Leo C. Stein — Publications

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Publication Summary

h-index —As of 2025-11-02: 67 (according to Google Scholar), or 59 (according to INSPIRE). Both include collaboration papers.

Top five cited —Excluding LIGO/Virgo collaboration papers.

1. Berti, E., (5 authors), **Stein, L. C.**, (46 more authors) (2015) *Testing General Relativity with Present and Future Astrophysical Observations*, Class. Quantum Grav. **32** 243001 [arXiv:1501.07274].
2. Barack, L., *et al.* (2019) *Black holes, gravitational waves and fundamental physics: a roadmap*, Class. Quantum Grav. **36** 143001 [arXiv:1806.05195].
3. Boyle, M., *et al.* (**LCS** is corresponding author) (2019) *The SXS Collaboration catalog of binary black hole simulations*, Class. Quantum Grav. **36** 195006 [arXiv:1904.04831].
4. Varma, V, *et al.* (2019) *Surrogate models for precessing binary black hole simulations with unequal masses*, Phys. Rev. Research **1**, 033015 [arXiv:1905.09300].
5. Yunes, N., **Stein, L. C.** (2011), *Nonspinning black holes in alternative theories of gravity*, Phys. Rev. D **83** 104002 [arXiv:1101.2921].

Submitted Publications

71. Sun, D. **Stein, L. C.**, (2025) *Parameter matching between horizon quasi-local and point-particle definitions at 1PN for quasi-circular and non spinning BBH systems in harmonic gauge*, [arXiv:2510.25618].
70. Berti, E. *et al.*, (2025) *Black hole spectroscopy: from theory to experiment*, [arXiv:2505.23895].

Collaboration Publications

From 2008–2012, I was coauthor on 34 refereed LIGO and/or LIGO/Virgo collaboration publications. I only list short author-list publications below.

Refereed Publications

69. De Amicis, M. (5 authors), **Stein, L. C.**, (13 more authors) (2025) *Late-time tails in nonlinear evolutions of merging black holes*, Phys. Rev. Lett. **135** 171401, [arXiv:2412.06887].
68. Scheel, M. (3 authors), **Stein, L. C.**, (54 more authors) (2025) *The SXS Collaboration's third catalog of binary black hole simulations*, Class. Quantum Grav. **42** 195017, [arXiv:2505.13378].
67. Magaña Zertuche, L., **Stein, L. C.**, *et al.*, (2025) *High-Precision Ringdown Surrogate Model for Non-Precessing Binary Black Holes*, Phys. Rev. D. **112** 024077, [arXiv:2408.05300].
66. Da Re, G., Mitman, K., **Stein, L. C.**, *et al.*, (2025) *Modeling the BMS transformation induced by a binary black hole merger*, Phys. Rev. D. **111** 124019, [arXiv:2503.09569].
65. Mitman, K., **Stein, L. C.**, *et al.*, (2025) *Length dependence of waveform mismatch: a caveat on waveform accuracy*, Class. Quantum Grav. **42** 117001, [arXiv:2502.14025].
64. Field, S. *et al.*, (2025) *GWSurrogate: A Python package for gravitational wave surrogate models*, J. Open Source Softw., 10(107), 7073, [arXiv:2504.08839].
63. Witzany, V. Skoupý, V., **Stein, L. C.**, Tanay, S., (2025) *Actions of spinning compact binaries: Spinning particle in Kerr matched to dynamics at 1.5 post-Newtonian order*, Phys. Rev. D. **111** 044032, [arXiv:2411.09742].
62. Khairnar, A., **Stein, L. C.**, Boyle, M., (2025) *Approximate helical symmetry in compact binaries*, Phys. Rev. D. **111** 024072, [arXiv:2410.16373].
61. Zhu, H., (9 authors), **Stein, L. C.**, (2024) *Imprints of Changing Mass and Spin on Black Hole Ringdown*, Phys. Rev. D. **110** 124028, [arXiv:2404.12424].

60. Sun, D., Boyle, M., Mitman, K., Scheel, M. A., **Stein, L. C.**, Teukolsky, S. A., Varma, V., (2024) *Optimizing post-Newtonian parameters and fixing the BMS frame for numerical-relativity waveform hybridizations*, Phys. Rev. D. **110** 104076, [arXiv:2403.10278].
59. Mitman, K., Boyle, M., **Stein, L. C.**, *et al.*, (2024) *A Review of Gravitational Memory and BMS Frame Fixing in Numerical Relativity*, Class. Quantum Grav. **41** 223001, [arXiv:2405.08868].
58. **Stein, L. C.**, (2024) *Can a radiation gauge be horizon-locking?*, Class. Quantum Grav. **41** 157001 [arXiv:2404.10113].
57. Samanta, R., Tanay, S., **Stein, L. C.**, (2023) *Closed-form solutions of spinning, eccentric binary black holes at 1.5 post-Newtonian order*, Phys. Rev. D **108**, 124039 [arXiv:2210.01605].
56. Bronicki, D., Cárdenas-Avendaño, A., **Stein, L. C.**, (2023) *Tidally-induced nonlinear resonances in EMRIs with an analogue model*, Class. Quantum Grav. **40** 215015 [arXiv:2203.08841].
55. Yoo, J., *et al.*, (2023) *Numerical relativity surrogate model with memory effects and post-Newtonian hybridization*, Phys. Rev. D **108**, 064027 [arXiv:2306.03148].
54. Ma, S., Varma, V., **Stein, L. C.**, *et al.* (2023) *Numerical simulations of black hole–neutron star mergers in scalar-tensor gravity*, Phys. Rev. D **107**, 124051 [arXiv:2304.11836].
53. Tanay, S., **Stein, L. C.**, Cho, G., (2023) *Action-angle variables of a binary black-hole with arbitrary eccentricity, spins, and masses at 1.5 post-Newtonian order*, Phys. Rev. D **107**, 103040 [arXiv:2110.15351].
52. Grant, A. M., Saffer, A., **Stein, L. C.**, Tahura, A., (2023) *Gravitational-wave energy and other fluxes in ghost-free bigravity*, Phys. Rev. D **107**, 044041 [arXiv:2208.02123].
51. Mitman, K., Lagos, M., **Stein, L. C.**, *et al.* (2023) *Nonlinearities in black hole ringdowns*, Phys. Rev. Lett. **130**, 081402 [arXiv:2208.07380]. Editors' Suggestion, Featured in Physics.
50. Clark, W. A., Gomes, M. W., Rodriguez-Gonzalez, A., **Stein, L. C.**, Strogatz, S. H., (2023) *Surprises in a classic boundary-layer problem*, SIAM Review 2023 65:1, 291-315 [arXiv:2107.11624].
49. Mitman, K., **Stein, L. C.**, Boyle, M., *et al.* (2022) *Fixing the BMS Frame of Numerical Relativity Waveforms with BMS Charges*, Phys. Rev. D **106**, 084029 [arXiv:2208.04356].
48. Okounkova, M, Farr, W. M., Isi, M., **Stein, L. C.**, (2022) *Constraining gravitational wave amplitude birefringence and Chern-Simons gravity with GWTC-2*, Phys. Rev. D **106**, 044067 [arXiv:2101.11153].
47. Magaña Zertuche, L., Mitman, K., Khera, N., **Stein, L. C.**, et al., (2022) *High Precision Ringdown Modeling: Multimode Fits and BMS Frames*, Phys. Rev. D **105**, 104015 [arXiv:2110.15922].
46. Gálvez Ghersi, J. T., **Stein, L. C.**, (2021) *Numerical renormalization group-based approach to secular perturbation theory*, Phys. Rev. E **104**, 034219 [arXiv:2106.08410].
45. Mitman, K., Khera, N., Iozzo, D. A. B., **Stein, L. C.**, et al., (2021) *Fixing the BMS frame of numerical relativity waveforms*, Phys. Rev. D **104**, 024051 [arXiv:2105.02300].
44. Iozzo, D. A. B., Khera, N., **Stein, L. C.**, et al., (2021) *Comparing Remnant Properties from Horizon Data and Asymptotic Data in Numerical Relativity*, Phys. Rev. D **103**, 124029 [arXiv:2104.07052].
43. Tahura, S., Nichols, D. A., Saffer, A., **Stein, L. C.**, Yagi, K. (2020) *Brans-Dicke theory in Bondi-Sachs form: Asymptotically flat solutions, asymptotic symmetries and gravitational-wave memory effects*, Phys. Rev. D **103**, 104026 [arXiv:2007.13799].
42. Tanay, S., **Stein, L. C.**, Gálvez Ghersi, J. T., (2020) *Integrability of eccentric, spinning black hole binaries up to second post-Newtonian order*, Phys. Rev. D **103**, 064066 [arXiv:2012.06586].
41. Gálvez Ghersi, J. T., **Stein, L. C.**, (2020) *A fixed point for black hole distributions*, Class. Quantum Grav. **38** 045012 [arXiv:2007.11578].
40. Okounkova, M., **Stein, L. C.**, Moxon, J., Scheel, M. A., Teukolsky, S. A., (2020) *Numerical relativity simulation of GW150914 beyond general relativity*, Phys. Rev. D **101**, 104016 [arXiv:1911.02588].

39. **Stein, L. C.**, Warburton, N., (2020) *Location of the last stable orbit in Kerr spacetime*, Phys. Rev. D **101**, 064007 [arXiv:1912.07609].
38. Okounkova, M., **Stein, L. C.**, Scheel, M. A., Teukolsky, S. A., (2019) *Numerical binary black hole collisions in dynamical Chern-Simons gravity*, Phys. Rev. D **100**, 104026 [arXiv:1906.08789].
37. Varma, V, *et al.* (2019) *Surrogate models for precessing binary black hole simulations with unequal masses*, Phys. Rev. Research **1**, 033015 [arXiv:1905.09300].
36. **Stein, L. C.**, (2019) `qnm`: *A Python package for calculating Kerr quasinormal modes, separation constants, and spherical-spheroidal mixing coefficients*, J. Open Source Softw., 4(42), 1683 [arXiv:1908.10377].
35. Boyle, M., *et al.* (**LCS** is corresponding author) (2019) *The SXS Collaboration catalog of binary black hole simulations*, Class. Quantum Grav. **36** 195006 [arXiv:1904.04831].
34. Barack, L., *et al.* (2019) *Black holes, gravitational waves and fundamental physics: a roadmap*, Class. Quantum Grav. **36** 143001 [arXiv:1806.05195].
33. Varma, V., **Stein, L. C.**, Gerosa, D., (2019) *The binary black hole explorer: on-the-fly visualizations of precessing binary black holes*, Class. Quantum Grav. **36** 095007 [arXiv:1811.06552], [project website].
32. Varma, V., Gerosa, D., **Stein, L. C.**, Hébert, F., Zhang, H., (2019) *High-accuracy mass, spin, and recoil predictions of generic black-hole merger remnants*, Phys. Rev. Lett. **122**, 011101 [arXiv:1809.09125].
31. Isi, M., **Stein, L. C.** (2018) *Measuring stochastic gravitational-wave energy beyond general relativity*, Phys. Rev. D **98**, 104025 [arXiv:1807.02123].
30. Prabhu, K., **Stein, L. C.** (2018) *Black hole scalar charge from a topological horizon integral in Einstein-dilaton-Gauss-Bonnet gravity*, Phys. Rev. D **98**, 021503(R) (Rapid Communication) [arXiv:1805.02668].
29. Gerosa, D., Hébert, F., **Stein, L. C.** (2018) *Black-hole kicks from numerical-relativity surrogate models*, Phys. Rev. D **97**, 104049 [arXiv:1802.04276].
28. Chen, B., **Stein, L. C.** (2018) *Deformation of extremal black holes from stringy interactions*, Phys. Rev. D **97**, 084012 [arXiv:1802.02159].
27. Chen, B., **Stein, L. C.** (2017) *Separating metric perturbations in near-horizon extremal Kerr*, Phys. Rev. D **96**, 064017 [arXiv:1707.05319].
26. Okounkova, M., **Stein, L. C.**, Scheel, M. A., Hemberger, D. A. (2017) *Numerical binary black hole mergers in dynamical Chern-Simons: I. Scalar field*, Phys. Rev. D **96**, 044020 [arXiv:1705.07924].
25. Tso, R., Isi, M., Chen, Y., **Stein, L. C.** (2017) *Modeling the Dispersion and Polarization Content of Gravitational Waves for Tests of General Relativity*, CPT and Lorentz Symmetry: pp. 205–208 [arXiv:1608.01284].
24. McNees, R., **Stein, L. C.**, Yunes, N. (2016) *Extremal Black Holes in Dynamical Chern-Simons Gravity*, Class. Quantum Grav. **33** 235013 [arXiv:1512.05453].
23. Flanagan, É. É., Nichols, D. A., **Stein, L. C.**, Vines, J. (2016) *Prescriptions for Measuring and Transporting Local Angular Momenta in General Relativity*, Phys. Rev. D **93**, 104007 [arXiv:1602.01847].
22. Yagi, K., **Stein, L. C.** (2016) *Black Hole Based Tests of General Relativity*, Class. Quantum Grav. **33** 054001 [arXiv:1602.02413].
21. Yagi, K., **Stein, L. C.**, Yunes, N. (2016) *Challenging the Presence of Scalar Charge and Dipolar Radiation in Binary Pulsars*, Phys. Rev. D **93** 024010 [arXiv:1510.02152].
20. Berti, E., (5 authors), **Stein, L. C.**, (46 more authors) (2015) *Testing General Relativity with Present and Future Astrophysical Observations*, Class. Quantum Grav. **32** 243001 [arXiv:1501.07274].
19. Tsang, D., Galley, C. R., **Stein, L. C.**, Turner, A. (2015) *"Slimplectic" Integrators: Variational Integrators for General Nonconservative Systems*, ApJ **809** L9 [arXiv:1506.08443].

18. Yagi, K., **Stein, L. C.**, Pappas, G., Yunes, N., Apostolatos, T. (2014) *Why I-Love-Q: Explaining why universality emerges in compact objects*, Phys. Rev. D **90** 063010 [arXiv:1406.7587].
17. **Stein, L. C.** (2014) *Rapidly rotating black holes in dynamical Chern-Simons gravity: Decoupling limit solutions and breakdown*, Phys. Rev. D **90** 044061 [arXiv:1407.2350].
16. **Stein, L. C.**, Yagi, K., Yunes, N. (2014) *Three-Hair Newtonian Relations for Rotating Stars*, ApJ **788** 15 [arXiv:1312.4532].
15. **Stein, L. C.**, Yagi, K. (2014) *Parameterizing and constraining scalar corrections to general relativity*, Phys. Rev. D **89** 044026 [arXiv:1310.6743].
14. Yagi, K., **Stein, L. C.**, Yunes, N., Tanaka, T. (2013) *Isolated and Binary Neutron Stars in Dynamical Chern-Simons Gravity*, Phys. Rev. D **87** 084058 [arXiv:1302.1918].
13. Yagi, K., **Stein, L. C.**, Yunes, N., Tanaka, T. (2012), *Post-Newtonian, Quasi-Circular Binary Inspirals in Quadratic Modified Gravity*, Phys. Rev. D **85** 064022 [arXiv:1110.5950].
12. Vigeland, S., Yunes, N., **Stein, L. C.** (2011), *Bumpy black holes in alternative theories of gravity*, Phys. Rev. D **83** 104027 [arXiv:1102.3706].
11. Yunes, N., **Stein, L. C.** (2011), *Nonspinning black holes in alternative theories of gravity*, Phys. Rev. D **83** 104002 [arXiv:1101.2921].
10. **Stein, L. C.**, Yunes, N. (2011), *Effective gravitational wave stress-energy tensor in alternative theories of gravity*, Phys. Rev. D **83** 064038 [arXiv:1012.3144].
9. Lutomirski, A., Tegmark, M., Sanchez, N. J., **Stein, L. C.**, Urry, W. L., Zaldarriaga, M. (2011), *Solving the corner-turning problem for large interferometers*, MNRAS **410** 2075 [arXiv:0910.1351].
8. Sutton, P., Jones, G., Chatterji, S., Kalmus, P., Leonor, I., Poprocki, S., Rollins, J., Searle, A., **Stein, L.**, Tinto, M., Was, M. (2010), *X-Pipeline: an analysis package for autonomous gravitational-wave burst searches*, New J. Phys. **12** 053034 [arXiv:0908.3665].
7. Chatterji, S., Lazzarini, A., **Stein, L.**, Sutton, P., Searle, A. (2006), *Coherent network analysis technique for discriminating gravitational-wave bursts from instrumental noise*, Phys. Rev. D **74** 082005 [arXiv:gr-qc/0605002].

Unrefereed Publications

6. Galley, C. R., Tsang, D., **Stein, L. C.** (2014) *The principle of stationary nonconservative action for classical mechanics and field theories*, [arXiv:1412.3082].
5. **Stein, L. C.** (2014), *Note on Legendre decomposition of the Pontryagin density in Kerr*, [arXiv:1407.0744].
4. **Stein, L. C.** (2012), *Probes of Strong-field Gravity*, Ph.D. thesis at Massachusetts Institute of Technology [hdl:1721.1/77256].
3. Betancourt, M., **Stein, L. C.** (2011) *The Geometry of Hamiltonian Monte Carlo*, [arXiv:1112.4118].
2. **Stein, L. C.** (2009), *Binary Inspiral Gravitational Waves from a Post-Newtonian Expansion*, Contribution to the Wolfram Demonstrations Project, `http://demonstrations.wolfram.com/BinaryInspiralGravitationalWavesFromAPostNewtonianExpansion/`
1. **Stein, L. C.** (2006), *Gravitational Wave Burst Source Localization in a Coherent Network Analysis*, Senior thesis at California Institute of Technology