

## Ian W. Harry - Curriculum Vitae

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EMPLOYMENT      **University of Portsmouth (ICG)**, Portsmouth, United Kingdom  
Senior Lecturer, October 2018 - PRESENT

**Max Planck Institut für Gravitationsphysik**, Potsdam-Golm, Germany  
Post-doctoral Research Associate, August 2014 - October 2018  
• Supervisors: Prof. Alessandra Buonanno

**Syracuse University**, Syracuse, United States  
Post-doctoral Research Associate, August 2011 - July 2014  
• Supervisors: Prof. Peter Saulson and Prof. Duncan Brown

**Cardiff University**, Cardiff, United Kingdom  
Post-doctoral Research Associate, May 2011 - July 2011  
• Supervisors: Dr. Stephen Fairhurst and Prof. Sathyaprakash

EDUCATION      **Cardiff University**, Cardiff, United Kingdom  
Ph.D., Astrophysics, September 2007 - April 2011  
• Dissertation Topic: [“Searching for the gravitational wave signatures of compact binary coalescences with ground-based interferometers”](#)  
• Brief synopsis of research: My PhD research focused on searching for compact binary coalescences with the LIGO and Virgo observatories. I was one of two people who lead the search and corresponding paper analysing 7 months of Initial LIGO data for compact binary coalescences from an unknown sky location and at an unknown time. I also pioneered a new “coherent” technique to increase the sensitivity of searches for compact binary mergers in coincident with gamma-ray bursts. Finally I explored methods to expand such searches to include the effects of precessing spins.  
• Advisors: Dr. Stephen Fairhurst and Prof. Sathyaprakash  
M.Phys., Astrophysics, September 2003 to June 2007  
• Graduated with first class honours  
• Awarded the Sir Arthur Davies prize for graduating with the highest average grade in the school of physics for the class of 2007.  
• Fourth year masters project was developing a new “stochastic” method to create banks of filter waveforms for ground and space based gravitational wave astronomy under B.S. Sathyaprakash. This “stochastic” technique became the method by which such banks of filter waveforms is created in Advanced LIGO searches to detect compact binary mergers.  
• Third year project was on the effect of gravitational waves on the cosmic microwave background under Leonid Grishchuk.

TEACHING EXPERIENCE      • 2019 - PRESENT: Lecturer in third year “General Relativity” course at the University of Portsmouth.

- 2019 - PRESENT: Lecturer in second year “Computing Physics” course at the University of Portsmouth.
- 2018: Lecturer in gravitational-wave astronomy at the Jürgen Ehlers Spring School.
- 2017: Lecturer in statistical methods and gravitational-wave search techniques at the International Max Planck Research School (IMPRS) in Berlin.
- 2007 - 2010: Postgraduate Demonstrator: During my PhD I spent 4 hours a week as one of 3 PhD demonstrators along with a member of academic staff whose duties were to supervise first year physics BSc and MPhys students in carrying out basic experiments. I also demonstrated a mathematics exercise class for first year undergraduate students.

#### MENTORING AND SUPERVISION

- Student mentorship (Arthur Tolley), 2020 - PRESENT: I am the primary PhD supervisor of Arthur Tolley at the University of Portsmouth. He is working on gravitational-wave astronomy with LIGO/Virgo and LISA.
- Student mentorship (Connor McIsaac), 2018 - PRESENT: I am the primary PhD supervisor of Connor McIsaac at the University of Portsmouth. He is working on analysis of Advanced LIGO and Virgo data to search for compact binary mergers.
- Student mentorship (Roberto Cotesta), 2017 - 2018: Roberto Cotesta is a PhD student in Potsdam who is working on improving waveform models for compact binary mergers. I assisted this work in an advisory capacity and helped to discuss problems being encountered in the development of this work.
- Student mentorship (Niki Kilibertus and Timothy Gebhard), 2016-2018: Niki Kilibertus and Timothy Gebhard were masters students at the Max Planck Institute for Intelligent Systems. I co-supervised them on a project exploring how machine learning techniques can be applied in analysis of data from gravitational-wave observatories.
- Student mentorship (Marcel Kehl): Marcel Kehl was an undergraduate student who visited me both in Syracuse and in Potsdam to learn about gravitational-wave searches for compact binary mergers and to work on his undergraduate project exploring the improvement gained from using identical sets of filter waveforms in all observatories and exploring the technical challenges involved to make that change. This work formed a large part of the publication [S16], which was recently accepted by CQG and selected as a journal highlight. When taking up a PhD position in medical physics Marcel said of me: “Thank you for everything you taught me. I enjoyed a lot to work with you and I learned a lot during this time. I am impressed how much you know about every detail of the LIGO data analysis and how well you can answer any question offhand.”
- Student supervision (Syracuse): While at Syracuse I assisted in the supervision of PhD students, including Alex Nitz and Chris Biwer. This involved acting as a point of contact for the students for cases where I could help the student to solve a problem while the faculty supervisor was busy, travelling or just because it was easier to ask a post-doc for help first. Additionally, when Duncan Brown took a sabbatical in California for 6 months I was the person responsible for dealing with day-to-day concerns of these PhD students. Alex Nitz moved to a post-doctoral research position at the Max Planck Institute in Hannover and Chris Biwer moved to a scientist position at the Los Alamos national laboratory in the US.

#### OTHER ACADEMIC ACTIVITIES

- 2018 - PRESENT: Member of the computing committee, ICG, University of Portsmouth, UK
- 2016 - PRESENT: Internal reviewer of open data products for the Gravitational-Wave Open Science Center (GWOSC) as part of the LIGO Scientific Collaboration.
- 2014 - 2018: I served on the PhD applications committee for Alessandra Buonanno’s division at the Max Planck Institute between 2014 and 2018.
- 2014 - 2018: Local coordinator of LIGO activities (including running weekly meetings and ensuring that the group meets responsibilities to LIGO), Max Planck Institute, Potsdam, Germany
- 2012 - 2017: Editor of the LIGO Magazine, responsible for sourcing and writing articles for the biannual magazine published by the LIGO Scientific Collaboration.

## COMPUTING SKILLS

- Programming Languages: I am very familiar with both C and Python programming languages and have written many thousands of lines of code in both languages. I also have some familiarity with Fortran, Matlab, R, MySQL and HTML. As I have experience in both procedural and object-oriented computer languages I am able to quickly learn new computer languages.
- Code examples: I am one of two primary contributors and maintainers of the PyCBC software package, <https://github.com/ligo-cbc/pycbc>. I am also the author of the “coh\_PTF” software tools that are used to search for compact binary mergers in coincidence with short GRBs <https://github.com/lscsoft/lalsuite/tree/master/lalapps/src/ring>. I wrote much of, and maintain the code used for generating sets of filter waveforms for all gravitational-wave searches for compact binary coalescences <https://bit.ly/2kbCjci>. I wrote the logical back-end code underpinning the BlackHoleHunter game <http://www.blackholehunter.org/>.
- Codefights.com: I won \$50 for finishing 3rd out of 1055 participants in the monthly CodeFights.com coding marathon in December 2016 [LINK](#).
- Operating Systems: I am familiar and comfortable using Windows, Mac and various Linux operating systems.
- Cluster management: I managed the Cardiff “Coma”, 200 core cluster from September 2010 to July 2011.

## PROFESSIONAL MEMBERSHIPS

- I have been a member of the LISA Consortium, PI of the Portsmouth LISA group, and co-chair of the “Data Analysis Tools” working group from 2018 to present.
- I have been a member of the 3G (third generation gravitational-wave observatories) consortium from 2017 to present.
- I have been a member of the LIGO scientific collaboration from 2006 to present.
- I was a member of the GEO collaboration from 2006 - 2011.
- I was a member of the ET (Einstein Telescope) task force in 2011.
- I have been a member of the APS (American Physical Society) between 2011 and present.
- I have been a member of the IOP (Institute of Physics) between 2008 to present.

## HONORS AND AWARDS

- 2017 Princess of Asturias Award for technical and scientific research – Awarded to the LIGO Scientific Collaboration.
- 2016 Gruber Cosmology Prize – Awarded to the LIGO Scientific Collaboration.
- One of the winners of the 2016 “Special Breakthrough Prize in Fundamental Physics” for the discovery of a compact binary merger with gravitational-wave observatories.
- Bessie Jones postgraduate bursary for “Most outstanding postgraduate student for the Session 2008-2009”
- Sir Arthur Davies Prize 2006-2007 “For the best performance in the MPhys Honours Degree Examination in the School of Physics and Astronomy, Cardiff University”
- 2005 R.G. Howells Scholarship “Based on best all round performance in year two” (of MPhys degree)
- Prize for best performance in Physics A-level in Tasker Milward School 2001-2003.

## OUTREACH ACTIVITIES

- I am a demonstrator in the ICG’s yearly “Stargazing live” event held at the historical Portsmouth dockyards.
- I have taken part as an exhibitor for the LIGO exhibit at the “World Science Festival”, in New York NY, USA, June 2013.
- I was the lead developer, and was until 2015 the lead maintainer, of the “Black hole hunter” interactive game ([www.blackholehunter.org](http://www.blackholehunter.org)). This game is designed to educate people about how searches for gravitational waves are performed through a fun and interesting medium. The game has received very positive feedback and forms a major part of an exhibition that has been widely used for outreach purposes throughout the U.S.
- I have taken part as an exhibitor for the “Can you hear black holes collide” stand for the Royal Society’s “Summer Science” exhibition. This exhibition tried to explain to members of the public what gravitational waves are, how gravitational wave detectors work and how we try to

detect them (with the help of “Black hole hunter”).

- I have participated in the IOP run “Lab in a lorry” scheme, which is a “mobile lab that gives young people the chance to explore science through hands-on experiments.” Through this I became a STEMNet Science and Engineering Ambassador ([www.stemnet.org.uk](http://www.stemnet.org.uk)).
- I have been an editor of the “LIGO Magazine” from the first edition to September 2017 <http://www.ligo.org/magazine/>. This involved sourcing articles for the magazine, proof-reading articles and helping with circulation of the magazine.
- I am one of the team that reviews and verifies the release of LIGO data to the public from the LIGO Open Science Center <https://losc.ligo.org/>.
- I have participated in writing “science summaries” of full LIGO authorlist papers. One example of a science summary that I wrote is here <http://www.ligo.org/science/Publication-NINJA2/>.
- I appear in a short video produced by the Max Planck Institute, illustrating the contribution of the institute to the first observation of a compact binary merger <https://www.youtube.com/watch?v=vRXUpN7a-1U>

SHORT AUTHOR  
PUBLICATIONS

- [S1]: “A hierarchical search for gravitational waves from supermassive black hole binary mergers.” I. Harry, S. Fairhurst, B.S. Sathyaprakash. *Class.Quant.Grav.* **25** (2008) 184027.
- [S2]: “The Mock LISA Data Challenges: From Challenge 1B to Challenge 3.” S. Babak, ..., I. Harry *et al.* *Class.Quant.Grav.* **25** (2008) 184026.
- [S3]: “Template banks to search for compact binaries with spinning components in gravitational wave data.” C Van Den Broeck, D. Brown, T. Coklear, I. Harry, G. Jones, B.S. Sathyaprakash, H. Tagoshi and H. Takahashi. *Phys.Rev D80* (2009) 024009.
- [S4]: “A stochastic template placement algorithm for gravitational wave data analysis.” I. Harry, B. Allen and B.S. Sathyaprakash. *Phys.Rev. D80* (2009) 104014.
- [S5]: “A targeted coherent search for gravitational waves from compact binary coalescences.” I. Harry and S. Fairhurst. *Phys.Rev. D83* (2011) 084002.
- [S6]: “A coherent triggered search for single spin compact binary coalescences in gravitational wave data.” I. Harry and S. Fairhurst. *Class.Quant.Grav.* **28** (2011) 134008.
- [S7]: “Searching for gravitational waves from binary coalescence” S. Babak, ..., I. Harry *et al.* *Phys.Rev. D87* (2013) 024033.
- [S8]: “Detecting binary neutron star systems with spin in advanced gravitational-wave detectors.” D. Brown, I. Harry, A. Lundgren and A. Nitz. *Phys.Rev. D86* (2012) 084017.
- [S9]: “When can gravitational-wave observations distinguish between black holes and neutron stars?” M. Hannam, D. Brown, S. Fairhurst, C. Fryer and I. Harry. *Astrophys.J.* **766** (2013) L14.
- [S10]: “Accuracy of gravitational waveform models for observing neutron-star-black-hole binaries in Advanced LIGO” A. Nitz, A. Lundgren, D. Brown, E. Ochsner, D. Keppel and I. Harry. *Phys.Rev. D88* (2013) 124039.
- [S11]: “Investigating the effect of precession on searches for neutron-star-black-hole binaries with Advanced LIGO” I. Harry, A. Nitz, D. Brown, A. Lundgren, E. Ochsner and D. Keppel. *Phys.Rev. D89* (2014) 024010.
- [S12]: “Implementing a search for aligned-spin neutron star-black hole systems with advanced ground based gravitational wave detectors ” Dal Canton, ..., I. Harry *et al.* *Phys.Rev. D90* (2014) 082004.
- [S13]: “Prospects for joint gravitational wave and short gamma-ray burst observations” J. Clark, H. Evans, S. Fairhurst, I. Harry, E. Macdonald, D. Macleod, P. Sutton and A. Williamson. *Astrophys.J.* **809** (2015) 53.
- [S14]: “Improved methods for detecting gravitational waves associated with short gamma-ray bursts” A. Williamson, C. Biwer, S. Fairhurst, I. Harry, E. Macdonald, D. Macleod and V. Predoi. *Phys.Rev. D90* (2014) 122004.
- [S15]: “Application of Artificial Neural Network to Search for Gravitational-Wave Signals Associated with Short Gamma-Ray Bursts” K. Kim, I. Harry, K. Hodge, Y.-M. Kim, C.-H. Lee, H.K. Lee, J.J. Oh, S.H. Oh and E.J. Son. *Class.Quant.Grav.* **32** (2015) 245002.
- [S16]: “The PyCBC search for gravitational waves from compact binary coalescence” S. Usman, M. Kehl, A. Nitz, I. Harry *et al.* *Class.Quant.Grav.* **33** (2016) 215004.

- [S17]: “Fully-coherent all-sky search for gravitational-waves from compact binary coalescences” D. Macleod, I. Harry and S. Fairhurst. [Phys.Rev. D93 \(2016\) 064004](#).
- [S18]: “Implementing a search for gravitational waves from binary black holes with nonprecessing spin” C. Capano, I. Harry, S. Privitera and A. Buonanno. [Phys.Rev. D93 \(2016\) 124007](#).
- [S19]: “Searching for Gravitational Waves from Compact Binaries with Precessing Spins” I. Harry, S. Privitera, A. Bohe and A. Buonanno. [Phys.Rev. D94 \(2016\) 024012](#).
- [S20]: “Improved effective-one-body model of spinning, nonprecessing binary black holes for the era of gravitational-wave astrophysics with advanced detectors” A. Bohé, ..., I. Harry, *et al.* [Phys.Rev. D95 \(2017\) 044028](#).
- [S21]: “Designing a template bank to observe compact binary coalescences in Advanced LIGO’s second observing run” T. Dal Canton, I. Harry. [ArXiv:1705.01845](#).
- [S22]: “Matter Effects on LIGO/Virgo Searches for Gravitational Waves from Merging Neutron Stars” T. Cullen, I. Harry, J. Read, E. Flynn. [Class.Quant.Grav. 34 \(2017\) 245003](#).
- [S23]: “Searching for the full symphony of black hole binary mergers” I. Harry, J. Calderón Bustillo, A. Nitz. [Phys. Rev. D97 \(2018\) 023004](#).
- [S24]: “Observing and measuring the neutron-star equation-of-state in spinning binary neutron star systems.”. I.Harry, T. Hinderer. [Class.Quant.Grav. 35 \(2018\) 145010](#).
- [S25]: “On the properties of the massive binary black hole merger GW170729.”. K. Chatziioannou, ..., I. Harry, *et al.* [Phys. Rev. D100 \(2019\) 104015](#).
- [S26]: “Convolutional neural networks: a magic bullet for gravitational-wave detection?”. T. Gebhard, N. Kilibertus, I. Harry, B. Schölkopf. [Phys. Rev. D100 \(2019\) 063015](#).
- [S27]: “2-OGC: Open Gravitational-wave Catalog of binary mergers from analysis of public Advanced LIGO and Virgo data” A. Nitz, ..., I. Harry, *et al.* [Astrophys.J. 891 \(2020\) 123](#).
- [S28]: “Search for strongly lensed counterpart images of binary black hole mergers in the first two LIGO observing runs” C. McIsaac, D. Keitel, T. Collett, I. Harry, *et al.* Accepted for publication in PRD.
- [S29]: “Lensed or not lensed: Determining lensing magnifications for binary neutron star mergers from a single detection” P. Pang, O. Hannuksela, T. Dietrich, G. Pagano and I. Harry. Undergoing peer review.
- [S30]: “Extending the PyCBC search for gravitational waves from compact binary mergers to a global network”. G. Davies, T. Dent, M. Tapai, I. Harry, *et al.* [Phys. Rev. D102 \(2020\) 022004](#).
- [S31]: “A Search for Gravitational Waves from Binary Mergers with a Single Observatory” A. Nitz, T. Dent, G. Davies and I. Harry. [Astrophys.J. 897 \(2020\) 169](#).
- [S32]: “Realtime search for compact binary mergers in Advanced LIGO and Virgo’s third observing run using PyCBC Live” T. Dal Canton, ..., I. Harry, *et al.* Undergoing peer review.

LSC-VIRGO  
PUBLICATIONS

As a member of the LIGO scientific collaboration my name has appeared on many papers published with the full LIGO author list. Here I list the papers to which I have made a significant contribution and describe that contribution.

- [L1]: “Search for Gravitational Waves from Low Mass Compact Binary Coalescence in 186 Days of LIGO’s fifth Science Run” B.Abbott *et al.* [Phys.Rev. D80 \(2009\) 047101](#).
  - As a junior graduate student I and a fellow graduate student, under the supervision of Steve Fairhurst, were responsible for coordinating, running and writing up this analysis for compact binary coalescences in a stretch of Initial LIGO data.
- [L2]: “Search for Gravitational Waves from Compact Binary Coalescence in LIGO and Virgo Data from S5 and VSRI” J.Abadie *et al.* [Phys.Rev. D82 \(2010\) 102001](#).
  - This paper described the results of a continuation of the search published in [L1]. A number of the methods I helped develop were used directly in this search.
- [L3]: “Search for Gravitational Waves from Low Mass Compact Binary Coalescence in LIGO’s Sixth Science Run and Virgo’s Science Runs 2 and 3” J.Abadie *et al.* [Phys.Rev. D85 \(2012\) 082002](#).
  - I was one of the lead maintainers of the “IHOPE” analysis that was used to produce the

results in this paper. I analysed stretches of this data myself and also helped training others to interpret the results of this analysis.

- [L4]: “Search for gravitational waves associated with gamma-ray bursts during LIGO science run 6 and Virgo science runs 2 and 3” J. Abadie *et al.*. [Astrophys. J. 760 \(2012\) 12](#).
- This paper was the first time that the methods described in my short-author paper [S5], was applied to the analysis of LIGO and Virgo data, searching for GRB + gravitational-wave coincident signals. I was responsible for applying and running our new analysis on the data and for producing the results specifically for compact binary coalescence signals.
  - I was one of two lead authors of this paper.
- [L5]: “Search for gravitational waves associated with gamma-ray bursts detected by the InterPlanetary Network” J. Aasi *et al.*. [Phys.Rev.Lett. 113 \(2014\) 011102](#).
- This paper used the analysis code “coh PTF”, which I wrote, to search for compact binary coalescences in coincidence with short GRBs.
- [L6]: “The NINJA-2 project: Detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations.” J. Aasi *et al.*. [Class.Quant.Grav. 31 \(2014\) 115004](#).
- I was the lead author on this work. I ran the weekly teleconferences where the ongoing work on this paper was discussed with the NINJA-2 collaboration and I ran the simulations and generated results plot in this work.
- [L7]: “Observation of Gravitational Waves from a Binary Black Hole Merger” B. Abbott *et al.*. [Phys.Rev.Lett. 116 \(2016\) 061102](#).
- The first direct detection of gravitational waves. I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s first observing run, which was used to obtain the significance statement used to claim with  $> 5\sigma$  confidence that GW150914 was astrophysical in origin.
- [L8]: “GW150914: First results from the search for binary black hole coalescence with Advanced LIGO” B. Abbott *et al.*. [Phys.Rev. D93 \(2016\) 122003](#).
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s first observing run, which was used to obtain the detection confidence statement quoted in this work. I also generated Fig. 3 of this work using methods published in my search methods short-author paper [S19].
- [L9]: “Tests of general relativity with GW150914” B. Abbott *et al.*. [Phys.Rev.Lett. 116 \(2016\) 221101](#).
- I contributed to the analysis constraining the parameters of the ringdown component of the observed signal, which appears in Fig. 5 of this work.
- [L10]: “GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence” B. Abbott *et al.*. [Phys.Rev.Lett. 116 \(2016\) 241103](#).
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s first observing run, which was used to obtain the detection confidence statement quoted in this work.
- [L11]: “Binary Black Hole Mergers in the first Advanced LIGO Observing Run” B. Abbott *et al.*. [Phys.Rev. X6 \(2016\) 041015](#).
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s first observing run, which was used to obtain some of the main results in this work. I was also one of the authors of the search analysis techniques section.
- [L12]: “Upper limits on the rates of binary neutron star and neutron-star–black-hole mergers from Advanced LIGO’s first observing run” B. Abbott *et al.*. [Astrophys. J. Lett. 832 \(2016\) L21](#)
- I was one of two lead authors on this work. I also coordinated generating, running and interpreting the results of the sets of simulated signals that were used to assess the sensitivity of Advanced LIGO and to constrain merger rates in the Universe.

- [L13]: “Search for gravitational waves associated with gamma-ray bursts during the First Advanced LIGO Observing Run and implications for the Origin of GRB 150906B” B. Abbott *et al.*. *Astrophys. J.* 841 (2017) 89
- This paper used the analysis code that I wrote to search for compact binary coalescences in coincidence with short GRBs. It also utilizes a number of new improvements to the search that I helped to develop ([S14]).
- [L14]: “GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2” B. Abbott *et al.*. *Phys.Rev.Lett.* 118 (2017) 221101.
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s second observing run, which was used to obtain the detection confidence statement quoted in this work. I performed the analysis of this data to evaluate the significance of this event, this was assigned on a rota basis amongst the search team.
- [L15]: “GW170814: A three-detector observation of gravitational waves from a binary black hole coalescence” B. Abbott *et al.*. *Phys.Rev.Lett.* 119 (2017) 141101.
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s second observing run, which was used to obtain the detection confidence statement quoted in this work. I also acted as an internal reviewer for some of the statements appearing in this work.
- [L16]: “GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral ” B. Abbott *et al.*. *Phys.Rev.Lett.* 119 (2017) 161101.
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s second observing run, which was used to obtain the detection confidence statement quoted in this work. I also worked on exploring the neutron-star equation-of-state, which lead towards the production of Figure 5.
- [L17]: “Gravitational Waves and Gamma-rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A.” B. Abbott *et al.*. *Phys.Rev.Lett.* 119 (2017) 161101.
- This paper used the analysis code that I wrote to search for compact binary coalescences in coincidence with short GRBs.
- [L18]: “Multi-Messenger Observations of a Binary Neutron Star Merger.” B. Abbott *et al.*. *Phys.Rev.Lett.* 119 (2017) 161101.
- This paper describes the real-time removal of a non-Gaussian transient in the Livingston data, which I performed, that was vital for production of the 3-observatory sky-map and subsequent electromagnetic observations.
- [L19]: “GW170608: Observation of a 19-solar-mass Binary Black Hole Coalescence” B. Abbott *et al.*. *Astrophys. J. Lett.* 851 (2017) L35.
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s second observing run, which first observed this event and was used to obtain the detection confidence statement quoted in this work.
- [L20]: “GW170817: Measurements of neutron star radii and equation of state” B. Abbott *et al.*. *Phys.Rev.Lett.* 121 (2018) 161101.
- I was one of the team of 5 people who wrote this paper.
- [L21]: “GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs” B. Abbott *et al.*. *Phys.Rev.* 9 (2019) 031040.
- This paper summarizes the results of the search for compact binary mergers in Advanced LIGO and Virgo to date.
  - This paper contains a number of results I directly generated or contributed to as one of the leaders of the “PyCBC” compact binary merger search effort.

- I was assigned as a liaison to the paper writing team to ensure that PyCBC results were generated for the paper are were shown accurately.
- [L22]: “Model comparison from LIGO-Virgo data on GW170817’s binary components and consequences for the merger remnant” B. Abbott *et al.*. [Class.Quant.Grav.](#) **37** (2020) 045006.
- I was the lead editor of this paper and was responsible for coordinating writing in a team of 5 primary editors.
  - I generated the Bayes Factors’ comparing various equation-of-state models, which form the primary scientific result in this paper.
- [L23]: “GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object” B. Abbott *et al.*. [Astrophys. J. Lett.](#) **896** (2020) L44.
- I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s third observing run, was used to obtain a detection confidence statement quoted in this work.
- [L24]: “GW190521: A Binary Black Hole Merger with a Total Mass of 150  $M_{\odot}$ ” B. Abbott *et al.*. [Astrophys. J. Lett.](#) **896** (2020) L44.
- This event was first identified by the “PyCBC Live” analysis pipeline, which I was one of the lead analysts of during the third observing run.
  - I was one of the main developers and maintainers of the “PyCBC” analysis during Advanced LIGO’s third observing run, was used to obtain a detection confidence statement quoted in this work.

CONFERENCES,  
PRESENTATIONS AND  
COURSES ATTENDED

- Invited seminar, Southampton, UK. “GW190425: Observation of a compact binary coalescence with a total mass of 3.4 solar masses” (2020)
- Invited talk, 5th IUPAP Nuclear Science Symposium, London, UK, “The multi-messenger signals from gravitational waves and the implications for nuclear synthesis” (2019)
- Workshop talks, “Beyond LIGO’s Black Holes: Are There More?” and “Adventures in LISA data analysis” at the KITP program “The New Era of Gravitational-Wave Astrophysics”, Santa Barbara, USA (2019).
- Invited talk, “Introduction to LIGO/Virgo Data Analysis and Results from Binary Neutron Star Observations in 01/02” at the “Merging Visions: Exploring Compact-Object Binaries with Gravity and Light” conference, Santa Barbara, USA (2019).
- Invited talk, LIGO/Virgo Open Data Workshop, Paris, France, “The methods used to observe compact binary mergers” (2019)
- Invited talk, GWEOS 19, Pisa, Italy, “The challenges and potential of observing neutron-star-black-hole mergers” (2019)
- Invited talk, Neutrino Oscillation Workshop, Ostuni, Italy, “Gravitational-wave astronomy” (2018)
- Invited talk, CAPRA meeting, Potsdam, Germany, “The dawn of gravitational-wave astronomy” (2018)
- Invited seminar, Technische Universitaet, Berlin, Germany, “Detecting colliding black holes with gravitational wave observatories” (2018)
- Contributed talk, GWPAW meeting Annecy, France, “Are we missing the most interesting binary mergers?” (2017). This talk was mentioned in the first slide of the “Conference highlights” presentation that followed discussion of the recent discovery of GW170107.
- Invited talk, APS April meeting, Salt Lake City, Utah, USA. “Computing meets LIGO” (2016)
- Contributed talk, APS April meeting, Salt Lake City, Utah, USA. “Searching for gravitational waves from compact binaries with precessing spins.” (2016)
- Invited talk, workshop on black holes and gravitational waves, near Cardiff, UK. “Observing compact binary coalescences”. (2015)
- Invited seminar, Annecy, France. “Listening for compact binary coalescences: On the first observations of the gravitational-wave sky”. (2015)

- Invited seminar, Potsdam-Golm, Germany. “Observing spinning neutron-star black-hole mergers with second generation gravitational-wave observatories”. (2014)
- Invited seminar, SUNY Geneseo, NY, USA. “Can we hear black holes collide?: Towards the first observations of the gravitational-wave sky.” (2013)
- Invited seminar, CITA, Toronto, Canada. “ Observing spinning neutron-star black-hole mergers with second generation gravitational-wave observatories” (2013)
- NRDA Meeting, Mallorca, Spain. Talk “The NINJA-2 project: Combining the numerical relativity and data-analysis communities to optimise binary black hole searches with 2nd generation gravitational wave detectors.” (2013)
- APS April Meeting, Denver, CO, USA. Talk “Observing spinning NSBH coalescences with second generation gravitational wave observatories.” (2013)
- “Chirps, Mergers and Explosions: The Final Moments of Coalescing Compact Binaries”, Santa Barbara, CA, USA. Invited participant of KITP workshop between August-September 2012.
- “Rattle and Shine: Gravitational Wave and Electromagnetic Studies of Compact Binary Mergers”, Santa Barbara, CA, USA. Invited talk “Searching for Binaries with Spin in aLIGO and AdvVirgo” (2012)
- Amaldi 9, Cardiff, UK. Talk “Targeted coherent search for gravitational waves from compact binary coalescences.” (2011)
- Invited seminar, Southampton, UK. “Searching for Compact Binary Coalescences with the LIGO and Virgo gravitational wave detectors.” (2010)
- BritGrav10, Dublin, Ireland. Talk “Coherently searching for spinning compact binary coalescences”. (2010)
- GWDAW 14, Rome, Italy. Talk “Status of the search for untriggered gravitational wave signals from compact binary coalescences in LIGO and Virgo data during S5/VSR1” (2010)
- Amaldi 8, New York, NY. Talk ““Black Hole Hunter”: The game that lets YOU search for gravitational waves” (2009)
- JeNAM 2009, Hertfordshire, U.K. Talk “The Search for Low Mass Compact Binary Coalescences in LIGO’s S5 Data” (2009)
- BritGrav9, Cardiff, U.K. Talk “The Search for Low Mass Compact Binary Coalescences in LIGO’s S5 Data” (2009)
- NAM 2008, Belfast, U.K. Poster “A search for Super Massive Binary Black Hole Coalescences in the Mock LISA Data Challenge” (2008)
- BritGrav8, York, U.K. Talk “A search for Super Massive Binary Black Hole Coalescences in the Mock LISA Data Challenge” (2008)
- GWDAW 12, Boston, MA. Poster “A search for Super Massive Binary Black Hole Coalescences in the MLDC 1B dataset” (2007)
- I have had an active participation in many LIGO/Virgo collaboration meetings. I have presented my work to the compact binary coalescence working group at many face to face sessions at these meetings and have given multiple plenary session talks to the full collaboration.