dark Energy Camera GW-EM), "A gravitational-wave standard siren measurement of the Hubble constant," Nature **551**, 85 (2017), arXiv:1710.05835 [astro-ph.CO]
14. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817," Astrophys. J. **850**, L39 (2017), arXiv:1710.05836 [astro-ph.HE]
13. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW170817: Implications for the Stochastic Gravitational-Wave Background from Compact Binary Coalescences," Phys. Rev. Lett. **120**,

091101 (2018), arXiv:1710.05837 [gr-qc]

12. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "On the Progenitor of Binary Neutron Star Merger GW170817," Astrophys. J. **850**, L40 (2017), arXiv:1710.05838 [astro-ph.HE]
11. A. Albert *et al.* (ANTARES, IceCube, Pierre Auger, LIGO Scientific, Virgo), "Search for High-energy Neutrinos from Binary Neutron Star Merger GW170817 with ANTARES, IceCube, and the Pierre Auger Observatory," Astrophys. J. **850**, L35 (2017), arXiv:1710.05839 [astro-ph.HE]
10. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "First narrow-band search for continuous gravitational waves from known pulsars in advanced detector data," Phys. Rev. D **96**, 122006 (2017), arXiv:1710.02327 [gr-qc]
9. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence," Phys. Rev. Lett. **119**, 141101 (2017), arXiv:1709.09660 [gr-qc]
8. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "First search for nontensorial gravitational waves from known pulsars," Phys. Rev. Lett. **120**, 031104 (2018), arXiv:1709.09203 [gr-qc]
7. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "First low-frequency Einstein@Home all-sky search for continuous gravitational waves in Advanced LIGO data," Phys. Rev. D **96**, 122004 (2017), arXiv:1707.02669 [gr-qc]
6. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "All-sky Search for Periodic Gravitational Waves in the O1 LIGO Data," Phys. Rev. D **96**, 062002 (2017), arXiv:1707.02667 [gr-qc]
5. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Upper Limits on Gravitational Waves from Scorpius X-1 from a Model-Based Cross-Correlation Search in Advanced LIGO Data," Astrophys. J. **847**, 47 (2017), arXiv:1706.03119 [astro-ph.HE]
4. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2," Phys. Rev. Lett. **118**, 221101 (2017), arXiv:1706.01812 [gr-qc]
3. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for intermediate mass black hole binaries in the first observing run of Advanced LIGO," Phys. Rev. D **96**, 022001 (2017), arXiv:1704.04628 [gr-qc]
2. B. P. Abbott *et al.* (LIGO Scientific, Virgo), "Search for gravitational waves from Scorpius X-1 in the first Advanced LIGO observing run with a hidden Markov model," Phys. Rev. D **95**, 122003 (2017), arXiv:1704.03719 [gr-qc]
1. F. Acernese *et al.* (Virgo), "Status of the Advanced Virgo gravitational wave detector," Int. J. Mod. Phys. A **32**, 1744003 (2017)

Short-Author-List, Non-Peer-Reviewed Articles

3. G. Compère and **D. A. Nichols**, "Classical and Quantized General-Relativistic Angular Momentum," (2021), arXiv:2103.17103 [gr-qc]
2. A. Zimmerman, H. Yang, F. Zhang, **D. A. Nichols**, E. Berti, and Y. Chen, "Reply to 'On the branching of quasinormal resonances of near-extremal Kerr black holes' by Shahar Hod," (2015), arXiv:1510.08159 [gr-qc]
1. **D. A. Nichols**, "Frontiers of Neutron Star Astrophysics," in *Matters of Gravity, The Newsletter of the Topical Group on Gravitation of the American Physical Society*, Vol. 44, edited by D. Garfinkle (2014) arXiv:1412.8368 [gr-qc]

Ph.D. Thesis

1. **D. A. Nichols**, *Visualizing, approximating, and understanding black-hole binaries*, Ph.D.

thesis, Caltech (2012)

Talks and Conference Sessions Chaired

Invited Talks

24. **Celestical Amplitudes Workshop, Discussion Panel**, *09/2021*, Online
“Observing gravitational-wave memory effects and the infrared triangle.”
23. **Lyon/Marseille Summer School**, *06/2021*, Online
“Gravitational waves: Testing classical (and quantum?) gravity.”
22. **Perimeter Institute Strong Gravity Seminar**, *04/2021*, Online
“Gravitational-wave memory effects from binary-black-hole mergers.”
21. **Harvard Black-Hole Initiative Colloquium**, *12/2020*, Online
“Gravitational-wave memory effects from binary-black-hole mergers.”
20. **Athena Multimessenger Synergy Workshop**, *05/2020*, Online
“Multimessenger observations with future gravitational-wave observatories.”
19. **Virginia Tech Neutrino Physics Seminar**, *10/2019*, Blacksburg, VA, USA
“Gravitational-wave memory effects from binary-black-hole mergers.”
18. **Birmingham University Astrophysics Seminar**, *05/2019*, Birmingham, UK
“Computing and detecting gravitational-wave memory effects from binary black holes.”
17. **University of Virginia Physics Colloquium**, *02/2019*, Charlottesville, VA, USA
“Gravitational waves and fundamental properties of matter and spacetime.”
16. **University of Mississippi Physics Colloquium**, *02/2019*, Oxford, MS, USA
“Gravitational waves and fundamental properties of matter and spacetime.”
15. **Southern Methodist University Physics Seminar**, *02/2019*, Dallas, TX, USA
“Gravitational waves and fundamental properties of matter and spacetime.”
14. **Athena Multimessenger Workshop**, *11/2018*, Alicante, Spain
“Prospects for multimessenger observations with future gravitational-wave observatories.”
13. **MITP Sound of Spacetime Workshop**, *06/2018*, Mainz, Germany
“Gravitational-wave memory effects: Observables and prospects for measurement.”
12. **ULB Solvay Workshop, Infrared Physics**, *05/2018*, Brussels, Belgium
“Gravitational-wave memory effects: Observables and prospects for measurement.”
11. **Perimeter Institute, Strong-Gravity Seminar**, *02/2018*, Waterloo, Canada
“Gravitational waves: Exploring the strongly curved side of the Universe.”
10. **University of Guelph, Physics Colloquium**, *02/2018*, Guelph, Canada
“Gravitational waves: Exploring the strongly curved side of the Universe.”
9. **Jena University, Quantum & Gravitational Fields Seminar**, *01/2018*, Jena, Germany
“Spin memory effect and charges of the extended BMS algebra.”
8. **Nikhef, PAX Workshop**, *08/2017*, Amsterdam, Netherlands
“Gravitational-wave memory effects: Testing general relativity by measuring non-oscillatory gravitational waves from binary black holes.”
7. **Nordita, Physics of Extreme-Gravity Stars**, *06/2017*, Stockholm, Sweden
“Testing general relativity with the LIGO observations of binary black holes.”
6. **AEI Postdam, Astrophysical Relativity Seminar**, *12/2016*, Postdam, Germany
“Gravitational-wave memory observables and charges of the extended BMS algebra”
5. **University of Southampton Gravity Seminar**, *11/2016*, Southampton, UK
“Gravitational-wave memory observables and charges of the extended BMS algebra”

4. **NPCSM Workshop, YITP, Kyoto University**, *11/2016*, Kyoto, Japan
"Gravitational-wave memory observables and charges of the extended BMS algebra"
3. **Kavli IPMU, Mathematics–String-Theory Seminar**, *10/2016*, Tokyo, Japan
"Gravitational-wave memory observables and charges of the extended BMS algebra"
2. **Radboud IMAPP Quantum Gravity Seminar**, *10/2016*, Nijmegen, Netherlands
"Gravitational-wave memory observables and charges of the extended BMS algebra"
1. **Claremont Colleges Mathematics Colloquium**, *02/2011*, Claremont, CA, USA
"Black-Hole Binaries: Observing, Visualizing, and Understanding Strongly Curved, Dynamical Spacetime"

Contributed Talks

20. **APS April Meeting**, *04/2021*, Online
"Effects of dynamical dark-matter distributions on intermediate mass-ratio inspirals (IMRIs)."
19. **LISA Symposium XIII**, *09/2020*, Online
"Effects of dynamical dark-matter distributions on IMRI and EMRI systems."
18. **American Physical Society April Meeting**, *04/2020*, Online
"Forecasts for detecting the gravitational-wave memory effect with Advanced LIGO and Virgo."
17. **GWverse Global Meeting**, *01/2018*, Valetta, Malta
"Gravitational-wave spin memory effect for compact binaries."
16. **Physics of Extreme-Gravity Stars**, *06/2017*, Stockholm, Sweden
"Gravitational-wave displacement and spin memory effects."
15. **6$^{\text{th}}$ Dutch-Belgian GW Meeting**, *03/2017*, Leuven, Belgium
"Spin memory effect for compact binaries"
14. **GrAMPa Workshop**, *08/2016*, Paris, France
"Gravitational-wave memory observables"
13. **GR21 Meeting**, *07/2016*, New York City, NY, USA
"Conserved charges of the extended Bondi-Metzner-Sachs algebra"
12. **American Physical Society April Meeting**, *04/2016*, Salt Lake City, UT, USA
"Methods for measuring and transporting angular momentum in general relativity"
11. **Eastern Gravity Meeting**, *05/2015*, Rochester, NY, USA
"Subleading gravitational-wave memory effects"
10. **Eastern Gravity Meeting**, *05/2014*, Morgantown, WV, USA
"Ambiguity in angular momentum and its relationship to gravitational-wave memory"
9. **American Physical Society April Meeting**, *04/2014*, Savannah, GA, USA
"Ambiguity in angular momentum and its relationship to gravitational-wave memory"
8. **American Physical Society April Meeting**, *04/2012*, Atlanta, GA, USA
"Tendex and Vortex Lines of Perturbed Schwarzschild and Kerr Black Holes"
7. **Pacific Coast Gravity Meeting**, *03/2012*, Santa Barbara, CA, USA
"Tendex and Vortex Lines of Black-Hole Spacetimes"
6. **American Physical Society April Meeting**, *04/2011*, Anaheim, CA, USA
"Vortex and Tendex Lines in Post-Newtonian and Black-Hole Perturbation Spacetimes"
5. **Pacific Coast Gravity Meeting**, *03/2011*, Pasadena, CA, USA
"Vortex and Tendex Lines in Post-Newtonian and Black-Hole Perturbation Spacetimes"
4. **Pacific Coast Gravity Meeting**, *03/2010*, San Diego, CA, USA
"A Hybrid Approximation Technique for Head-on Black-Hole-Binary Mergers"
3. **American Physical Society April Meeting**, *02/2010*, Washington DC, USA

"A Hybrid Approximation Technique for Head-on Binary-Black-Hole Mergers"

2. **American Physical Society April Meeting**, *05/2009*, Denver, CO, USA
"Momentum Flow in Inspiraling Binary Black Holes"
1. **Pacific Coast Gravity Meeting**, *03/2009*, Eugene, OR, USA
"Momentum Flow in Black-Hole Binaries: Post-Newtonian Approximation"

Sessions Chaired

4. **American Physical Society April Meeting**, *04/2021*, Online
"Session T17: Topics in Classical General Relativity"
3. **2017 Dutch Astronomy Conference**, *05/2017*, Nijmegen, Netherlands
"Plenary Session 6"
2. **Fall 2016 NOVA NW3 Meeting**, *09/2016*, Nijmegen, Netherlands
"Session 1: Compact Objects"
1. **American Physical Society April Meeting**, *04/2016*, Salt Lake City, UT, USA
"Session X18: Dynamics and Observables of Curved Spacetime"

Outreach Talks

5. **Radboud Huygens Colloquium**, *10/2017*, Nijmegen, Netherlands
"The discovery of a binary neutron star merger"
4. **ICMS Nobel Prizes 2017 Evening**, *10/2017*, Eindhoven, Netherlands
"The 2017 Nobel Prize in Physics"
3. **Cornell Astro REU Gravitational Waves Workshop**, *06/2015*, Ithaca, NY, USA
"Detecting Gravitational Waves with Laser Interferometry"
2. **Cornell Astro REU Gravitational Waves Workshop**, *07/2014*, Ithaca, NY, USA
"Detecting Gravitational Waves with Laser Interferometry"
1. **Cornell Astro REU Gravitational Waves Workshop**, *07/2013*, Ithaca, NY, USA
"Detecting Gravitational Waves with Laser Interferometry"

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