

## Leo C. Stein — Publications

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### PUBLICATION SUMMARY

**h-index** —As of 2024-10-13: 62 (according to Google Scholar), or 55 (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

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 Gherzi, 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 Gherzi, 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 Gherzi, 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](#)].
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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) *“Simplictic” 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](#)].
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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](#)].
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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](#)].
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](#)].
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1. **Stein, L. C.** (2006), *Gravitational Wave Burst Source Localization in a Coherent Network Analysis*, Senior thesis at California Institute of Technology

UNREFEREED  
PUBLICATIONS