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Gravity Exploration Institute

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EDUCATION

- 2008–2012 Ph.D. in Physics and Astronomy, Northwestern University, USA.
Ph.D. thesis: Parameter Estimation Using Markov Chain Monte Carlo Methods for Gravitational Waves from Spinning Inspirals of Compact Objects. Advisor: Prof. Vicky Kalogera. Thesis winner of the Stefano Braccini Prize.
- 2007–2008 Engineering degree (M.Sc. major physics), ENSPS, France and M.Sc. in astrophysics from University Louis Pasteur, France. (distinction "Très Bien": summa cum laude).
- 2005–2007 Engineer's school ENSPS (Ecole Nationale Supérieure de Physique de Strasbourg).

APPOINTMENTS

- 2020 Senior Lecturer (associate professor) in Physics and Astronomy at Cardiff University, Cardiff, UK.
- 2018–2020 Lecturer (assistant professor) in Physics and Astronomy at Cardiff University, Cardiff, UK.
- 2014–2017 Senior Postdoc at the Max Planck Institute (Albert Einstein Institute), Potsdam-Golm, Germany.
- 2012–2014 Richard Chase Tolman Postdoctoral Scholar in Experimental Physics at the California Institute of Technology, USA.

RESEARCH INTERESTS

- Astronomy:** Transient gravitational-wave observations. In particular with the LIGO (Laser Interferometer Gravitational-wave Observatory) and Virgo interferometer network and jointly with Electromagnetic or Neutrino counterparts.
- Experimental physics:** Optimised experimental design of future detectors. Holistic modelling for gravitational-wave observatories.
- Astrophysics:** Understanding gravitational sources with parameter estimation using Bayesian Methods. Inference of universal properties using multiple events.

AWARDS AND GRANTS

- 2020 2021 co-I on STFC *Advanced LIGO Operations Support*, funding large-scale computing and fraction of salary.
- 2020 2021 co-I on STFC grant *Investigations in Gravitational Radiation – case for 1 year extension*. Consolidator grant for the Gravity Exploration Institute.
- 2019 2020 PI on STFC New Applicant Award *Gravitational-wave Research*, covering fraction of salary and equipment.
- 2019 2021 co-I on STFC uplift *Investigations in Gravitational Radiation - Support of LIGO O3*, funding for two postdoctoral researchers.
- 2019 Travel award for the *Cardiff-OzGrav gravitational-wave inference collaboration* from the Australian Research Council - OzGrav.
- 2017 *Bruno Rossi Prize* (recognising the LIGO Scientific Collaboration) from the High Energy Astrophysics division of the American Astronomical Society for the first direct detections of gravitational waves, the discovery of merging black hole binaries, and beginning the new era of gravitational-wave astronomy. aas.org/posts/news/2017/01/aas-announces-recipients-2017-prizes-and-awards
- 2017 *Group Achievement Award* (recognising the LIGO team) from the Royal Astronomical Society for the direct detection of gravitational waves. ras.org.uk/images/stories/awards/winners/2017/LIGO%202017%20Group%20Achievement%20Award%20A.pdf
- 2017 *Princess of Asturias Award for Technical & Scientific Research* (recognising the LIGO founders and the entire LIGO discovery team) for the first observation of gravitational waves. fpa.es/en/princess-of-asturias-awards
- 2017 *Albert Einstein Medal* to the LIGO Scientific Collaboration and the VIRGO Collaboration. einstein-bern.ch/en/einstein-society
- 2016 *Gruber Cosmology Prize* (recognising the LIGO founders and the entire LIGO discovery team) for the first observation of gravitational waves. gruber.yale.edu/prize/2016-gruber-cosmology-prize
- 2016 *Special Breakthrough Prize in Fundamental Physics* (shared between the LIGO founders and the contributors to the discovery) for the detection of gravitational waves. breakthroughprize.org/News/32
- 2012 The *Stefano Braccini Prize* for a doctoral thesis on gravitational waves.
- 2011 Grant for the access to the Quest High Performance Computing System from Northwestern University, USA. ~1.6 million processor-hours.
- 2010 *James B. Hartle Award* from the International Society on General Relativity and Gravitation for the best student presentation at session C2 at the 19th conference of the society held in Mexico City, July 5 - 9 2010.

- 2010 Grant for the access to the Quest High Performance Computing System from Northwestern University, USA. ~1 million processor-hours.
- 2008 2009 *Huang Fellowship* and *University Fellowship*, Northwestern University.
- 2007 2008 *Boussole Scholarship* from the Région Alsace, France. (Partially covered the cost of studies in Osaka University and Northwestern University before joining the graduate program).

ACADEMIC ACTIVITIES

- 2018 Cardiff University's *Gravitational-wave Physics* MSc coordinator.
- 2018 Module designer for the course *Observational Gravitational-wave Astronomy* (graduate).
- 2018 Module organiser for the course *Structured Programming* (undergraduate).
- 2018 Grant reviewer for the UK Research and Innovation (Science and Technology Facilities Council), Netherlands Organisation for Scientific Research (NWO).
- 2016 2020 Co-chair of the LIGO-Virgo Compact Binaries Coalescence Parameter Estimation group.
- 2015 2017 Chair of the LIGO review committee for the Burst group (searches for unmodelled gravitational-wave transients in LIGO-Virgo data).
- 2012 Reviewer for Classical and Quantum Gravity, Physical Review D, Physical Review Letters, the Astrophysical Journal.
- 2007 Member of the LIGO Scientific Collaboration.
- 2007 Research assistant with Prof. Satoshi Hamaguchi, Center for Atomic and Molecular Technologies, Graduate School of Engineering, Osaka University, Japan.

PUBLIC OUTREACH

- 2019 BBC Radio Wales Science Café discussion on Black Holes with prof. Sutton and prof. Grote.
- 2019 Presentation at the Center for Digital Education webinar "Enabling University Research at Scale"
- 2018 Presentations to prospective undergraduate students at the Cardiff University Open Day, Cardiff, UK. Title: Exploding stars, black holes and gravitational waves.
- 2017 Televised interview on gravitational waves in *Tomorrow Today* <http://p.dw.com/p/2p33b>, on *Deutsche Welle*, Germany's public international broadcaster.
- 2017 Televised interview on the first joint electromagnetic and gravitational waves observation in *Zibb* www.rbb-online.de/zibb/, German evening news program.
- 2017 Invited talk at the Potsdam Tag Der Wissenschaften, Potsdam, Germany, www.potsdamertagderwissenschaften.de. Title: Explodierende Sterne, Schwarze Löcher und Gravitationswellen (Exploding stars, black holes and gravitational waves).
- 2017 Presentation to high-school students of the Physik-LK des Schadowgymnasiums, Potsdam, Germany. Title: Explodierende Sterne, Schwarze Löcher und Gravitationswellen (Exploding stars, black holes and gravitational waves).
- 2016 Invited talk at the Nuit des Étoiles, Montalivet, France www.astronomieclubmedocain.fr. Title: Trous noirs, Relativité Générale et ondes gravitationnelles (Black holes, General Relativity and gravitational waves).
- 2016 Invited talk at the Lange Nacht der Wissenschaften, Berlin, Germany www.langenachtderwissenschaften.de. Title: Explodierende Sterne, Schwarze Löcher und Gravitationswellen (Exploding stars, black holes and gravitational waves).
- 2016 Televised interview on the first direct gravitational waves detection in *Zibb* www.rbb-online.de/zibb/, German evening news program.
- 2016 Potsdam Tag Der Wissenschaften, Potsdam, Germany, www.potsdamertagderwissenschaften.de (presentation and interaction with the public)
- 2016 Press interviews in the Märkische Allgemeine Zeitung (www.maz-online.de/Nachrichten/Kultur/Neue-Art-der-Weltallforschung-in-Potsdam) and Spektrum der Wissenschaft (www.spektrum.de/news/im-kreisssaal-der-gravitationswellen-astronomie/1408830)
- 2013 Pasadena Engineering and Science Expo at the Pasadena City College, Pasadena, California, USA (presentation and interaction with the public).

- 2011 2012 Astronomy Conversations at the Space Visualization Laboratory at the Adler Planetarium, Chicago, Illinois, USA (presentation and interaction with the public).
- 2007 2012 Telescope assistant at Dearborn Observatory, Northwestern university, Evanston, Illinois, USA (monthly public observing sessions).
- 2009 Special Traveling Exhibit "Catch A New Wave: Gravitational Wave Astronomy as a Probe of the Universe" at the Adler Planetarium, Chicago, Illinois, USA (installation and presentation to museum visitors).

RESEARCH ADVISING AND MENTORING

Postdoctoral Research Fellows:

Tessa Carver (2019)

Hong Qi (2018)

Ph.D. Thesis Students:

Virginia D'Emilio (2018)

Rhys Green (2018)

Chinmay Kalaghatgi (2018 - 2020) now a postdoc at Nikhef, Netherlands.

More than 15 undergraduate research students.

TALKS

"**Gravitational Waves Observations by LIGO and Virgo**" Invited talk, Universidad Nacional de Córdoba, Argentina, December 2020

"**Gravitational-wave Astrophysics**" Invited talk, A New Decade of Supercomputing, Cardiff, UK, January 2020

"**Gravitational Waves Observations by LIGO and Virgo**" Invited talk, University of Sussex, UK, January 2020

"**Gravitational Waves Observations by LIGO and Virgo**" Invited talk, 6th Conference of the Polish Relativity Society, Maritime Academy, Szczecin, Poland, September 2019

"**Markov-chain Monte Carlo**" Invited talk, Workshop: gravitational-wave Bayesian parameter estimation with PyCBC Inference, Institute of Cosmology and Gravitation, University of Portsmouth, UK, May 2019

"**Introduction to Parameter Estimation of Compact Binary Coalescences**" Invited talk, 2nd Gravitational-wave Open Data Workshop, Laboratoire Astroparticule et Cosmologie, Paris, France, April 2019.

"**Gravitational waves in the cloud**" Invited talk, Oracle's High Performance Cloud for Research & Innovation, Bristol, UK, November 2018.

"Gravitational wave observations: the lens of waveform modelling" Invited talk, University of Oregon, Oregon, USA, March 2018.

"Astrophysical results from compact binary coalescences" Invited talk, EPS-HEP 2017, Venice, Italy, July 2017.

"Studying gravitational waves with LIGO" Invited talk, DESY in Zeuthen, Germany, April 2017.

"Gravitational-wave astrophysics" Invited talk and consecutive tutorial, 2nd International Interdisciplinary Workshop on Time Series Analysis, University Paris Descartes, Paris, France, December 2016.

"A new beginning for transient Gravitational-wave astrophysics." Invited CaJAGWR seminar, California Institute of Technology, Pasadena, California, USA, November 2016.

"GW150914, GW151226 and LVT151012: a new beginning for transient Gravitational-wave astrophysics." Invited talk, University of Glasgow, United Kingdom, October 2016.

"Gravitational-wave science; parameter inference of compact binaries with Advanced LIGO." Invited talk, Queen Mary University of London, United Kingdom, September 2016.

"Astrophysical inference from gravitational-wave observations of compact binaries with Advanced LIGO." Invited talk, Seoul National University, South Korea, July 2016.

"On the measurement of spinning compact binaries with the gravitational-wave observatory Advanced LIGO." Contributed talk, APS April Meeting 2016, Salt Lake City, Utah, USA, April 2016.

"GW150914: A new beginning for transient gravitational-wave astrophysics." Invited talk, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA, February 2016.

"GW150914: Characterisation and properties." Invited talk, Max Planck Institute for Gravitational Physics, Potsdam, Germany, February 2016.

"GW150914: Astrophysical & Cosmological Relativity." Invited talk on behalf of Prof. Alessandra Buonanno, Max Planck Institute for Gravitational Physics, Hannover, Germany, February 2016.

"Population inference in gravitational-wave astronomy." Contributed talk, Gravitational Wave Physics and Astronomy Workshop, Osaka, Japan, June 2015.

"Status and future of gravitational-wave parameter estimation for Compact Binary Coalescences ." Invited talk, Numerical and Analytical Relativity and Data Analysis, California State University, Fullerton, California, USA, August 2014.

"What can we learn from gravitational waves on the physics of bursts and compact binaries ." Invited talk, 10th Rencontres du Vietnam: "Very High Energy Phenomena in the Universe", Quy Nhon, Vietnam, August 2014.

"Some Thoughts about Rates & Statistics." Contributed talk with prof. Rana Adhikari (Caltech), Gravitational Wave Advanced Detector Workshop, Takayama, Japan, May 2014.

"Gravitational Waves from Spinning Inspirals of Compact Objects." Invited talk, Pisa INFN Section, Department of Physics, Pisa University, Pisa, Italy, October 2013.

"How Much We Lose in Sky Localization If We Neglect Spin Effects in NS-NS and NS-BH Binaries." Invited talk, Rattle and Shine conference, KITP Conference, Santa Barbara, California, USA, August 2012.

"Evidence for Spin in Compact Binary Coalescence Gravitational Waves signals." Contributed talk, APS April Meeting 2012, Atlanta, Georgia, USA, April 2012.

"Astrophysics with LIGO/Virgo, the challenges of parameter estimation." Seminar, Canadian Institute for Theoretical Astrophysics, University of Toronto, Ontario, Canada, December 2011; Seminar, California Institute of Technology, Pasadena, California, USA, February 2012

"Status of LIGO CBC Bayesian Inference." Seminar, Center for Gravitation and Cosmology, University of Wisconsin-Milwaukee, Wisconsin, USA, December 2011.

"Evidence for Spin in Compact Binary Coalescence: when can we trust it?" Contributed talk, 21st Midwest Relativity Meeting, Departments of Physics and Astronomy, University of Illinois at Urbana Champaign, Illinois, USA, November 2011.

"How well can we distinguish spinning, spin aligned and non- spinning binary systems with the advanced detector network?" Contributed talk, Amaldi 9 & NRDA, Cardiff, United Kingdom, July 2011.

"Parameter Estimation of Gravitational Waves" Contributed talk, Rencontres de Moriond, La Thuile, Aosta valley, Italy, March 2011.

"PhenSpin MCMC: Parameter estimation and model selection using spinning phenomenological waveforms" Contributed talk, 19th International Conference on General Relativity and Gravitation, Mexico City, Mexico, July 2010; Contributed talk, Theory Meets Data Analysis at Comparable and Extreme Mass Ratios, Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada, June 2010.

"Accurate parameter estimation of spinning compact binary inspirals: Markov-chain Monte Carlo applied to LIGO gravitational-wave signals" Contributed talk, Numerical Relativity and Data Analysis Meeting, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Golm, Germany, July 2009.

"Parameter estimation of spinning binary inspirals using Markov-chain Monte Carlo", Contributed talk, Numerical Relativity and Data Analysis Meeting, Physics department, Syracuse University, Syracuse, New-York, USA, August 2008.

REFEREED PUBLICATIONS

More than 200 publications in total, with an h-index from NASA ADS of 83. The list below includes only publications from the LIGO-Virgo collaboration which contain major personal contributions.

1. Morisaki, S., & Raymond, V., "Rapid parameter estimation of gravitational waves from binary neutron star coalescence using focused reduced order quadrature", 2020, Physical Review D, 102, 104020
2. The LIGO Scientific Collaboration, the Virgo Collaboration, Abbott, R., Abbott, T. D., et al., "Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog", 2020, arXiv e-prints, arXiv:2010.14533
3. The LIGO Scientific Collaboration, the Virgo Collaboration, Abbott, R., Abbott, T. D., et al., "Tests of General Relativity with Binary Black Holes from the second LIGO-Virgo Gravitational-Wave Transient Catalog", 2020, arXiv e-prints, arXiv:2010.14529
4. Abbott, R., Abbott, T. D., Abraham, S., et al., "GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run", 2020, arXiv e-prints, arXiv:2010.14527
5. Abbott, R., Abbott, T. D., Abraham, S., et al., "GW190521: A Binary Black Hole Merger with a Total Mass of $150 M_{\odot}$ ", 2020, Physical Review Letters, 125, 101102
6. Romero-Shaw, I. M., Talbot, C., Biscoveanu, S., et al., "Bayesian inference for compact binary coalescences with BILBY: validation and application to the first LIGO-Virgo gravitational-wave transient catalogue", 2020, Monthly Notices of the Royal Astronomical Society, 499, 3295
7. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Prospects for observing and localizing gravitational-wave transients with Advanced LIGO, Advanced Virgo and KAGRA", 2020, Living Reviews in Relativity, 23, 3
8. Qi, H., & Raymond, V., "PyROQ: a Python-based Reduced Order Quadrature Building Code for Fast Gravitational Wave Inference", 2020, arXiv e-prints, arXiv:2009.13812
9. Abbott, R., Abbott, T. D., Abraham, S., et al., "Properties and Astrophysical Implications of the $150 M_{\odot}$ Binary Black Hole Merger GW190521", 2020, The Astrophysical Journal, 900, L13
10. Abbott, R., Abbott, T. D., Abraham, S., et al., "GW190412: Observation of a binary-black-hole coalescence with asymmetric masses", 2020, Physical Review D, 102, 043015
11. Barausse, E., Berti, E., Hertog, T., et al., "Prospects for fundamental physics with LISA", 2020, General Relativity and Gravitation, 52, 81
12. Hoy, C., & Raymond, V., "PESummary: the code agnostic Parameter Estimation Summary page builder", 2020, arXiv e-prints, arXiv:2006.06639

13. Abbott, R., Abbott, T. D., Abraham, S., et al., "GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object", 2020, *The Astrophysical Journal*, 896, L44
14. Kalaghatgi, C., Hannam, M., & Raymond, V., "Parameter estimation with a spinning multimode waveform model", 2020, *Physical Review D*, 101, 103004
15. The LIGO Scientific Collaboration, the Virgo Collaboration, Abbott, R., Abbott, T. D., et al., "GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses", 2020, arXiv e-prints, arXiv:2004.08342
16. Hamburg, R., Fletcher, C., Burns, E., et al., "A Joint Fermi-GBM and LIGO/Virgo Analysis of Compact Binary Mergers from the First and Second Gravitational-wave Observing Runs", 2020, *The Astrophysical Journal*, 893, 100
17. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW190425: Observation of a Compact Binary Coalescence with Total Mass $\sim 3.4 M_{\odot}$ ", 2020, *The Astrophysical Journal*, 892, L3
18. Morisaki, S., & Raymond, V., "Prompt and accurate sky localization of gravitational-wave sources", 2020, *Journal of Physics Conference Series*, 1468, 012219
19. Adhikari, R. X., Ajith, P., Chen, Y., Clark, J. A., Dergachev, V., Fotopoulos, N. V., Gossan, S. E., Mandel, I., Okounkova, M., Raymond, V., & Read, J. S., "Astrophysical science metrics for next-generation gravitational-wave detectors", 2019, *Classical and Quantum Gravity*, 36, 245010
20. Chatziioannou, K., Cotesta, R., Ghonge, S., et al., "On the properties of the massive binary black hole merger GW170729", 2019, *Physical Review D*, 100, 104015
21. Hernandez Vivanco, F., Smith, R., Thrane, E., Lasky, P. D., Talbot, C., & Raymond, V., "Measuring the neutron star equation of state with gravitational waves: The first forty binary neutron star merger observations", 2019, *Physical Review D*, 100, 103009
22. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo", 2019, *The Astrophysical Journal*, 882, L24
23. The LIGO Scientific Collaboration, the Virgo Collaboration, Abbott, B. P., Abbott, R., et al., "A gravitational-wave measurement of the Hubble constant following the second observing run of Advanced LIGO and Virgo", 2019, arXiv e-prints, arXiv:1908.06060
24. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs", 2019, *Physical Review X*, 9, 031040
25. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Tests of General Relativity with GW170817", 2019, *Physical Review Letters*, 123, 011102

26. Soares-Santos, M., Palmese, A., Hartley, W., et al., "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", 2019, *The Astrophysical Journal*, 876, L7
27. Biwer, C. M., Capano, C. D., De, S., Cabero, M., Brown, D. A., Nitz, A. H., & Raymond, V., "PyCBC Inference: A Python-based Parameter Estimation Toolkit for Compact Binary Coalescence Signal", 2019, *Publications of the Astronomical Society of the Pacific*, 131, 024503
28. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Properties of the Binary Neutron Star Merger GW170817", 2019, *Physical Review X*, 9, 011001
29. Fishbach, M., Gray, R., Magaña Hernandez, I., et al., "A Standard Siren Measurement of the Hubble Constant from GW170817 without the Electromagnetic Counterpart", 2019, *The Astrophysical Journal*, 871, L13
30. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW170817: Measurements of Neutron Star Radii and Equation of State", 2018, *Physical Review Letters*, 121, 161101
31. Brito, R., Buonanno, A., & Raymond, V., "Black-hole spectroscopy by making full use of gravitational-wave modeling", 2018, *Physical Review D*, 98, 084038
32. Pankow, C., Chatziioannou, K., Chase, E. A., et al., "Mitigation of the instrumental noise transient in gravitational-wave data surrounding GW170817", 2018, *Physical Review D*, 98, 084016
33. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Prospects for observing and localizing gravitational-wave transients with Advanced LIGO, Advanced Virgo and KAGRA", 2018, *Living Reviews in Relativity*, 21, 3
34. Meidam, J., Tsang, K. W., Goldstein, J., et al., "Parametrized tests of the strong-field dynamics of general relativity using gravitational wave signals from coalescing binary black holes: Fast likelihood calculations and sensitivity of the method", 2018, *Physical Review D*, 97, 044033
35. Pürrer, M., Smith, R., Field, S., Cañal-Izates, P., Raymond, V., Gair, J., & Hannam, M., "Accelerating parameter estimation of gravitational waves from black hole binaries with reduced order quadratures", 2018, *Fourteenth Marcel Grossmann Meeting - MG14*, 2015
36. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW170608: Observation of a 19 Solar-mass Binary Black Hole Coalescence", 2017, *The Astrophysical Journal*, 851, L35
37. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "On the Progenitor of Binary Neutron Star Merger GW170817", 2017, *The Astrophysical Journal*, 850, L40
38. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "A gravitational-wave standard siren measurement of the Hubble constant", 2017, *Nature*, 551, 85
39. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral", 2017, *Physical Review Letters*, 119, 161101

40. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence", 2017, *Physical Review Letters*, 119, 141101
41. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A", 2017, *The Astrophysical Journal*, 848, L13
42. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Multi-messenger Observations of a Binary Neutron Star Merger", 2017, *The Astrophysical Journal*, 848, L12
43. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2", 2017, *Physical Review Letters*, 118, 221101
44. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Effects of waveform model systematics on the interpretation of GW150914", 2017, *Classical and Quantum Gravity*, 34, 104002
45. Vitale, S., Lynch, R., Raymond, V., Sturani, R., Veitch, J., & Graff, P., "Parameter estimation for heavy binary-black holes with networks of second-generation gravitational-wave detectors", 2017, *Physical Review D*, 95, 064053
46. Bohé, A., Shao, L., Taracchini, A., et al., "Improved effective-one-body model of spinning, nonprecessing binary black holes for the era of gravitational-wave astrophysics with advanced detectors", 2017, *Physical Review D*, 95, 044028
47. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Binary Black Hole Mergers in the First Advanced LIGO Observing Run", 2016, *Physical Review X*, 6, 041015
48. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Improved Analysis of GW150914 Using a Fully Spin-Precessing Waveform Model", 2016, *Physical Review X*, 6, 041014
49. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Directly comparing GW150914 with numerical solutions of Einstein's equations for binary black hole coalescence", 2016, *Physical Review D*, 94, 064035
50. Singer, L. P., Chen, H.-Y., Holz, D. E., et al., "Supplement: "Going the Distance: Mapping Host Galaxies of LIGO and Virgo Sources in Three Dimensions Using Local Cosmography and Targeted Follow-up" (2016, *ApJL*, 829, L15)", 2016, *The Astrophysical Journal Supplement Series*, 226, 10
51. Singer, L. P., Chen, H.-Y., Holz, D. E., et al., "Going the Distance: Mapping Host Galaxies of LIGO and Virgo Sources in Three Dimensions Using Local Cosmography and Targeted Follow-up", 2016, *The Astrophysical Journal*, 829, L15
52. Smith, R., Field, S. E., Blackburn, K., Haster, C.-J., Pürrer, M., Raymond, V., & Schmidt, P., "Fast and accurate inference on gravitational waves from precessing compact binaries", 2016, *Physical Review D*, 94, 044031

53. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Characterization of transient noise in Advanced LIGO relevant to gravitational wave signal GW150914", 2016, *Classical and Quantum Gravity*, 33, 134001
54. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Supplement: "Localization and Broadband Follow-up of the Gravitational-wave Transient GW150914" (2016, *ApJL*, 826, L13)", 2016, *The Astrophysical Journal Supplement Series*, 225, 8
55. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Localization and Broadband Follow-up of the Gravitational-wave Transient GW150914", 2016, *The Astrophysical Journal*, 826, L13
56. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence", 2016, *Physical Review Letters*, 116, 241103
57. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Properties of the Binary Black Hole Merger GW150914", 2016, *Physical Review Letters*, 116, 241102
58. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Tests of General Relativity with GW150914", 2016, *Physical Review Letters*, 116, 221101
59. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Observation of Gravitational Waves from a Binary Black Hole Merger", 2016, *Physical Review Letters*, 116, 061102
60. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Prospects for Observing and Localizing Gravitational-Wave Transients with Advanced LIGO and Advanced Virgo", 2016, *Living Reviews in Relativity*, 19, 1
61. Abbott, B. P., Abbott, R., Abbott, T. D., et al., "Astrophysical Implications of the Binary Black-hole Merger GW150914", 2016, *The Astrophysical Journal*, 818, L22
62. Canizares, P., Field, S. E., Gair, J., Raymond, V., Smith, R., & Tiglio, M., "Accelerated Gravitational Wave Parameter Estimation with Reduced Order Modeling", 2015, *Physical Review Letters*, 114, 071104
63. Veitch, J., Raymond, V., Farr, B., et al., "Parameter estimation for compact binaries with ground-based gravitational-wave observations using the LALInference software library", 2015, *Physical Review D*, 91, 042003
64. Vitale, S., Lynch, R., Veitch, J., Raymond, V., & Sturani, R., "Measuring the Spin of Black Holes in Binary Systems Using Gravitational Waves", 2014, *Physical Review Letters*, 112, 251101
65. Aasi, J., Abbott, B. P., Abbott, R., et al., "The NINJA-2 project: detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations", 2014, *Classical and Quantum Gravity*, 31, 115004

66. Wade, L., Creighton, J. D. E., Ochsner, E., Lackey, B. D., Farr, B. F., Littenberg, T. B., & Raymond, V., "Systematic and statistical errors in a Bayesian approach to the estimation of the neutron-star equation of state using advanced gravitational wave detectors", 2014, *Physical Review D*, 89, 103012
67. O'Shaughnessy, R., Farr, B., Ochsner, E., Cho, H.-S., Raymond, V., Kim, C., & Lee, C.-H., "Parameter estimation of gravitational waves from precessing black hole-neutron star inspirals with higher harmonics", 2014, *Physical Review D*, 89, 102005
68. Sidery, T., Aylott, B., Christensen, N., et al., "Reconstructing the sky location of gravitational-wave detected compact binary systems: Methodology for testing and comparison", 2014, *Physical Review D*, 89, 084060
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