Adrian F. Helmling-Cornell

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Education

M.S. in Physics from the University of Oregon, 2020.
B.S. in Honors Physics from Purdue University, 2018.

Research Activities

LIGO Scientific Collaboration March 2019 - Present

Supervised by Raymond Frey and Robert Schofield.
Observing gravitational radiation from astrophysical sources. Identifying and mitigating sources of environmental noise that couple into the gravitational wave detector. Searching for sources of blip glitches in the gravitational wave data channel. Validating and vetting event candidates during LIGO's third observing run. Monitoring the data quality of the detector from week-to-week. Producing materials for the outreach group.

Modulation Experiment May 2016 - May 2018

Supervised by Rafael Lang and Cassie Reuter.
Investigated claims of time-varying β-decay rate in certain isotopes associated with changing flux of dark matter candidate particles of solar origin. Calibrated photomultiplier tubes used for detecting radioactive decays. Designed a method for discriminating between decays from radioactive sources and background radiation. Mitigated the effects of pileup in the photomultiplier tubes.

Selected Publications & Preprints

1. "LIGO Detector Characterization in the first half of the fourth Observing run," S. Soni, *et al.* [arXiv: 2409.02831 [astro-ph.IM]].

   Experiment design, data collection, analysis, paperwriting section lead

2. "Observation of Gravitational Waves from the Coalescence of a 2.5–4.5 $M_\odot$ Compact Object and a Neutron Star," A. Abac, *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJL* **970**, L34 (2024) [arXiv: 2404.04248 [astro-ph.HE]].

   Review team member

3. "Automated evaluation of environmental coupling for Advanced LIGO gravitational wave detections," A. Helmling-Cornell, P. Nguyen, R. Schofield, R. Frey., *Class. Quantum Grav.* **41**, no.14, 145003 (2024) [arXiv: 2312.0073 [gr-qc]].

   Experiment design, data collection, analysis, lead author

4. "Search for Gravitational Waves Associated with Fast Radio Bursts Detected by CHIME/FRB During the LIGO-Virgo Observing Run O3a," R. Abbott *et al.* (LIGO-Virgo-KAGRA, CHIME/FRB Collaborations), *ApJ* **955**, 2 (2023) [arXiv: 2203.12038 [astro-ph.HE]].

   Data analysis

5. "Population of Merging Compact Binaries Inferred Using Gravitational Waves through GWTC-3," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. X* **13** 011048 (2023) [arXiv: 2111.03634 [gr-qc]].

   Paperwriting team member

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6. "General-relativistic precession in a black-hole binary," M. Hannam *et al. Nature* **610**, no.7933, 652-655 (2022) [arXiv: 2112.11300 [gr-qc]].

   Data analysis

7. "Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Astron. Astrophys.* **659**, A84 (2022) [arXiv: 2105.15120 [astro-ph.HE]].

   Review team member

8. "Environmental noise in Advanced LIGO detectors," P. Nguyen *et al.*, *Class. Quantum Grav.* **38**, no.14, 145001 (2021) [arXiv: 2101.09935 [astro-ph.IM]].

   Data collection, analysis

9. "LIGO detector characterization in the second and third observing runs," D. Davis *et al.*, *Class. Quantum Grav.* **38**, no.13, 135014 (2021) [arXiv: 2101.11673 [astro-ph.IM]].

   Data analysis, paperwriting team member

10. "A precision experiment to investigate long-lived radioactive decays," J.R. Angevaare *et al.*, *JINST* **13**, no.07, P07011 (2018) [arXiv: 1804.02765 [nucl-ex]].

    Experiment design, data collection, analysis

Presentations

1. "Identifying Environmental Noise in LIGO's Fourth Observing Run," Fullerton, CA, February 2025.
2. "Quantifying LIGO's Response to Environmental Disturbances in O4 and Beyond," LIGO Seminar Series, Pasadena, CA, February 2025.
3. "Evaluating Environmental Noise at LIGO," Gravitational Wave Astronomy North West, Hanford, WA, June 2023.
4. "Prospects for Observing Cosmic Strings in LIGO's Fourth Observing Run," Gravitational Wave Astronomy North West, Hanford, WA, June 2022.
5. "Blip Glitches in LHO," Gravitational Wave Astronomy Northwest, virtual meeting, June 2020.

Posters

1. "LIGO Detector Characterization for the Fourth Observing Run," American Physical Society April Meeting, Sacramento CA, April 2024.
2. "Prospects for Constraining Cosmic String Properties," LIGO-Virgo-KAGRA Collaboration Meeting, Baton Rouge, LA, March 2024.
3. "Studying Observable Cosmic String Bursts with Bilby in O4," LIGO-Virgo-KAGRA Collaboration Meeting, Evanston, IL, March 2023.
4. "Identifying and Mitigating Environmental Noise in the Advanced LIGO Detectors," American Astronomical Society Meeting #241, Seattle, WA, January 2023. Abstract available at *Bulletin of the American Astronomical Society* **55**, no.2, id.268.08.
5. "No Blip Glitching Found in LIGO Data Acquisition System in O3 or O4 Configuration," LIGO-Virgo-KAGRA Collaboration Meeting, virtual meeting, September 2021.
6. "LIGO Detector Characterization: O2/O3 Successes and O4 Plans," LIGO-Virgo-KAGRA Collaboration Meeting, virtual meeting, March 2021.

Awards

1. Honorable Mention, LIGO Laboratory Award for Excellence in Detector Characterization and Calibration (November 2023).
2. IOP Publishing Outstanding Reviewer Award 2022 (March 2023).
3. LIGO-Virgo-KAGRA Instrumental/Experimental Student Poster Prize (September 2021).
4. Weiser First Year Teaching Assistant Award (June 2019).

Review Experience

Reviewer for *Classical and Quantum Gravity* 5 reviews completed

LIGO Collaboration Service

Review team member, GW230529 discovery paper (2024)
Paperwriting team member, O4a all-sky short duration burst search paper (2023 - Present)
Trainee, Detchar noise mitigation review team (2023 - Present)
Member, O4a Detchar Level 1 Rapid Response Team (2023 - Present)
Science summary reviewer, O3 EBBH search paper (2023)
Internal Publications and Presentations Reviewer (1 paper reviewed) (2023)
Member, O4a Level 0 Rapid Response Team (2023)
Analyst, O3b Triggered X-pipeline FRB search (2023)
Member, O4a detchar event validation team (2023 - Present)
O4 data quality shift mentor (2023 - Present)
LIGO Hanford Detector Characterization Co-lead (August 2022 - Present)
Pre-stabilized Laser O4 Detector Characterization Lead (March 2022 - Present)
Analyst, O3a Triggered PyGRB FRB search (2021)
Science summary reviewer, O3 dark photon dark matter search paper (2021)
Review team member, O3 IMBH search paper (2019-2022)
Member, O3 detchar event validation team (17 candidates evaluated) (2019-2022)
Science summary reviewer, O1-O2 LIGO/Virgo GWOSC paper (2019)

Department Service

Graduate admissions committee member (2021-2023)
Graduate student representative to department faculty search committee (2021)
Graduate student representative to department head search committee (2020 - 2021)
Vice President, physics graduate students (2020 - 2021)
Graduate student representative to faculty committee (2020 - 2022)
Graduate student representative to graduate studies committee (2019 - 2021)
Member, graduate recruitment committee (2019 - 2022)

Education and Public Outreach

Presenter, Eugene Universe on Tap (November 2022)
Panelist, LIGO-Virgo-KAGRA Webinar on GWTC-3 population results (2021)
Represented Oregon LIGO group at meetings for minoritized groups in STEM (2021-2022)
Volunteer representative for LIGO, LISA and Nanograv at the SACNAS National Diversity in STEM Conference (2021)
Guest lecturer on gravitational wave astronomy and LIGO to introductory astronomy students (2020)
Produced publicly-available graphics for observed gravitational waves with detection statistics and inferred merger parameters (2019 - 2020)
Led regular tours of LIGO Hanford for visiting students and the public (2019)

Students Supervised

Jesse Wilson, University of Oregon (July 2022 - October 2022)

Other Activities

Section leader, Gravitational Wave Astronomy Northwest Student Workshp. Presentations available at `sites.uw.edu/joeykey/gwanw21/` (2021 - 2022)
Participant, La Serena School for Data Science (2021)

Teaching

1. PHYS 412 Fall 2023
   Mechanics, Electricity, and Magnetism - Upper-level course in vector calculus and electrostatics. Graded homework and exams and led tutorial sessions.
2. PHYS 422 Spring 2023
   Electromagnetisem - Final course in upper-level undergraduate electromagnetism sequence covering Maxwell's equations and special relativity. Graded homework and exams.
3. PHYS 205 Winter 2022, Winter 2019
   Introductory Physics Laboratory II - Laboratory to complement PHYS 202. Ran labs, graded homework and exams.
4. PHYS 202 Winter 2022, Winter 2019
   General Physics II - Algebra-based course on fluids, geometric optics and heat transfer. Ran tutorial sections and graded exams. Wrote exams to minimize cheating in 400-person class section.
5. PHYS 631 Fall 2020
   Quantum Mechanics I - First course of the required sequence of quantum mechanics courses for graduate students. Graded homework assignments and helped design exams.
6. PHYS 391 Spring 2020
   Physics Experimentation Data Analysis Laboratory - Laboratory course for second-year majors to introduce them to Python programming and error analysis. Helped adapt existing materials for online distribution, ran virtual lab sessions and graded homework.
7. ASTR 122 Winter 2020
   Birth and Death of Stars - Survey course for interested non-scientists. Gave a guest lecture on gravitational wave astronomy, wrote exam questions, graded homework and exams.
8. PHYS 206 Spring 2019
   Introductory Physics Laboratory III - Laboratory to complement PHYS 203. Ran labs, further refined activities to improve quality of written work produced by students, graded homework and exams.
9. PHYS 203 Spring 2019
   General Physics III - Algebra-based course on electricity and magnetism, special relativity and a qualitative introduction to topics in quantum mechanics. Ran tutorial sections and graded exams.
10. PHYS 204 Fall 2019, Fall 2018
    Introductory Physics Laboratory I - Laboratory to complement PHYS 201. Ran labs, designed activities to improve quality of written work produced by students, graded homework and exams.

11. PHYS 201 Fall 2019, Fall 2018
General Physics I - Algebra-based course on kinematics & Newton's laws of motion for non-majors. Ran tutorial sessions, graded exams, wrote exam questions and came up with new activities to reinforce difficult topics for students.

12. PHYS 172 Fall 2016, Spring 2016
Modern Mechanics - Aided graduate teaching assistant in lab sections for a calculus-based course for engineering and non-physics science majors. Assisted students in troubleshooting Python/VPython code and interpreting simulation results.

All Publications

1. "A search using GEO600 for gravitational waves coincident with fast radio bursts from SGR 1935+2154," A. Abac, *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **977**, no.2, 255 (2024) [arXiv: 2410.09151 [astro-ph.HE]].
2. "Search for Eccentric Black Hole Coalescences during the Third Observing Run of LIGO and Virgo," A. Abac *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **973**, no.2, 132 (2024) [arXiv: 2308.03822 [astro-ph.HE]].
3. "Squeezing the quantum noise of a gravitational-wave detector below the standard quantum limit," W. Jia *et al.* (LIGO Detector/Instrument Science Group), *Science* **385** (2024).
4. "Ultralight vector dark matter search using data from the KAGRA O3GK run," A. Abac *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **110**, no.4, 0420001 (2024) [arXiv: 2403.03004 [astro-ph.CO]].
5. "Observation of Gravitational Waves from the Coalescence of a 2.5–4.5 $M_\odot$ Compact Object and a Neutron Star," A. Abac, *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJL* **970**, L34 (2024) [arXiv: 2404.04248 [astro-ph.HE]].
6. "Automated evaluation of environmental coupling for Advanced LIGO gravitational wave detections," A. Helmling-Cornell, P. Nguyen, R. Schofield, R. Frey., *Class. Quantum Grav.* **41**, no.14, 145003 (2024) [arXiv: 2312.0073 [gr-qc]].
7. "Search for gravitational-wave transients associated with magnetar bursts in Advanced LIGO and Advanced Virgo data from the third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **966**, no.1, 137 (2024) [arXiv: 2210.10931[astro-ph.HE]].
8. "A Joint Fermi-GBM and Swift-BAT Analysis of Gravitational-Wave Candidates from the Third Gravitational-wave Observing Run," C. Fletcher *et al.* (Fermi Gamma-Ray Burst Monitor Team, LIGO-Virgo-KAGRA Collaboration), *ApJ* **964**, no.2, 149 (2024) [arXiv: 2308.13666 [astro-ph.HE]].
9. "GWTC-2.1: deep extended catalog of compact binary coalescences observed by LIGO and Virgo during the first half of the third observing run," R. Abbott *et al.* (LIGO-Virgo Collaboration), *Phys. Rev. D* **109**, no.2, 022001 (2024) [arXiv: 2108.01045 [gr-qc]].
10. "GWTC-3: compact binary coalescences observed by LIGO and Virgo during the second part of the third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. X*, **13**, 041039 (2023) [arXiv: 2111.03606 [astro-ph.HE]].
11. "Broadband Quantum Enhancement of the LIGO Detectors with Frequency-Dependent Squeezing," D. Ganapathy *et al.* (O4 LIGO Detector/Instrument Science Group), *Phys. Rev. X*, **13**, 041021 (2023).
12. "Search for Gravitational Waves Associated with Fast Radio Bursts Detected by CHIME/FRB During the LIGO-Virgo Observing Run O3a," R. Abbott *et al.*

(LIGO-Virgo-KAGRA, CHIME/FRB Collaborations), *ApJ* **955**, 2 (2023) [arXiv: 2203.12038 [astro-ph.HE]].

13. "Open data from the third observing run of LIGO, Virgo, KAGRA and GEO," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJS* **267**, 2 (2023) [arXiv: 2302.03676 [gr-qc]].
14. "Constraints on the cosmic expansion history from GWTC-3," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **949**, 76 (2023) [arXiv: 2111.03604 [gr-qc]].
15. "Searching fot the causes of anomalous Advanced LIGO noise," B. K. Berger, *et al.* (LIGO Detector/Instrument Science Group), *Appl. Phys. Lett.* **122**, no.18, 184101 (2023).
16. "Population of Merging Compact Binaries Inferred Using Gravitational Waves through GWTC-3," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. X* **13** 011048 (2023) [arXiv: 2111.03634 [gr-qc]].
17. "Search for subsolar-mass black hole binaries in the second part of Advanced LIGO's and Advanced Virgo's third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *MNRAS* **stad588** (2023) [arXiv: 2212.01477 [astro-ph.HE]].
18. "Model-based cross-correlation search for gravitational waves from the low-mass X-ray binary Scorpius X-1 in LIGO O3 data," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJL* **941**, no.2, L30 (2022) [arXiv: 2209.02863 [astro-ph.HE]].
19. "All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO and Advanced Virgo O3 data," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **106**, no.10, 102008 (2022) [arXiv: 2201.00697 [gr-qc]].
20. "General-relativistic precession in a black-hole binary," M. Hannam *et al. Nature* **610**, no.7933, 652-655 (2022) [arXiv: 2112.11300 [gr-qc]].
21. "Search for gravitational waves from Scorpius X-1 with a hidden Markov model in O3 LIGO data," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **106**, no.6, 062002 (2022) [arXiv: 2201.10104 [gr-qc]].
22. "Search for continuous gravitational wave emission from the Milky Way center in O3 LIGO-Virgo data." R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaborations), *Phys. Rev. D* **106**, no.4. 042003 (2022) [arXiv:2204.04523[astro-ph.HE]].
23. "Search for subsolar-mass binaries in the first half of Advanced LIGO and Virgo's third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. Lett.* **129**, no.6, 061104 (2022) [arXiv: 2109.12197 [astro-ph.CO]].
24. "Narrowband searches for continuous and long-duration transient gravitational waves from known pulsars in the LIGO-Virgo third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **932**, no.2, 133 (2022) [arXiv: 2112.10990 [gr-qc]].
25. "First joint observation by the underground gravitational-wave detctor KAGRA with GEO600," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *PTEP* **2022**, no.6, 063F01 (2022) [arXiv: 2203.01270 [gr-qc]].
26. "All-sky, all-frequency directional search for persistent gravitational waves from Advanced LIGO's and Advanced Virgo's first three observing runs," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **105**, no.12 122001 (2022) [arXiv: 2110.09834 [gr-qc]].
27. "Searches for Gravitational Waves from Known Pulsars at Two Harmonics in the Second and Third LIGO-Virgo Observing Runs," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **935**, no.1, 1 (2022) [arXiv: 2111.13106 [astro-ph.HE]].

28. "All-sky search for gravitational wave emission from scalar boson clouds around spinning black holes in LIGO O3 data," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **105**, no.10, 102001 (2022) [arXiv: 2111.155074 [astro-ph.HE]].

29. "Search of the early O3 LIGO Data for continuous gravitational waves from the Cassiopeia A and Vela Jr. supernova remnants," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **105**, no.8, 082005 (2022) [arXiv: 2111.15116 [gr-qc]].

30. "Search for gravitational waves associated with gamma-ray bursts detected by Fermi and Swift during the LIGO-Virgo run O3b," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **928**, no.2, 186 (2022) [arXiv: 2111.03608 [gr-qc]].

31. "Constraints on dark photon dark matter using data from LIGO's and Virgo's third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **105**, no.6, 063030 (2022) [arXiv: 2105.13085 [astro-ph.CO]].

32. "Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Astron. Astrophys.* **659**, A84 (2022) [arXiv: 2105.15120 [astro-ph.HE]].

33. "Search for continuous gravitational waves from 20 accreting millisecond X-ray pulsars in O3 LIGO data," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **105**, no.22, 022002 (2022) [arXiv: 2109.092555 [astro-ph.HE]].

34. "All-sky search for short gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **104**, no.12, 122004 (2021) [arXiv: 2107.03701 [gr-qc]].

35. "Search for lensing signatures in the gravitational-wave observations from the first half of LIGO-Virgo's third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **923**, no.1, 14 (2021) [arXiv: 2105.06384 [gr-qc]].

36. "Point absorber limits to future gravitational-wave detectors," W. Jia *et al.* (LIGO Detector/Instrument Science Group), *Phys. Rev. Lett.* **127**, no.24, 241102 (2021) [arXiv: 2109.08743 [physics.ins-det]].

37. "Constraints from LIGO O3 data on gravitational-wave emission due to r-modes in the glitching pulsar PSR J0537-6910," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJL* **922**, no.1, 71 (2021) [arXiv: 2104.14417 [astro-ph.HE]].

38. "Searches for continuous gravitational waves from young supernova remnants in the early third observing run of Advanced LIGO and Virgo," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJ* **921**, no.1, 80 (2021) [arXiv: 2105.11641 [astro-ph.HE]].

39. "All-sky search for long-duration gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **104**, no.10, 102001 (2021) [arXiv: 2107.13796 [gr-qc]].

40. "All-sky search for continuous gravitational waves from isolated neutron stars in the early O3 LIGO data," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **104**, no.8, 082004 (2021) [arXiv: 2107.00600 [gr-qc]].

41. "LIGO's Quantum Response to Squeezed States," L. McCuller *et al.* (LIGO Detector/Instrument Science Group), *Phys. Rev. D* **104**, no.6, 062006 (2021) [arXiv: 2105.12052 [physics.ins-det]].

42. "Search for anisotropic gravitational-wave backgrounds using data from Advanced LIGO's and Advanced Virgo's first three observing runs," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **104**, no.2, 022005 (2021) [arXiv: 2103.08520 [gr-qc]].

43. "Upper limits on the isotropic gravitational-wave background from Advanced LIGO's and Advanced Virgo's third observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. D* **104**, no.2, 022004 (2021) [arXiv: 2101.12130 [gr-qc]].

44. "Observation of gravitational waves from two neutron-star black hole coalescences," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJL* **915**, L21 (2021) [arXiv: 2106.15163 [astro-ph.HE]].

45. "Approaching the motional ground state of a 10 kg object," C. Whittle *et al.* (LIGO Detector/Instrument Science Group), *Science* **372**, no.6548, 1333-1336 (2021) [arXiv: 2102.12665 [quant-ph]].

46. "Environmental noise in Advanced LIGO detectors," P. Nguyen *et al.*, *Class. Quantum Grav.* **38**, no.14, 145001 (2021) [arXiv: 2101.09935 [astro-ph.IM]].

47. "Constraints on cosmic strings using data from the third Advanced LIGO-Virgo observing run," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *Phys. Rev. Lett.* **126**, no.24, 241102 (2021) [arXiv: 2101.12248 [gr-qc]].

48. "Tests of general relativity with binary black holes from the second LIGO-Virgo gravitational-wave transient catalog," R. Abbott *et al.* (LIGO-Virgo Collaboration), *Phys. Rev. D* **103**, no.12, 122002 (2021) [arXiv: 2010.14529 [gr-qc]].

49. "GWTC-2: compact binary coalescences observed by LIGO and Virgo during the first half of the third observing run," R. Abbott *et al.* (LIGO-Virgo Collaboration), *Phys. Rev. X* **11**, 021053 (2021) [arXiv: 2010.14527 [gr-qc]].

50. "LIGO detector characterization in the second and third observing runs," D. Davis *et al.*, *Class. Quantum Grav.* **38**, no.13, 135014 (2021) [arXiv: 2101.11673 [astro-ph.IM]].

51. "Population properties of compact objects from the second LIGO-Virgo Gravitational-Wave Transient Catalog," R. Abbott *et al.* (LIGO-Virgo Collaboration), *ApJL* **913**, no.1, L7 (2021) [arXiv: 2010.14533 [astro-ph.HE]].

52. "Diving below the spin-down limit: Constraints on gravitational waves from the energetic young pulsar PSR J0537-6910," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration), *ApJL* **913**, no.2, L27 (2021) [arXiv: 2012.12926 [astro-ph.HE]].

53. "Point absorbers in Advanced LIGO," A.F. Brooks *et al.* (LIGO Detector/Instrument Science Group), *Appl. Optics* **60**, no.13, 4047-4063 (2021) [arXiv: 2101.05828 [physics.ins-det]].

54. "All-sky search in early O3 LIGO data for continuous gravitational-wave signals from unknown neutron stars in binary systems," R. Abbott *et al.* (LIGO-Virgo Collaboration), *Phys. Rev. D* **103**, no.6, 064017 (2021) [arXiv: 2012.12128 [gr-qc]].

55. "Sensitivity and performance of the Advanced LIGO detectors in the third observing run," A. Buikema *et al.* (LIGO Detector/Instrument Science Group), *Phys. Rev. D* **102**, no.6, 062003 (2020) [arXiv: 2008.01301 [astro-ph.IM]].

56. "Reducing scattered light in LIGO's third observing run," S. Soni *et al.* (LIGO Detector/Instrument Science Group), *Class. Quantum Grav.* **38**, no.2, 025016 (2020) [arXiv: 2007.14876 [astro-ph.IM]].

57. "Gravitational-wave constraints on the equatorial ellipticity of millisecond pulsars," R. Abbott *et al.* (LIGO-Virgo Collaboration), *ApJL* **902**, no.1, L21 (2020) [arXiv: 2007:14251 [astro-ph.HE]].

58. "Improving the robustness of the advanced LIGO detectors to earthquakes," E. Schwartz *et al.* (LIGO Detector/Instrument Science Group), *Class. Quantum Grav.* **37**, no.23, 235007 (2020) [arXiv: 2007.12847 [physics.ins-det]].

59. "Quantum correlations between the light and kilogram-mass mirrors of LIGO," H. Yu *et al.* (LIGO Detector/Instrument Science Group), *Nature* **583**, no.7814, 43-47 (2020) [arXiv: 2002.01519 [quant-ph]].
60. "Quantum-enhanced Advanced LIGO detectors in the era of gravitational-wave astronomy," M.Tse *et al.* (LIGO Detector/Instrument Science Group), *Phys. Rev. Lett.* **123**, no.23, 231107 (2019).
61. "A precision experiment to investigate long-lived radioactive decays," J.R. Angevaare *et al.*, *JINST* **13**, no.07, P07011 (2018) [arXiv: 1804.02765 [nucl-ex]].

All Preprints

1. "Search for continuous gravitational waves from known pulsars in the first part of the fourth LIGO-Virgo-KAGRA observing run," A. Abac, *et al.* (LIGO-Virgo-KAGRA Collaboration), [arXiv: 2501.01495 [astro-ph.HE]].
2. "Advanced LIGO detector performance in the fourth observing run," E. Capote, *et al.* (LIGO Detector/Instrument Science Group) [arXiv: 2411.14607 [gr-qc]].
3. "Search for gravitational waves emitted from SN 2023ixf," A. Abac, *et al.* (LIGO-Virgo-KAGRA Collaboration) [arXiv: 2410.16565 [astro-ph.HE]].
4. "LIGO Detector Characterization in the first half of the fourth Observing run," S. Soni, *et al.* [arXiv: 2409.02831 [astro-ph.IM]].
5. "Swift-BAT GUANO follow-up of gravitational-wave triggers in the third LIGO-Virgo-KAGRA observing run," G. Raman *et al.* (Swift-BAT/GUANO Team, Swift Collaboration, LIGO-Virgo-KAGRA Collaboration) [arXiv: 2407.12867 [astro-ph.HE]].
6. "LIGO operates with quantum noise below the Standard Quantum Limit." W. Jia *et al.* (LIGO Detector/Instrument Science Group) [arXiv: 2404.14569 [gr-qc]].
7. "Search for gravitational-lensing signatures in the full third observing run of the LIGO–Virgo network," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration) [arXiv: 2304.0839 [gr-qc]].
8. "Tests of general relativity with GWTC-3," R. Abbott *et al.* (LIGO-Virgo-KAGRA Collaboration) [arXiv: 2112.06861 [gr-qc]].