

Papers by Anirban Ain

1 Limited Author Published Papers

1. **“Fast Gravitational Wave Radiometry using Data Folding”**
A. Ain, P. Dalvi and S. Mitra.
arXiv:1504.01714 [gr-qc]
DOI:10.1103/PhysRevD.92.022003
Phys. Rev. D **92**, no. 2, 022003 (2015)
2. **“Stochastic Gravitational Wave Background from Exoplanets”**
A. Ain, S. Kastha and S. Mitra.
arXiv:1504.01715 [gr-qc]
DOI:10.1103/PhysRevD.91.124023
Phys. Rev. D **91**, no. 12, 124023 (2015)
3. **“All-sky, narrowband, gravitational-wave radiometry with folded data”**
E. Thrane, S. Mitra, N. Christensen, V. Mandic and A. Ain.
arXiv:1504.02158 [astro-ph.IM]
DOI:10.1103/PhysRevD.91.124012
Phys. Rev. D **91**, no. 12, 124012 (2015)

2 Limited Author Papers in Preparation

1. **“PyStoch - fast HEALPix based SGWB mapmaking”**
A. Ain, J. Suresh and S. Mitra.

3 Published Collaboration Papers

1. **“The NINJA-2 project: Detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations”**
J. Aasi *et al.* [LIGO Scientific and VIRGO and NINJA-2 Collaborations].
arXiv:1401.0939 [gr-qc]
DOI:10.1088/0264-9381/31/11/115004
Class. Quant. Grav. **31**, 115004 (2014)
LIGO-P1300199
2. **“Implementation of an \mathcal{F} -statistic all-sky search for continuous gravitational waves in Virgo VSR1 data”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1402.4974 [gr-qc]
DOI:10.1088/0264-9381/31/16/165014
Class. Quant. Grav. **31**, 165014 (2014)
LIGO-DOCUMENT-NO.-LIGO-P1300133
3. **“Search for gravitational wave ringdowns from perturbed intermediate mass black holes in LIGO-Virgo data from 2005-2010”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1403.5306 [gr-qc]
DOI:10.1103/PhysRevD.89.102006

- Phys. Rev. D **89**, no. 10, 102006 (2014)
LIGO-P1300156
4. **“Search for gravitational radiation from intermediate mass black hole binaries in data from the second LIGO-Virgo joint science run”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1404.2199 [gr-qc]
DOI:10.1103/PhysRevD.89.122003
Phys. Rev. D **89**, no. 12, 122003 (2014)
LIGO-P1300158
 5. **“First all-sky search for continuous gravitational waves from unknown sources in binary systems”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1405.7904 [gr-qc]
DOI:10.1103/PhysRevD.90.062010
Phys. Rev. D **90**, no. 6, 062010 (2014)
 6. **“Improved Upper Limits on the Stochastic Gravitational-Wave Background from 2009?2010 LIGO and Virgo Data”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1406.4556 [gr-qc]
DOI:10.1103/PhysRevLett.113.231101
Phys. Rev. Lett. **113**, no. 23, 231101 (2014)
 7. **“Narrow-band search of continuous gravitational-wave signals from Crab and Vela pulsars in Virgo VSR4 data”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1410.8310 [astro-ph.IM]
DOI:10.1103/PhysRevD.91.022004
Phys. Rev. D **91**, no. 2, 022004 (2015)
 8. **“Advanced LIGO”**
J. Aasi *et al.* [LIGO Scientific Collaboration].
arXiv:1411.4547 [gr-qc]
DOI:10.1088/0264-9381/32/7/074001
Class. Quant. Grav. **32**, 074001 (2015)
 9. **“Directed search for gravitational waves from Scorpius X-1 with initial LIGO data”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1412.0605 [gr-qc]
DOI:10.1103/PhysRevD.91.062008
Phys. Rev. D **91**, no. 6, 062008 (2015)
 10. **“Searches for continuous gravitational waves from nine young supernova remnants”**
J. Aasi *et al.* [LIGO Scientific Collaboration].
arXiv:1412.5942 [astro-ph.HE]
DOI:10.1088/0004-637X/813/1/39
Astrophys. J. **813**, no. 1, 39 (2015)
LIGO-P1400182
 11. **“Search of the Orion spur for continuous gravitational waves using a loosely coherent algorithm on data from LIGO interferometers”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1510.03474 [gr-qc]
DOI:10.1103/PhysRevD.93.042006
Phys. Rev. D **93**, no. 4, 042006 (2016)
 12. **“First low frequency all-sky search for continuous gravitational wave signals”**
J. Aasi *et al.* [LIGO Scientific and VIRGO Collaborations].

- arXiv:1510.03621 [astro-ph.IM]
DOI:10.1103/PhysRevD.93.042007
Phys. Rev. D **93**, no. 4, 042007 (2016)
13. **“All-sky search for long-duration gravitational wave transients with initial LIGO”**
B. P. Abbott *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1511.04398 [gr-qc]
DOI:10.1103/PhysRevD.93.042005
Phys. Rev. D **93**, no. 4, 042005 (2016)
 14. **“Observation of Gravitational Waves from a Binary Black Hole Merger”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03837 [gr-qc]
DOI:10.1103/PhysRevLett.116.061102
Phys. Rev. Lett. **116**, no. 6, 061102 (2016)
LIGO-P150914
 15. **“GW150914: The Advanced LIGO Detectors in the Era of First Discoveries”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03838 [gr-qc]
DOI:10.1103/PhysRevLett.116.131103
Phys. Rev. Lett. **116**, no. 13, 131103 (2016)
LIGO-P1500237
 16. **“GW150914: First results from the search for binary black hole coalescence with Advanced LIGO”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03839 [gr-qc]
DOI:10.1103/PhysRevD.93.122003
Phys. Rev. D **93**, no. 12, 122003 (2016)
LIGO-P1500269
 17. **“Properties of the Binary Black Hole Merger GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03840 [gr-qc]
DOI:10.1103/PhysRevLett.116.241102
Phys. Rev. Lett. **116**, no. 24, 241102 (2016)
LIGO-P1500218
 18. **“The Rate of Binary Black Hole Mergers Inferred from Advanced LIGO Observations Surrounding GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03842 [astro-ph.HE]
DOI:10.3847/2041-8205/833/1/L1
Astrophys. J. **833**, no. 1, L1 (2016)
LIGO-P1500217
 19. **“Observing gravitational-wave transient GW150914 with minimal assumptions”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03843 [gr-qc]
DOI:10.1103/PhysRevD.94.069903, 10.1103/PhysRevD.93.122004
Phys. Rev. D **93**, no. 12, 122004 (2016), Addendum: [Phys. Rev. D **94**, no. 6, 069903 (2016)]
 20. **“Characterization of transient noise in Advanced LIGO relevant to gravitational wave signal GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03844 [gr-qc]
DOI:10.1088/0264-9381/33/13/134001
Class. Quant. Grav. **33**, no. 13, 134001 (2016)

21. **“Calibration of the Advanced LIGO detectors for the discovery of the binary black-hole merger GW150914”**
B. P. Abbott *et al.* [LIGO Scientific Collaboration].
arXiv:1602.03845 [gr-qc]
DOI:10.1103/PhysRevD.95.062003
Phys. Rev. D **95**, no. 6, 062003 (2017)
22. **“Astrophysical Implications of the Binary Black-Hole Merger GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03846 [astro-ph.HE]
DOI:10.3847/2041-8205/818/2/L22
Astrophys. J. **818**, no. 2, L22 (2016)
LIGO-P1500262
23. **“GW150914: Implications for the stochastic gravitational wave background from binary black holes”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03847 [gr-qc]
DOI:10.1103/PhysRevLett.116.131102
Phys. Rev. Lett. **116**, no. 13, 131102 (2016)
LIGO-P1500222
24. **“Tests of general relativity with GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1602.03841 [gr-qc]
DOI:10.1103/PhysRevLett.116.221101
Phys. Rev. Lett. **116**, no. 22, 221101 (2016)
LIGO-P1500213
25. **“High-energy Neutrino follow-up search of Gravitational Wave Event GW150914 with ANTARES and IceCube”**
S. Adrian-Martinez *et al.* [ANTARES and IceCube and LIGO Scientific and Virgo Collaborations].
arXiv:1602.05411 [astro-ph.HE]
DOI:10.1103/PhysRevD.93.122010
Phys. Rev. D **93**, no. 12, 122010 (2016)
26. **“Localization and broadband follow-up of the gravitational-wave transient GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo and ASKAP and BOOTES and DES and Fermi GBM and Fermi-LAT and GRAWITA and INTEGRAL and iPTF and InterPlanetary Network and J-GEM and La Silla-QUEST Survey and Liverpool Telescope and LOFAR and MASTER and MAXI and MWA and Pan-STARRS and PESSTO and Pi of the Sky and SkyMapper and Swift and C2PU and TOROS and VISTA Collaborations].
arXiv:1602.08492 [astro-ph.HE]
DOI:10.3847/2041-8205/826/1/L13
Astrophys. J. **826**, no. 1, L13 (2016)
LIGO-P1500227, LIGO-P1500227-V11, FERMILAB-PUB-16-148-AE-E, LIGO-P1500227-V12
27. **“Sensitivity of the Advanced LIGO detectors at the beginning of gravitational wave astronomy”**
D. V. Martynov *et al.* [LIGO Scientific Collaboration].
arXiv:1604.00439 [astro-ph.IM]
DOI:10.1103/PhysRevD.93.112004
Phys. Rev. D **93**, no. 11, 112004 (2016)
28. **“Supplement: Localization and broadband follow-up of the gravitational-wave transient GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo and ASKAP and BOOTES and DES and Fermi-GBM and Fermi-LAT and GRAWITA and INTEGRAL and iPTF and InterPlanetary Network and J-GEM and La Silla-QUEST Survey and Liverpool Telescope and LOFAR and MASTER and MAXI and MWA and Pan-STARRS and PESSTO and Pi of the Sky and SkyMapper and Swift and TAROT and Zadko

- and Algerian National Observatory and C2PU and TOROS and VISTA Collaborations].
arXiv:1604.07864 [astro-ph.HE]
DOI:10.3847/0067-0049/225/1/8
Astrophys. J. Suppl. **225**, no. 1, 8 (2016)
LIGO-P1600137-V1, FERMILAB-PUB-16-149-AE-E, LIGO-P1600137-V2
29. **“Search for transient gravitational waves in coincidence with short-duration radio transients during 2007?2013”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1605.01707 [astro-ph.HE]
DOI:10.1103/PhysRevD.93.122008
Phys. Rev. D **93**, no. 12, 122008 (2016)
LIGO-P1400154
 30. **“A First Targeted Search for Gravitational-Wave Bursts from Core-Collapse Supernovae in Data of First-Generation Laser Interferometer Detectors”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1605.01785 [gr-qc]
DOI:10.1103/PhysRevD.94.102001
Phys. Rev. D **94**, no. 10, 102001 (2016)
LIGO-P1400208
 31. **“Comprehensive all-sky search for periodic gravitational waves in the sixth science run LIGO data”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1605.03233 [gr-qc]
DOI:10.1103/PhysRevD.94.042002
Phys. Rev. D **94**, no. 4, 042002 (2016)
 32. **“Improved analysis of GW150914 using a fully spin-precessing waveform Model”**
T. D. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1606.01210 [gr-qc]
DOI:10.1103/PhysRevX.6.041014
Phys. Rev. X **6**, no. 4, 041014 (2016)
LIGO-P1600048
 33. **“Directly comparing GW150914 with numerical solutions of Einstein’s equations for binary black hole coalescence”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1606.01262 [gr-qc]
DOI:10.1103/PhysRevD.94.064035
Phys. Rev. D **94**, no. 6, 064035 (2016)
LIGO-P1500263
 34. **“Supplement: The Rate of Binary Black Hole Mergers Inferred from Advanced LIGO Observations Surrounding GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1606.03939 [astro-ph.HE]
DOI:10.3847/0067-0049/227/2/14
Astrophys. J. Suppl. **227**, no. 2, 14 (2016)
LIGO-P1500217
 35. **“GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1606.04855 [gr-qc]
DOI:10.1103/PhysRevLett.116.241103
Phys. Rev. Lett. **116**, no. 24, 241103 (2016)
LIGO-P151226

36. **“Binary Black Hole Mergers in the first Advanced LIGO Observing Run”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1606.04856 [gr-qc]
DOI:10.1103/PhysRevX.6.041015
Phys. Rev. X **6**, no. 4, 041015 (2016)
LIGO-P1600088
37. **“Results of the deepest all-sky survey for continuous gravitational waves on LIGO S6 data running on the Einstein@Home volunteer distributed computing project”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1606.09619 [gr-qc]
DOI:10.1103/PhysRevD.94.102002
Phys. Rev. D **94**, no. 10, 102002 (2016)
38. **“Search for continuous gravitational waves from neutron stars in globular cluster NGC 6544”**
T. D. Abbott *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1607.02216 [gr-qc]
DOI:10.1103/PhysRevD.95.082005
Phys. Rev. D **95**, no. 8, 082005 (2017)
LIGO-P1500225
39. **“Upper Limits on the Rates of Binary Neutron Star and Neutron Star?black Hole Mergers From Advanced Ligo?s First Observing run”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1607.07456 [astro-ph.HE]
DOI:10.3847/2041-8205/832/2/L21
Astrophys. J. **832**, no. 2, L21 (2016)
40. **“Exploring the Sensitivity of Next Generation Gravitational Wave Detectors”**
B. P. Abbott *et al.* [LIGO Scientific Collaboration].
arXiv:1607.08697 [astro-ph.IM]
DOI:10.1088/1361-6382/aa51f4
Class. Quant. Grav. **34**, no. 4, 044001 (2017)
LIGO-P1600143
41. **“The basic physics of the binary black hole merger GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1608.01940 [gr-qc]
DOI:10.1002/andp.201600209
Annalen Phys. (2016), [Annalen Phys. **529**, 0209 (2017)]
42. **“All-sky search for short gravitational-wave bursts in the first Advanced LIGO run”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1611.02972 [gr-qc]
DOI:10.1103/PhysRevD.95.042003
Phys. Rev. D **95**, no. 4, 042003 (2017)
43. **“Effects of waveform model systematics on the interpretation of GW150914”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1611.07531 [gr-qc]
DOI:10.1088/1361-6382/aa6854
Class. Quant. Grav. **34**, no. 10, 104002 (2017)
P1500259
44. **“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. P. Abbott *et al.* [LIGO Scientific and Virgo and IPN Collaborations].
arXiv:1611.07947 [astro-ph.HE]
DOI:10.3847/1538-4357/aa6c47

Astrophys. J. **841**, no. 2, 89 (2017)
P1600298

45. **“Upper Limits on the Stochastic Gravitational-Wave Background from Advanced LIGO’s First Observing Run”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1612.02029 [gr-qc]
DOI:10.1103/PhysRevLett.118.121101
Phys. Rev. Lett. **118**, no. 12, 121101 (2017)
46. **“Directional Limits on Persistent Gravitational Waves from Advanced LIGO’s First Observing Run”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1612.02030 [gr-qc]
DOI:10.1103/PhysRevLett.118.121102
Phys. Rev. Lett. **118**, no. 12, 121102 (2017)
47. **“First search for gravitational waves from known pulsars with Advanced LIGO”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1701.07709 [astro-ph.HE]
DOI:10.3847/1538-4357/aa677f
Astrophys. J. **839**, no. 1, 12 (2017)
LIGO-P1600159
48. **“GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2”**
B. P. Abbott *et al.* [LIGO Scientific and VIRGO Collaborations].
arXiv:1706.01812 [gr-qc]
DOI:10.1103/PhysRevLett.118.221101
Phys. Rev. Lett. **118**, no. 22, 221101 (2017)
LIGO-P170104

4 Collaboration Papers in Preparation

1. **“Search for High-energy Neutrinos from Gravitational Wave Event GW151226 and Candidate LVT151012 with ANTARES and IceCube”**
A. Albert *et al.* [ANTARES and IceCube and LIGO Scientific and Virgo Collaborations].
arXiv:1703.06298 [astro-ph.HE]
2. **“Search for gravitational waves from Scorpius X-1 in the first Advanced LIGO observing run with a hidden Markov model”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1704.03719 [gr-qc]
3. **“Search for intermediate mass black hole binaries in the first observing run of Advanced LIGO”**
B. P. Abbott *et al.* [LIGO Scientific and Virgo Collaborations].
arXiv:1704.04628 [gr-qc]