

# Sean T. McWilliams

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RESEARCH INTERESTS	Numerical relativity in vacuum and with matter Gravitational-wave signal and population modeling of compact binaries including their electromagnetic counterparts for Advanced LIGO, NANOGrav, and LISA Astronomical inference from gravitational-wave observations, including constraints on galaxy evolution, black hole populations at all scales, neutron star equation-of-state, and cosmology	
EDUCATION	<b>University of Maryland</b> , College Park, MD Ph. D. in Physics <span style="float: right;">Spring 2008</span> M. S. in Physics <span style="float: right;">Spring 2006</span> – Dissertation Topic: “Applying Numerical Relativity to Gravitational Wave Astronomy” – Advisor: Joan M. Centrella  <b>Pennsylvania State University</b> , University Park, PA B. S. in Physics and B. S. in Astronomy/Astrophysics, with honors <span style="float: right;">Spring 2003</span> Minors in Mathematics, Astrobiology, and Philosophy – Thesis Topic: “Detection of gravitational wave emission from coalescing black hole binaries” – Advisor: Pablo Laguna	
ACADEMIC HONORS	<b>Professional:</b> – NSF CAREER grant recipient <span style="float: right;">Fall 2019</span> – Outstanding Researcher Award, Eberly College, (2 recipients, 417 faculty in College) <span style="float: right;">Spring 2018</span> – Commencement Speaker, West Virginia University <span style="float: right;">Fall 2016</span> – Breakthrough Prize in Fundamental Physics (as part of the LIGO Collaboration) <span style="float: right;">Spring 2016</span> – Gruber Cosmology Prize (as part of the LIGO Collaboration) <span style="float: right;">Spring 2016</span> – The State Journal’s Generation Next: 40 Under 40 <span style="float: right;">Spring 2016</span> – Kavli Institute for Theoretical Physics (KITP) Scholar <span style="float: right;">2016 – 2018</span> – WVU Presidential Award for Excellence in Collaborative Research <span style="float: right;">Fall 2015</span>  <b>Graduate:</b> – Gravitational Wave International Committee Thesis Prize, Honorable Mention <span style="float: right;">Fall 2008</span> – University Senator <span style="float: right;">Fall 2007–Spring 2008</span> – Leon A. Herreid Fellowship <span style="float: right;">Fall 2005–Spring 2008</span> – NASA Lab for High Energy Astrophysics Fellowship <span style="float: right;">Fall 2003–Spring 2005</span>  <b>Undergraduate:</b> – Schreyer Honors Scholarship <span style="float: right;">Fall 1999–Spring 2003</span> – John Teas Scholarship <span style="float: right;">Fall 2001–Spring 2003</span> – Dean’s List <span style="float: right;">Spring 2000–Spring 2003</span> – Phi Beta Kappa National Honors Society <span style="float: right;">inducted Spring 2003</span>	
CURRENT AFFILIATIONS	American Astronomical Society American Physical Society LIGO Scientific Collaboration NANOGrav Collaboration NASA LISA Study Team	
PUBLICATION SUMMARY	144 accepted publications, 12 white papers, h-index = 65, 28482 citations. 1 review article published in <i>Class. Quant. Grav.</i> , 1 in preparation for <i>Phys. Rept.</i> 3 single author papers in <i>Phys. Rev. Lett.</i> , most recent (2019) was an Editor’s Suggestion and was also featured in <i>Science</i> A full list of publications is available at the end of this CV.	

CURRENT  
APPOINTMENTS

**Assistant Professor** Fall 2013–Present  
Department of Physics and Astronomy, West Virginia University, Morgantown, WV

- Lead a research group (currently one postdoctoral researcher, five graduate students, one undergraduate student) studying a variety of topics in theoretical astrophysics, with a particular focus on gravitational-wave astrophysics
- Lead a broad research focus (spanning six faculty members at two Universities and their postdoctoral scholars and students) as part of the West Virginia EPSCoR-funded Center for Gravitational Waves and Cosmology, focusing on the detection and characterization of compact binaries at all mass scales, through both gravitational-wave and electromagnetic emission
- Taught introductory Physics for non-majors (PHYS 101), junior-level classical mechanics for majors (PHYS 331), and graduate general relativity (ASTR 704), responsible for teaching two courses from the undergraduate and graduate curriculum in Physics and Astronomy each academic year

**Adjunct Associate Astronomer** Fall 2015–Present  
National Radio Astronomical Observatory

**Adjunct Assistant Scientist** Spring 2016–Present  
Green Bank Observatory, Green Bank, WV

- Perform radio observations with the Arecibo and Green Bank Telescopes, primarily of pulsars and other compact-object emission
- Supervise student projects and participate in NRAO EPO activities

PRIOR  
EMPLOYMENT

**Postdoctoral Fellow** Fall 2011–Spring 2013  
Department of Physics, Princeton University, Princeton, NJ  
Institute for Strings, Cosmology, and Astroparticle Physics, Columbia University, New York, NY

- Joint long-term fellowship. Developed magnetohydrodynamic capabilities in numerical relativity code and performed simulations including matter
- Applied results to source modeling (both gravitational waves and electromagnetic counterparts) and data analysis of simulated gravitational wave observations with LIGO, LISA, and NANOGrav

**NASA Postdoctoral Fellow** Fall 2008–Spring 2010  
NASA Goddard Space Flight Center, Greenbelt, MD

- Utilized numerical relativity code `Hahndol` to study black-hole binaries and develop waveform models
- Developed parameter estimation code `CalcFisher` to perform parameter estimation studies of space-based gravitational-wave observatories, including the relevant source physics, detector response and orbit, and noise characteristics

CURRENT  
GRANTS

**NSF CAREER grant 1945130**, 2020–2025

- PI
- Funding salary for one graduate student to work with McWilliams to make dramatic improvements to how we model generically spinning binaries, by extending the existing Effective One-Body (EOB) approach to exhibit an evolving background that naturally transitions to McWilliams’s newly developed Backwards One-Body (BOB) merger model, and evolving the system in a way that should yield enormous efficiency improvements
- Funding for a new gravity-themed massive outreach event that includes and builds on “Celebrating Einstein”, including the performance of a new stage play written by McWilliams
- \$400000 total award, including funding for PI and graduate student salaries

**NSF grant 1912497**, 2019–2021

- PI
- Funding salary for one graduate student to work with McWilliams to create a new waveform model for binaries with aligned spins, by improving an existing inspiral model and combining it with the BOB model
- \$100000 total award, including funding for PI and graduate student salaries

**NSF grant 1607405, 2016–2019**

- Co-PI
- Funding salary for one graduate student to work with McWilliams optimizing the most accurate waveform model for generically spinning binaries
- \$99020 total award, including funding for PI and graduate student salaries

**NSF Experimental Program for Stimulating Competitive Research (EPSCoR), 2015–2020**

- Senior Personnel (NB: official PI is Jan Taylor, Director of the Division of Science and Research, West Virginia Higher Education Policy Commission, but McWilliams was the lead author for the gravitational-wave-related content within the proposal)
- Research Focus Leader for “Gravitational wave signals and source populations”
- EPSCoR grant awarded to establish a Center for Gravitational Wave Astrophysics at WVU, including two new tenure lines, two postdoctoral associates, six graduate students, eight undergraduates, and substantial investment in infrastructure, including hardware development, a dedicated data server and additional supercomputing

**NSF Physics Frontiers Center, 2015–2020**

- Senior Personnel
- PFC awarded to support the efforts of the NANOGrav collaboration to detect gravitational waves
- \$14.5 million total award, \$5 million to WVU to support faculty summer salary, salary for one postdoctoral associate and three graduate students, and NANOGrav-dedicated GBT observing

ACADEMIC  
SERVICE

**Producer and Performer for “Celebrating Einstein” at WVU**

Spring 2017

- Wrote the script and narrated the Danced Lecture “A Shout Across Time”
- Conducted live interviews with relativists Shane Larson, Janna Levin, and Richard Price about Einstein, relativity, their own work, and the role of science in our culture
- Produced a month-long series of events, included public lectures by visiting scholars, an Einstein art fair, public readings of works and letters by Albert Einstein, visits by scientists to 12 local schools to talk to classes about Einstein and relativity, and a space-themed Fun Run
- Further details and videos of all events can be found at [einstein.wvu.edu](http://einstein.wvu.edu)

**NASA Physics of the Cosmos (PCOS) Executive Committee**

Fall 2019–Present

- Serve on the Executive Committee overseeing NASA’s efforts in high-energy astrophysics, cosmology, and fundamental physics
- One of two representatives in gravitational-wave astronomy

**NASA L3ST/LISA Study Team**

Spring 2016–Present

- Served on each iteration of the NASA-assembled team of 15 University scientists helping NASA coordinate the US LISA community
- Currently coordinating the community response for LISA to the decadal survey

**LIGO Scientific Collaboration Council Member/Institutional PI**

Spring 2014–Present

- Serve on the governing body for the LIGO Scientific Collaboration
- Principal investigator for the institutional membership of West Virginia University

**Conference/Seminar Organizer**

Fall 2011–Present

- Member of Scientific Organizing Committee for several NANOGrav and International Pulsar Timing Array meetings
- Member of Program Committee, “2nd Annual Meeting of the Mid-Atlantic Section of the American Physical Society”, October 23–October 25, 2015, West Virginia University, Morgantown, WV
- Sole Organizer, “17th annual Eastern Gravity Meeting”, May 16–May 17, 2014, Erickson Alumni Center, West Virginia University, Morgantown, WV
- Principal organizer, “Gravitational Waves Beyond the First Detection”, April 30–May 4, 2012, Princeton Center for Theoretical Science, Princeton University, Princeton, NJ
- Sole Organizer, “Gravity Group Astrophysics/Cosmology Seminar”, Fall 2011–Spring 2013, Princeton University, Princeton, NJ

**Student Advisor/Mentor**

Fall 2009–Present

- Currently serve as research advisor for one postdoctoral fellow (Michal Pirog), five graduate students (Ashok Choudhary, Andrew Kaiser, Tyler Knowles, Siddharth Mahesh, and Patrick Nelson), and one undergraduate student (Kenneth Sible)
- Previously served as research advisor for three postdoctoral associates (Paul Baker [WVU], now Assistant Professor at Widener University, Eliu Huerta [WVU], now Staff Scientist at the NCSA at the University of Illinois at Urbana-Champaign, and Fan Zhang [WVU], now Assistant Professor at Beijing Normal University)
- Previously served as research advisor for two undergraduate students (Trey McNeely [WVU], now a graduate student at Carnegie Mellon University, and Kai-Sheng Tai [Princeton], now a graduate student at Stanford University)

**Referee**

Fall 2008–Present

Astrophys. J., Astrophys. J. Lett., Class. Quant. Grav., Gen. Rel. Grav., MNRAS, Phys. Rev. D, and Phys. Rev. Lett.

**TALKS**

77. “An Analytical Solution for Merging SMBHBs and its Relevance for BWM Modeling”, North American Nanohertz Observatory for Gravitational Waves (NANOGrav) Conference, Cornell University, Ithaca, NY, November 2019
76. “Analytical black-hole binary merger waveforms”, Fundamental Theory Seminar, Pennsylvania State University, University Park, PA, October 2019
75. “Gravitational-wave data analysis, from waveform modeling through parameter estimation”, Frontiers of Gravitational Physics Conference, Princeton University, Princeton, NJ, September 2019
74. “Analytical black-hole binary merger waveforms”, LIGO Scientific Collaboration (LSC) Waveform Working Group, September 2018
73. “Update on LIGO and LISA”, International Pulsar Timing Array (IPTA) Meeting, Albuquerque, NM, June 2018
72. “Supermassive Black-Hole Binary Merger Timescales”, The Astrophysics of Massive Black Hole Mergers: From Galaxy Mergers to the Gravitational Wave Regime, Aspen Center for Physics, Aspen, CO, June 2018
71. “Development of more fundamental black-hole binary merger waveforms”, American Physical Society (APS) April Meeting, Columbus, OH, April 2018
70. “LISA Science Case Review”, NASA LISA Study Team Meeting, NASA Goddard Space Flight Center, Greenbelt, MD, February 2018
69. “Commencement Address”, December Commencement, West Virginia University, Morgantown, WV, December 2016
68. “Dawn of Gravitational Wave Astrophysics”, Nath lecture, Festival of Ideas, Morgantown, WV, November 2016
67. “Dawn of Gravitational Wave Astrophysics”, Public Science Talk and Physics Department Colloquium, James Madison University, Harrisonburg, VA, October 2016
66. “Leveraging science performance to make specific design choices for eLISA”, Laser Interferometer Space Antenna (LISA) 11 Symposium, University of Zurich, Zurich, Switzerland, September 2016
65. “Dawn of Gravitational Wave Astrophysics”, 22nd Annual Coalition for National Science Funding, Washington, DC, April 2016
64. “Direct Observation of Gravitational Waves from a Black-Hole Binary System with Advanced LIGO”, NSF distinguished lecture (co-sponsored by MPS and EPSCoR), Washington, DC, April 2016
63. “The Birth of Observational Gravitational-Wave Astrophysics, and Its Future”, Gravity/Cosmology Seminar, Princeton University, Princeton, NJ, March 2016
62. “Direct Observation of Gravitational Waves from a Black-Hole Binary System with Advanced LIGO”, Coalition of EPSCoR/IDeA States Annual Meeting, Washington, DC, February 2016
61. “Direct Observation of Gravitational Waves from a Black-Hole Binary System with Advanced LIGO”, Physics Colloquium, West Virginia University, February 2016

60. “Assuming there is a dip at low frequencies, should we change our observing strategy?”, NANOGrav Conference, McGill University, Montreal, Canada, October 2015
59. “Implications of PTA limits for the dynamics of galactic centres”, IPTA 2015, Leura, Australia, July 2015
58. “Prospects for detecting supermassive black-hole binaries with pulsar timing arrays”, General Relativity and Gravitation (GRG) Centennial, Pennsylvania State University, University Park, PA, June 2015
57. “Probing the environments of supermassive black-hole binaries with pulsar timing arrays”, Kavli Institute for Cosmological Physics (KICP) Seminar, University of Chicago, Chicago, IL, May 2015
56. “Force-free electrodynamics in dynamical curved spacetime”, APS April Meeting, Hilton Baltimore Inner Harbor Hotel, Baltimore, MD, April 2015
55. “Comparing predictions and measurements of the GW stochastic background”, National Radio Astronomy Observatory (NRAO) Seminar, Green Bank, WV, November 2014
54. “Detecting and characterizing SMBHBs with NANOGrav”, NANOGrav Conference, University of Wisconsin-Milwaukee, Milwaukee, WI, October 2014
53. “Merging Black Holes and Ripples in Spacetime”, Northern Virginia Astronomy Club, George Mason University, Fairfax, VA, August 2014
52. “Comparing predictions and measurements of the GW stochastic background”, IPTA Conference, The Banff Centre, Banff, Alberta, Canada, June 2014
51. “The status of gravitational-wave astronomy”, Gravity/Cosmology Seminar, Princeton University, Princeton, NJ, May 2014
50. “Optimal orbits for eLISA science”, LISA 10 Symposium, Gainesville, FL, May 2014
49. “The status of gravitational-wave astronomy”, Applied Analysis Seminar, Department of Mathematics, West Virginia University, Morgantown, WV, May 2014
48. “Signatures of massive galaxy mergers at  $z < 1$ ”, Astronomy Colloquium, Institute for Advanced Study, Princeton, NJ, May 2014
47. “Prospects for Detecting Stochastic Gravitational Waves from Supermassive Black-Hole Binaries with Pulsar Timing Arrays”, GRITTS Seminar, MIT, Cambridge, MA, March 2014
46. “Predicting the Stochastic Signal from Supermassive Black-Hole Binaries”, NANOGrav Conference, Arecibo Telescope, Arecibo, PR, February 2014
45. “Modeling and Detecting Gravitational Waves from Dynamical Capture Binaries”, Numerical Relativity and Data Analysis (NRDA), Mallorca, Spain, September 2013
44. “Signatures of massive galaxy mergers at  $z < 1$ ”, Frontiers in Cosmology Workshop, Perimeter Institute, Ontario, Canada, July 2013
43. “Gravitational waves and stalled satellites from massive galaxy mergers at  $z < 1$ ”, TAPIR Seminar, Caltech, Pasadena, CA, June 2013
42. “Update on massive galaxy merger rates at  $z < 1$ ”, NANOGrav Conference, Green Bank Telescope, Green Bank, WV, May 2013
41. “The imminent detection of gravitational-waves from massive black-hole binaries by pulsar timing arrays”, Theoretical Astrophysics and General Relativity Forum, University of Illinois at Urbana-Champaign, May 2013
40. “Gravitational waves and stalled satellites from massive galaxy mergers at  $z < 1$ ”, Theoretical Astrophysics Seminar, Johns Hopkins University, Baltimore, MD, March 2013
39. “Gravitational waves and stalled satellites from massive galaxy mergers at  $z < 1$ ”, Astrophysics Colloquium, NASA Goddard Space Flight Center, Greenbelt, MD, March 2013
38. “Binary Systems as Resonance Detectors for Gravitational Waves”, Astronomy Theory Seminar, University of Maryland, College Park, MD, March 2013
37. “Gravitational waves and stalled satellites from massive galaxy mergers at  $z < 1$ ”, Astrophysics Colloquium, Rutgers University, New Brunswick, NJ, February 2013
36. “Gravitational waves from massive galaxy mergers at  $z < 1$ ”, Gravity/Cosmology Seminar, Princeton University, Princeton, NJ, February 2013

35. “Predicting the Stochastic Signal from Supermassive Black-Hole Binaries”, Physical Applications of Millisecond Pulsars, Aspen Center for Physics, Aspen, CO, January 2013
34. “Gravitational-wave astronomy: the promise, the challenges, and the rapid approach of first ‘light’”, Astronomy Colloquium, West Virginia University, Morgantown, WV, December 2012
33. “The imminent detection of gravitational-waves from massive black-hole binaries by pulsar timing arrays”, NANOGrav Conference, Oberlin College, Oberlin, OH, October 2012
32. “Signatures of merger-dominated galaxy evolution at  $z < 1$ ”, Astrophysics Seminar, University of Chicago, Chicago, IL, October 2012
31. “Gravitational Wave and Electromagnetic Observation of Black Hole-Neutron Star Binaries”, CIERA Astrophysics Seminar, CIERA/Northwestern University, Evanston, IL, October 2012
30. “Alternatives to LISA for Gravitational Wave Observation at Low Frequencies”, Astrophysics Seminar, University of Pennsylvania, Philadelphia, PA, October 2012
29. “Alternatives to LISA for Gravitational Wave Observation at Low Frequencies”, Gravity Seminar, Albert Einstein Institute, Potsdam, Germany, August 2012
28. “Gravitational Wave and Electromagnetic Observation of Black Hole-Neutron Star Binaries”, Gravity Seminar, Albert Einstein Institute, Potsdam, Germany, August 2012
27. “Optimizing LISA for cost and science”, LISA 9 Symposium, Paris, France, May 2012
26. “Signatures of merger-dominated galaxy evolution at  $z < 1$ ”, Gravity/Cosmology Seminar, Princeton University, Princeton, NJ, February 2012
25. “Geostationary Antenna for Drag-Free Laser Interferometry (GADFLI)”, Gravitational Wave Mission Concepts Workshop, Columbia, MD, December 2011
24. “Electromagnetic Extraction of Energy from Black Hole-Neutron Star Binaries”, Astroplasmas Seminar, Princeton University, Princeton, NJ, October 2011
23. “Implications of a LISA Redesign for Massive Black-Hole Binary Observations”, Astro-GR, Universitat de les Illes Balears, Palma de Mallorca, September 2011
22. “Gravitational Wave Astronomy: Precision Measurements of Black Holes, Neutron Stars, and the Expanding Universe”, LA-Astro Seminar, Los Alamos National Laboratory, Los Alamos, NM, September 2011
21. “Gravitational Wave Astronomy in the Advanced Detector Era”, Astronomy Colloquium, Institute for Advanced Study, Princeton, NJ, March 2011
20. “Merging Black Holes and Ripples in Space”, Stargazing and Public Lecture Series, Columbia University, New York, NY, January 2011
19. “Gravitational Wave Astronomy with Black Hole Binary Mergers”, Astronomy Colloquium, Columbia University, New York, NY, November 2010
18. “The Status of Black Hole Binary Simulations”, Numerical Relativity and Data Analysis (NRDA) 2010, Perimeter Institute, Ontario, Canada, June 2010
17. “Impact of mergers on black hole binary observation with LISA”, LISA 8 Symposium, Palo Alto, CA, June 2010
16. “Cosmography to  $z \sim 6$  with Coincident Gravitational Wave and Electromagnetic Observations”, Gravity/Cosmology Seminar, Princeton University, Princeton, NJ, March 2010
15. “Cosmography to  $z \sim 6$  with Coincident Gravitational Wave and Electromagnetic Observations”, Institute for Strings, Cosmology, and Astroparticle Physics (ISCAP) Seminar, Columbia University, New York, NY, February 2010
14. “Precision Measurement of Complete Black Hole Binary Inspiral-Merger-Ringdown Signals with LISA”, American Astronomical Society (AAS) Meeting, Washington, DC, January 2010
13. “Applying Numerical Relativity to Gravitational Wave Data Analysis”, Gravitational-Wave and Data Analysis Workshop (GWDAW), Rome, Italy, January 2010
12. “The impact of binary black hole mergers on measurement accuracy with LISA”, 8<sup>th</sup> Edoardo Amaldi Conference, New York, NY, June 2009
11. “Applying Numerical Relativity to Black Hole Binary Observation”, Center for Gravitational-Wave Physics (CGWP) Seminar, Pennsylvania State University, University Park, PA, March 2009

10. “Parameter Estimation of Black-Hole Binary Mergers with LISA”, Stellar and Extragalactic Astronomy Lunch (SEAL) Seminar, NASA Goddard Space Flight Center, Greenbelt, MD, February 2009
9. “Parameter estimation of black hole binary mergers with LISA”, Numerical Relativity and Data Analysis (NRDA) 2008, Rochester, NY, August 2008
8. “Parameter Estimation with LISA”, 37th Committee on Space Research (COSPAR) Scientific Assembly, Montreal, Canada, July 2008
7. “Observing mergers of nonspinning black hole binaries with LISA”, LISA 7 Symposium, Barcelona, Spain, June 2008
6. “Assessing Errors in PN and NR Waveforms”, Post Newton 2008 International Workshop, Jena, June 2008
5. “Applying Numerical Relativity to Gravitational Wave Astronomy Using LISA”, High-Energy Astrophysics Division (HEAD) Conference, Los Angeles, CA, April 2008
4. “Describing Waveforms from Nonspinning Black Hole Binaries”, APS April Meeting, St. Louis, MO, April 2008
3. “Applying Numerical Relativity and EOB to Black Hole Binary Observation”, Institute for Gravitation and the Cosmos (IGC) Inaugural Conference, University Park, PA, August 2007
2. “Applying Numerical Relativity Results to Massive Black Hole Binary Observation”, APS April Meeting, Jacksonville, FL, April 2007
1. “Observing Massive Black Hole Binaries with LISA”, AAS Meeting, Seattle, WA, January 2007

#### PUBLICATIONS

Citations report via Google Scholar as of 9/23/2019:  
h-index = 65, 28484 citations.

NB: All members of the LIGO Scientific Collaboration (LSC) contributing more than half of their overall research effort to LSC-approved tasks are automatically included as coauthors on LSC papers. I therefore designate LSC papers on which I’ve played a more direct role (i. e. developing models that were employed, conducting relevant analyses, or writing portions of text) as **LSC** in bold-face.

SUBMITTED/IN PREPARATION (papers already submitted to a major journal or existing in advanced draft form, only includes short-author list)

150. **Sean T. McWilliams**, “Gravitational-Wave Astronomy: Observing Compact Binary Coalescences at All Scales”, invited review to be published in Physics Reports, Astrophysics Editor: Marc Kamionkowski, estimated publication date: May 2020
149. **Sean T. McWilliams**, “How black holes get their (super)kicks: Understanding spin-induced recoil in merging black-hole binaries”, to be submitted to *Astrophys. J* in January 2020
148. **Sean T. McWilliams**, “Backwards one-body approach to black-hole binary merger dynamics”, to be submitted to *Phys. Rev. D* in January 2020
147. Andrew Kaiser and **Sean T. McWilliams**, “Sensitivity of present and future black-hole binary observations across the entire gravitational-wave band”, to be submitted to *Phys. Rev. D* in December 2019
146. Ashok Choudhary and **Sean T. McWilliams**, “Effect of Black Hole Spins on Christodoulou Memory in Binary Mergers”, to be submitted to *Phys. Rev. D* in December 2019
145. Patrick E. Nelson, Zachariah B. Etienne, **Sean T. McWilliams**, and Viviana Nguyen, “Induced Spins from Scattering Experiments of Initially Nonspinning Black Holes”, submitted to *Phys. Rev. D* in September 2019

#### ACCEPTED TO MAJOR JOURNALS

144. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “All-sky search for short gravitational-wave bursts in the second Advanced LIGO and Advanced Virgo run”, *Phys. Rev. D* 100, 024017 (2019)
143. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Directional limits on persistent gravitational waves using data from Advanced LIGO’s first two observing runs”, *Phys. Rev. D* 100, 062001 (2019)

142. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Search for the isotropic stochastic background using data from Advanced LIGO’s second observing run”, *Phys. Rev. D* 100, 061101 (2019)
141. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO O2 data”, *Phys. Rev. D* 100, 024004 (2019)
140. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Narrow-band search for gravitational waves from known pulsars using the second LIGO observing run”, *Phys. Rev. D* 99, 122002 (2019)
139. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “All-sky search for long-duration gravitational-wave transients in the second Advanced LIGO observing run”, *Phys. Rev. D* 99, 104033 (2019)
138. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Search for transient gravitational wave signals associated with magnetar bursts during Advanced LIGO’s second observing run”, *Astrophys. J.* 874, (2019)
137. M. Soares-Santos *et al.* (DES, LIGO Scientific, and Virgo Collaborations), “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)
136. K. Aggarwal *et al.* (The NANOGrav Collaboration), “The NANOGrav 11-Year Data Set: Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries”, *Astrophys. J.* 880, 116 (2019)
135. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Searches for Gravitational Waves from Known Pulsars at Two Harmonics in 2015-2017 LIGO Data”, *Astrophys. J.* 879, 10 (2019)
134. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Low-Latency Gravitational Wave Alerts for Multi-Messenger Astronomy During the Second Advanced LIGO and Virgo Observing Run”, *Astrophys. J.* 875, 161 (2019)
133. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Searches for Continuous Gravitational Waves from Fifteen Supernova Remnants and Fomalhaut b with Advanced LIGO”, *Astrophys. J.* 875, 122 (2019)
132. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “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)
131. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Tests of General Relativity with GW170817”, *Phys. Rev. Lett.* 123, 011102 (2019)
130. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Search for gravitational waves from a long-lived remnant of the binary neutron star merger GW170817”, *Astrophys. J.* 875, 160 (2019)
129. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Search for transient gravitational wave signals associated with magnetar bursts during Advanced LIGO’s second observing run”, *Astrophys. J.* 874, 163 (2019)
128. E. Burns *et al.* (Fermi Gamma-ray Burst Monitor Team, LSC, and Virgo Collaboration), “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)
127. A. Albert *et al.*, (ANTARES, IceCube, LIGO Scientific, and Virgo Collaborations), “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)
126. **Sean T. McWilliams**, “Analytical Black-Hole Binary Merger Waveforms”, *Phys. Rev. Lett.* 122, 191102 (2019)
125. R. N. Caballero *et al.* (The IPTA Collaboration), “Studying the Solar system with the International Pulsar Timing Array”, *MNRAS* 481, 5 (2018)
124. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Search for sub-solar mass ultracompact binaries in Advanced LIGO’s first observing run”, *Phys. Rev. Lett.* 121, 231103 (2018)
123. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “GW170817: Measurements of Neutron Star Radii and Equation of State”, *Phys. Rev. Lett.* 121, 161101 (2018)
122. T. D. Knowles, C. Devine, D. A. Buch, S. A. Bilgili, T. R. Adams, Z. B. Etienne, and **S. T. McWilliams**, “Improving performance of SEOBNRv3 by  $\sim 300\times$ ”, *Class. Quant. Grav.* 35, 155003 (2018)



121. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “A Search for Tensor, Vector, and Scalar Polarizations in the Stochastic Gravitational-Wave Background”, *Phys. Rev. Lett.* 120, 201102 (2018)
120. B. P. Abbott *et al.* (LSC and Virgo Collaboration), “Full Band All-sky Search for Periodic Gravitational Waves in the O1 LIGO Data”, *Phys. Rev. D* 97, 102003(2018)
119. Zaven Arzoumanian *et al.* (The NANOGrav Collaboration), “The NANOGrav 11-year Data Set: Pulsar-timing Constraints On The Stochastic Gravitational-wave Background”, *Astrophys. J.* 859, 1 (2018)
118. Zaven Arzoumanian *et al.* (The NANOGrav Collaboration), “The NANOGrav 11-year Data Set: High-precision timing of 45 Millisecond Pulsars”, *Astrophys. J. Supp.* 235, 37 (2018)
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