Aldo Ejlli

Contact Informations

Name: Aldo Ejlli
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Work Experience

2023	**Research Group Leader**
Current	*Precision Interferometry and Fundamental Interactions*
Employer	**Max-Plank-Institute for Gravitational Wave Physics (Albert-Einstein-Institute)**
Location	Hannover, Germany

2018-2023	**Postdoctoral Research Associate**
	Conducting research and development for the construction of two sensitive co-located power-recycled Michelson interferometers for quantum space-time research at Cardiff University
Employer	**Cardiff University**
Location	Cardiff, UK

2017 2018	**Postdoctoral Researcher in Precision Optics Experiment**
	Conducted research and development of the PVLAS experiment, which aimed to make the first measurement of vacuum magnetic birefringence at the University of Ferrara
Employer	**University of Ferrara**
Location	Ferrara, IT

Education

2014 - 2017	**PhD in Physics**
Institution	University of Ferrara
Thesis Title	*Progress towards a first measurement of the magnetic birefringence of vacuum with a polarimeter based on a Fabry-Perot cavity*
Supervisors	Prof. Guido Zavattini (UNIFE) and Dr Federico Della Valle (UNTS)

2011 - 2013	**Master in Physics**
Institution	University of Ferrara
Thesis Title	*Measurement of the Cotton-Mouton effect in water vapor with an ellipsometer based on a Fabry-Perot cavity*
Supervisor	Prof. Guido Zavattini (UNIFE)

2007 - 2010	**Bachelor degree in Physics and Astrophysics**
Institution	University of Ferrara
Thesis Title	*Volume reflection in silicon crystals*
Supervisor	Prof. Vincenzo Guidi (UNIFE)

Grants, Awards, Fellowships, and Certificates

- **Grants:**
  - Innovation for All grant: Cardiff University, United Kingdom. Year: 2022.
- **Awards:**

  - Bruno Rossi prize for the best national doctoral thesis in Astroparticle Physics for the year 2018. Institution: Institute of Nuclear Physics (INFN), Italy.

- **Fellowships and Certificates**
  - **University Fellowship for Ph.D. Graduate Students:** University of Ferrara, awarded for 2014-2017.
  - **Certificate in European Integration:** Faculty of Law, University of Ferrara, received in 2012.

Teaching Experience

I have actively contributed to the academic programs in the School of Physics and Astronomy at Cardiff University, participating in the instruction of the following courses:

- **Statistical Mechanics:** Taught during the academic years 2021/2023.
- **Experimental Gravitational II:** Taught during the academic year 2020/2021.
- **Experimental Gravitational I:** Taught during the academic year 2019/2020.
- **Modern Quantum Optics:** Taught during the academic years 2018/2020.

Experience with Supervision

Max Planck Institute for Gravitational Physics (AEI), Hannover (From 2023 to date):

- Currently overseeing multiple postgraduate researchers and postdocs in laser interferometry for fundamental physics research.

Cardiff University (2019-2023):

- Guided and supervised postgraduate researchers in diverse projects related to experimental gravitational physics and laser interferometry for quantum gravity signature investigations.

Cardiff University (2019):

- Guided a summer student involved in the Finesse software simulation of a 3 m arm-length power-recycled Michelson interferometer.

Ferrara University (2017-2018):

- Supervised a Master's student conducting research on "Towards the Measurement of Vacuum Magnetic Birefringence: Test of a New Polarization Modulation Scheme."

Seminars, Workshops, and Conferences

Invited speaker

- *Heterodyne Detection*, Ultra-high frequency gravitational waves: where to next?, Dec 4–8, 2023 CERN, Switzerland.
- *Exploring dark matter and quantum space-time fluctuations through precision laser interferometry*, Searching for New Physics at the Quantum Technology Frontier Jul 2–7, 2023, Congressi Stefano Franscini (CSF), Ascona (Ticino), Switzerland.
- *Quantum Physics – the next generation*, Welsh Physics Teachers Conference Brecon, October 7, 2022.
- *Graviton-Photon Mixing and Future Laboratory Axion Searches*, Particle Physics Seminars, University of Birmingham, 2 Feb 2022.
- *Upper limits on HFGW from graviton to photon conversion*, Physics Opportunities at 100-500 MHz Haloscopes, 17 Feb 2022.

- *Ultra-high-frequency gravitational waves*, Quantum consortium workshop, Birmingham, Jan. 26-28, 2022.
- *Magnetic Conversion Detectors*, Ultra-High-Frequency GWs: A Theory and Technology Roadmap, 12 October 2021.
- *Optical receivers for the ALPS magnets*, Beyond ALPS II workshop, 8-9 February 2021.
- *Progress towards a first measurement of the magnetic birefringence of vacuum with a polarimeter based on a Fabry-Perot cavity: The PVLAS experiment*, INFN National Scientific Commission II, Siena, Italy, 09 April 2019.
- *Progress towards a first measurement of the magnetic birefringence of vacuum with a polarimeter based on a Fabry-Perot cavity*, Gravitational wave group at School of Physics Astronomy, Cardiff University, 17 January 2018.

Conference with Contribution

- *Probing the quantum nature of spacetime and beyond: The QUEST experiment uses two quantum-enhanced co-located interferometers for investigating space-time fluctuation and other fundamental physics research*, Quantum 2023, September 10 - 15, 2023, Torino, Italy.
- *Direct Search for Axion-Like Particles and Scalar-Field Dark Matter using Polarimetry with a Fabry-Perot Cavity*, 57th Rencontres de Moriond, 23 March 2023.
- *Experimental upper limits of ultra-high-frequency stochastic gravitational waves from graviton to photon conversion in a static magnetic field*, 56th Rencontres de Moriond, 1-6 Feb 2022.
- *Upper limits on the amplitude of ultra-high-frequency gravitational waves from graviton to photon conversion*, EPS-HEP – Virtual conference DESY Hamburg Germany, 26 July 2021.
- *Upper limits on the amplitude of Ultra-High-Frequency gravitational waves from graviton-to-photon mixing*, 19th Lomonosov conference Moscow Russia, August 24, 2019.
- *Experimental limits on the magnetic birefringence of the vacuum and limits on the existence of model-independent axion-like particles*, IFAE 2015, Rome, Italy, 8-10 Apr 2015.

Workshops

- *Warwick conference and networking event Quantum Technology for Fundamental Physics (QTFP)*, Thu, 2 Feb 2023, 10:30 –Fri, 3 Feb 2023.
- *Quantum-Interferometry Consortium Workshop*, Wednesday 1st Feb. 2023
- *Exhibition of the work package 3 of Quantum-Interferometry Consortium to the UK National Quantum Technologies Showcase* , London, 11 November 2022.
- *Quantum World workshop* at the School of Physics and Astronomy, UK, November 8, 2022
- *VMB@CERN initiative*: CERN Switzerland, January 17, 2019, September 24, 2019, and Ferrara Italy, January 5, 2020.
- *LIGO India Meeting*, Glasgow UK, 18-20 July 2018
- *INFN Piano Triennale*, Cagliari Italy, 13-14 October, 2017.
- *What Next 2016*, Rome Italy, Feb 16 – 17, 2016.
- *QED vacuum magnetic birefringence workshop*, DESY Hamburg Germany, 3-5 November 2015.

Conference and Workshop Organization Experience

- Member of the Local Organizing Committee for the *Quantum World Workshop* at the School of Physics and Astronomy in the UK, held on November 8, 2022.
- Member of the Local Organizing Committee for the *LIGO-Virgo-KAGRA Collaboration Meeting,* held from September 12-15, 2022.

Continued Professional Development

- *Regrading Explained,* Cardiff University
- *Rapid Reading,* Cardiff University
- *Bystander Awareness Training,* Cardiff University
- *From Complexity to Clarity - Communicating the Impact of Your Research,* Cardiff University
- *Introduction to Planning an Academic Career,* Cardiff University
- *Fellowship Support Program,* Cardiff University
- *Unconscious Bias,* Cardiff University
- *Countering Fraud and Bribery in Universities,* Cardiff University
- *Research Professional Funding Database - Hands-on Training,* Cardiff University
- *Equality, Diversity, and Inclusivity,* Cardiff University

Scientific Collaborations

- Member of the QTFP UK-consortium, *Quantum-enhanced interferometry for new physics consortium* (2020-2023)
- Member of the *VMB@CERN collaboration* (2019-2023).
- Member of the *LIGO Scientific Collaboration* (2018–Sept. 2023)
- Member of the *PVLAS Collaboration* (2013–2018).

Peer Review (Referee) - Academic Journals

- PRA, PRD, and PRL published by the American Physical Society Physics
- Living Reviews in Relativity

PhD Referee

- Member of the jury for the Ph.D. thesis defense of a candidate at Université de Namur ASBL, Rue de Bruxelles 61 - 5000 Namur Belgique.

Outreach Activities

- Quantum World Workshop between school teachers and researchers, *Gravitational Waves,* November 8, 2022
- Welsh Physics Teachers Conference Brecon, *Quantum Physics – the next generation,* October 7, 2022
- Cardiff Science Festival session Gravitational Waves, *Meet the Experts,* February 20, 2021

Publications

Short Author List Publications

1. **A. Ejlli**, S.M. Vermeulen, E. Schwartz, L. Aiello, and H. Grote, "Probing scalar field DM and axion-like particles with polarimetry techniques", Phys. Rev. D **107**, 083035 (2023).

2. Lorenzo A., **A. Ejlli**, K. L. Dooley, W. L. Griffiths, A. L. James, K. Kokeyam, A. Patra, E. Schwartz, S. M. Vermeulen, and H. Grote, "Quantum technologies for quantum gravity phenomena and other fundamental physics research", SPIE Photonex November 2022.

3. G. Zavattini, F. Della Valle, A.M. Soflau, L. Formaggio, G. Crapulli, G. Messineo, E. Mariotti, S. Kunc, **A. Ejlli**, G. Ruoso, C. Marinelli, M. Andreotti, "Polarimetry for measuring the vacuum magnetic birefringence with quasi-static fields. A feasibility study for the VMB@CERN experiment", Eur.Phys.J.C **82** 2, 159 (2022).

4. W.L. Griffiths, L. Aiello, **A. Ejlli**, A. L. James, S. M. Vermeulen, K. L. Dooley, H. Grote, "Optimization of table-top 3D interferometers for Observational Quantum Gravity" Contribution to: 55th Rencontres de Moriond on Gravitation, e-Print: 2105.09664 (2021).

5. S. M. Vermeulen, L. Aiello, **A. Ejlli**, W. L. Griffiths, A. L. James, K. L. Dooley and H. Grote, "An Experiment for Observing Quantum Gravity Phenomena using Twin Table-Top 3D Interferometers", Class. Quant. Grav., **38** 8, 085008 (2021).

6. **A. Ejlli**, F. Della Valle, U. Gastaldi, G. Messineo, R. Pengo, G. Ruoso, G. Zavattini, "The PVLAS experiment: A 25-year effort to measure vacuum magnetic birefringence", Phys. Rept. **871** 1-74 (2020).

7. **A. Ejlli**, D. Ejlli, A. M. Cruise, G. Pisano, H. Grote, "Upper limits on the amplitude of ultra-high-frequency gravitational waves from graviton to photon conversion", Eur. Phys. J. C **79** 12, 1032 (2019).

8. G. Zavattini, F. Della Valle, **A. Ejlli**, W.-T. Ni, U. Gastaldi, E. Milotti, R. Pengo, G. Ruoso, "Intrinsic mirror noise in Fabry–Perot based polarimeters: the case for the measurement of vacuum magnetic birefringence", Eur. Phys. J. C **78**, 585 (2018).

9. **A. Ejlli**, F. Della Valle, G. Zavattini, "Polarisation dynamics of a birefringent Fabry-Perot cavity", App. Phys. B **124**, 22 (2018).

10. G. Zavattini, F. Della Valle, **A. Ejlli**, G. Ruoso, "A polarisation modulation scheme for measuring vacuum magnetic birefringence with static fields", European Physics Journal C **76**, 294 (2016), Erratum: Physical Journal C **77** (12) (2017).

11. F. Della Valle, **A. Ejlli**, U. Gastaldi, G. Messineo, E. Milotti, R. Pengo, G. Ruoso, G. Zavattini, "The PVLAS experiment: measuring vacuum magnetic birefringence and dichroism with a birefringent Fabry-Perot", European Physics Journal C **76**, 24 (2016).

12. **A. Ejlli**, F. Della Valle, U. Gastaldi, G. Messineo, E. Milotti, R. Pengo, G. Ruoso, G. Zavattini, "Progress toward a direct experimental detection of gamma-gamma interactions", Nuclear and Particle Physics Proceedings **270-272**, 67 (2016).

13. F. Della Valle, **A. Ejlli**, U. Gastaldi, G. Messineo, E. Milotti, R. Pengo, L. Piemontese, G. Ruoso, G. Zavattini, "New PVLAS model-independent limit for the axion coupling to $\gamma\gamma$ for axion masses above 1 meV", AXION-WIMP **67-70**, (2014).

14. F. Della Valle, E. Milotti, **A. Ejlli**, G. Messineo, L. Piemontese, G. Zavattini, U. Gastaldi, R. Pengo, G. Ruoso, "First results from the new PVLAS apparatus: a new limit on vacuum magnetic birefringence", Physical Review D **90**, 092003 (2014)

15. F. Della Valle, E. Milotti, **A. Ejlli**, U. Gastaldi, G. Messineo, L. Piemontese, G. Zavattini, R. Pengo, G. Ruoso, "Extremely long decay long decay time optical cavity", Optics Express **22**, 11570 (2014).

16. F. Della Valle, **A. Ejlli**, U. Gastaldi, G. Messineo, E. Milotti, R. Pengo, L. Piemontese, G. Ruoso, S. Sabotig, G. Zavattini, "Experimental perspectives in (low-energy) photon-photon scattering", Journal of Physics: Conference Series **490**, 012153 (2014).

17. F. Della Valle, **A. Ejlli**, U. Gastaldi, G. Messineo, E. Milotti, R. Pengo, L. Piemontese, G. Ruoso, G. Zavattini, "Measurement of the Cotton-Mouton effect of water vapour", Chemical Physics Letters **592**, 288 (2014).

Collaborations Publications

Since July 2018, I have been a member of the LIGO Scientific Collaboration and have contributed as a co-author to the articles listed below.

1. D. Ganapathy *et al.* [LIGO O4 Detector], "Broadband Quantum Enhancement of the LIGO Detectors with Frequency-Dependent Squeezing," Phys. Rev. X **13**, no.4, 041021 (2023) doi:10.1103/PhysRevX.13.041021
2. C. Fletcher *et al.* [Fermi Gamma-ray Burst Monitor Team, LIGO Scientific, VIRGO and KAGRA], "A Joint Fermi-GBM and Swift-BAT Analysis of Gravitational-Wave Candidates from the Third Gravitational-wave Observing Run," [arXiv:2308.13666 [astro-ph.HE]].
3. A. G. Abac *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for Eccentric Black Hole Coalescences during the Third Observing Run of LIGO and Virgo," [arXiv:2308.03822 [astro-ph.HE]].
4. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for gravitational-lensing signatures in the full third observing run of the LIGO-Virgo network," [arXiv:2304.08393 [gr-qc]].
5. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Open data from the third observing run of LIGO, Virgo, KAGRA and GEO," Astrophys. J. Suppl. **267**, no.2, 29 (2023) doi:10.3847/1538-4365/acdc9f [arXiv:2302.03676 [gr-qc]].
6. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for subsolar-mass black hole binaries in the second part of Advanced LIGO's and Advanced Virgo's third observing run," [arXiv:2212.01477 [astro-ph.HE]].
7. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for gravitational-wave transients associated with magnetar bursts in Advanced LIGO and Advanced Virgo data from the third observing run," [arXiv:2210.10931 [astro-ph.HE]].
8. R. Abbott *et al.* [LIGO Scientific, KAGRA and VIRGO], "Model-based Cross-correlation Search for Gravitational Waves from the Low-mass X-Ray Binary Scorpius X-1 in LIGO O3 Data," Astrophys. J. Lett. **941**, no.2, L30 (2022), doi:10.3847/2041-8213/aca1b0 [arXiv:2209.02863 [astro-ph.HE]].
9. R. Abbott *et al.* [KAGRA, LIGO Scientific and VIRGO], "Search for continuous gravitational wave emission from the Milky Way center in O3 LIGO-Virgo data," Phys. Rev. D **106**, no.4, 042003 (2022), doi:10.1103/PhysRevD.106.042003
10. R. Abbott *et al.* [LIGO Scientific, VIRGO, KAGRA and CHIME/FRB], "Search for Gravitational Waves Associated with Fast Radio Bursts Detected by CHIME/FRB During the LIGO–Virgo Observing Run O3a,"
11. R. Abbott *et al.* [KAGRA, VIRGO and LIGO Scientific], "First joint observation by the underground gravitational-wave detector KAGRA with GEO 600," PTEP **2022**, no.6, 063F01 (2022), doi:10.1093/ptep/ptac073
12. R. Abbott *et al.* [KAGRA, VIRGO and LIGO Scientific], "Search for gravitational waves from Scorpius X-1 with a hidden Markov model in O3 LIGO data," Phys. Rev. D **106**, no.6, 062002 (2022), doi:10.1103/PhysRevD.106.062002
13. R. Abbott *et al.* [KAGRA, LIGO Scientific and VIRGO], "All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO and Advanced Virgo O3 data," Phys. Rev. D **106**, no.10, 102008 (2022), doi:10.1103/PhysRevD.106.102008

14. R. Abbott *et al.* [LIGO Scientific, KAGRA and VIRGO], "Narrowband Searches for Continuous and Long-duration Transient Gravitational Waves from Known Pulsars in the LIGO-Virgo Third Observing Run," Astrophys. J. **932**, no.2, 133 (2022), doi:10.3847/1538-4357/ac6ad0

15. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Tests of General Relativity with GWTC-3,"

16. R. Abbott *et al.* [KAGRA, VIRGO and LIGO Scientific], "All-sky search for gravitational wave emission from scalar boson clouds around spinning black holes in LIGO O3 data," Phys. Rev. D **105**, no.10, 102001 (2022), doi:10.1103/PhysRevD.105.102001

17. R. Abbott *et al.* [LIGO Scientific and VIRGO], "Search of the early O3 LIGO data for continuous gravitational waves from the Cassiopeia A and Vela JR. supernova remnants," Phys. Rev. D **105**, no.8, 082005 (2022), doi:10.1103/PhysRevD.105.082005

18. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Searches for Gravitational Waves from Known Pulsars at Two Harmonics in the Second and Third LIGO-Virgo Observing Runs," Astrophys. J. **935**, no.1, 1 (2022), doi:10.3847/1538-4357/ac6acf

19. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Constraints on the cosmic expansion history from GWTC-3,"

20. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "The population of merging compact binaries inferred using gravitational waves through GWTC-3,"

21. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift during the LIGO–Virgo Run O3b," Astrophys. J. **928**, no.2, 186 (2022), doi:10.3847/1538-4357/ac532b

22. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run,"

23. R. Abbott *et al.* [KAGRA, Virgo and LIGO Scientific], "All-sky, all-frequency directional search for persistent gravitational waves from Advanced LIGO's and Advanced Virgo's first three observing runs," Phys. Rev. D **105**, no.12, 122001 (2022), doi:10.1103/PhysRevD.105.122001

24. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for Subsolar-Mass Binaries in the First Half of Advanced LIGO's and Advanced Virgo's Third Observing Run," Phys. Rev. Lett. **129**, no.6, 061104 (2022), doi:10.1103/PhysRevLett.129.061104

25. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for continuous gravitational waves from 20 accreting millisecond x-ray pulsars in O3 LIGO data," doi:10.1103/PhysRevD.105.022002

26. R. Abbott *et al.* [LIGO Scientific and VIRGO], "GWTC-2.1: Deep Extended Catalog of Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run,"

27. R. Abbott *et al.* [KAGRA, VIRGO and LIGO Scientific], "All-sky search for long-duration gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run," Phys. Rev. D **104**, no.10, 102001 (2021), doi:10.1103/PhysRevD.104.102001

28. R. Abbott *et al.* [KAGRA, VIRGO and LIGO Scientific], "All-sky search for short gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run," Phys. Rev. D **104**, no.12, 122004 (2021), doi:10.1103/PhysRevD.104.122004

29. R. Abbott *et al.* [KAGRA, VIRGO and LIGO Scientific], "All-sky search for continuous gravitational waves from isolated neutron stars in the early O3 LIGO data," Phys. Rev. D **104**, no.8, 082004 (2021), doi:10.1103/PhysRevD.104.082004

30. R. Abbott *et al.* [LIGO Scientific, KAGRA and VIRGO], "Observation of Gravitational Waves from Two Neutron Star–Black Hole Coalescences," Astrophys. J. Lett. **915**, no.1, L5 (2021), doi:10.3847/2041-8213/ac082e

31. R. Abbott *et al.* [LIGO Scientific, VIRGO and KAGRA], "Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo," Astron. Astrophys. **659**, A84 (2022), doi:10.1051/0004-6361/202141452

32. R. Abbott *et al.* [LIGO Scientific, KAGRA and Virgo], "Constraints on dark photon dark matter using data from LIGO's and Virgo's third observing run," Phys. Rev. D **105**, no.6, 063030 (2022), doi:10.1103/PhysRevD.105.063030

33. R. Abbott *et al.* [LIGO Scientific, VIRGO, KAGRA and Virgo], "Searches for Continuous Gravitational Waves from Young Supernova Remnants in the Early Third Observing Run of Advanced LIGO and Virgo," Astrophys. J. **921**, no.1, 80 (2021), doi:10.3847/1538-4357/ac17ea

34. R. Abbott *et al.* [LIGO Scientific and VIRGO], "Search for Lensing Signatures in the Gravitational-Wave Observations from the First Half of LIGO–Virgo's Third Observing Run," Astrophys. J. **923**, no.1, 14 (2021), doi:10.3847/1538-4357/ac23db

35. R. Abbott *et al.* [LIGO Scientific, Virgo and KAGRA], "Constraints from LIGO O3 Data on Gravitational-wave Emission Due to R-modes in the Glitching Pulsar PSR J0537–6910," Astrophys. J. **922**, no.1, 71 (2021), doi:10.3847/1538-4357/ac0d52

36. R. Abbott *et al.* [KAGRA, Virgo and LIGO Scientific], "Search for anisotropic gravitational-wave backgrounds using data from Advanced LIGO and Advanced Virgo's first three observing runs," Phys. Rev. D **104**, no.2, 022005 (2021), doi:10.1103/PhysRevD.104.022005

37. R. Abbott *et al.* [KAGRA, Virgo and LIGO Scientific], "Upper limits on the isotropic gravitational-wave background from Advanced LIGO and Advanced Virgo's third observing run," Phys. Rev. D **104**, no.2, 022004 (2021), doi:10.1103/PhysRevD.104.022004

38. R. Abbott *et al.* [LIGO Scientific, Virgo and KAGRA], "Constraints on Cosmic Strings Using Data from the Third Advanced LIGO–Virgo Observing Run," Phys. Rev. Lett. **126**, no.24, 241102 (2021), doi:10.1103/PhysRevLett.126.241102

39. R. Abbott *et al.* [LIGO Scientific, Virgo and KAGRA], "Diving below the Spin-down Limit: Constraints on Gravitational Waves from the Energetic Young Pulsar PSR J0537-6910," Astrophys. J. **913**, L27 (2021), doi:10.3847/2041-8213/abffcd

40. R. Abbott *et al.* [LIGO Scientific and Virgo], "All-sky search in early O3 LIGO data for continuous gravitational-wave signals from unknown neutron stars in binary systems," Phys. Rev. D **103**, no.6, 064017 (2021), doi:10.1103/PhysRevD.103.064017

41. R. Abbott *et al.* [LIGO Scientific and Virgo], "Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog," Astrophys. J. Lett. **913**, no.1, L7 (2021), doi:10.3847/2041-8213/abe949

42. R. Abbott *et al.* [LIGO Scientific and Virgo], "GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run," Phys. Rev. X **11**, 021053 (2021), doi:10.1103/PhysRevX.11.021053

43. R. Abbott *et al.* [LIGO Scientific and Virgo], "Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO-Virgo Run O3a," Astrophys. J. **915**, no.2, 86 (2021), doi:10.3847/1538-4357/abee15

44. R. Abbott *et al.* [LIGO Scientific and Virgo], "Tests of general relativity with binary black holes from the second LIGO-Virgo gravitational-wave transient catalog," Phys. Rev. D **103**, no.12, 122002 (2021), doi:10.1103/PhysRevD.103.122002

45. R. Abbott *et al.* [LIGO Scientific and Virgo], "GW190521: A Binary Black Hole Merger with a Total Mass of $150M_{\odot}$," Phys. Rev. Lett. **125**, no.10, 101102 (2020).

46. R. Abbott *et al.* [LIGO Scientific and Virgo], "Properties and Astrophysical Implications of the 150 $M_{\odot}$ Binary Black Hole Merger GW190521," Astrophys. J. Lett. **900**, no.1, L13 (2020), doi:10.3847/2041-8213/aba493

47. R. Abbott *et al.* [LIGO Scientific and Virgo], "Gravitational-wave Constraints on the Equatorial Ellipticity of Millisecond Pulsars," Astrophys. J. Lett. **902**, no.1, L21 (2020), doi:10.3847/2041-8213/abb655

48. R. Abbott *et al.* [LIGO Scientific and Virgo], "GW190814: Gravitational Waves from the Coalescence of a 23 Solar Mass Black Hole with a 2.6 Solar Mass Compact Object," Astrophys. J. Lett. **896**, no.2, L44 (2020), doi:10.3847/2041-8213/ab960f

49. R. Abbott *et al.* [LIGO Scientific and Virgo], "GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses," Phys. Rev. D **102**, no.4, 043015 (2020), doi:10.1103/PhysRevD.102.043015

50. R. Hamburg *et al.* [Fermi Gamma-ray Burst Monitor Team, LIGO Scientific and Virgo], "A Joint Fermi-GBM and LIGO/Virgo Analysis of Compact Binary Mergers From the First and Second Gravitational-wave Observing Runs," Astrophys. J. **893**, 100 (2020), doi:10.3847/1538-4357/ab7d3e

51. R. Abbott *et al.* [LIGO Scientific and Virgo], "Open data from the first and second observing runs of Advanced LIGO and Advanced Virgo," SoftwareX **13**, 100658 (2021), doi:10.1016/j.softx.2021.100658