

## Leo C. Stein

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CONTACT INFORMATION	205 Lewis Hall University of Mississippi University, MS 38677-1848 USA	lcstein@olemiss.edu duetosymmetry.com 1-662-915-1941
EDUCATION	<b>Ph.D., Physics</b> , Massachusetts Institute of Technology, Cambridge, MA, USA Dissertation Advisor: Prof. Scott Hughes Dissertation Title: <i>Probes of strong-field gravity</i> <b>B.S., Physics</b> , California Institute of Technology, Pasadena, CA, USA Degree conferred with honor. Senior Thesis Advisors: Dr. Patrick Sutton and Prof. Alan Weinstein	<b>May 2012</b>    <b>June 2006</b>
EMPLOYMENT	<b>Associate Professor</b> , University of Mississippi, Oxford, MS USA <b>Assistant Professor</b> , University of Mississippi, Oxford, MS USA <b>Senior Postdoctoral Researcher</b> , Caltech, Pasadena, CA USA <b>NASA Einstein Fellow</b> , Cornell, Ithaca NY, USA <b>Research and Teaching Assistant</b> , MIT, Cambridge MA, USA <b>Teaching Assistant</b> , Caltech, Pasadena, CA, USA <b>Summer Research Fellow</b> , Caltech, Pasadena, CA, USA	<b>July 2024–Present</b> <b>August 2018–June 2024</b> <b>September 2015–August 2018</b> <b>September 2012–August 2015</b> <b>September 2006–May 2012</b> <b>Fall 2004, Spring 2005</b> <b>June–September 2003/2005</b>
RESEARCH INTERESTS	General relativity (GR), gravitation, and astrophysical phenomena which can elucidate gravity. One major theme is pushing numerical and analytical gravitational-wave (GW) predictions to the precision frontier in advance of next-generation observatories. A second major theme is using GWs to test GR against beyond-GR models, in both theory-independent and theory-dependent models. This involves numerical relativity and renormalization methods applied to specific effective field models for beyond-GR theories.	
HONORS AND AWARDS	<b>Sloan Research Fellowship</b> , Alfred P. Sloan Foundation, <b>CAREER Award</b> , NSF <b>Einstein Postdoctoral Fellow</b> , NASA <b>Henry Kendall Teaching Award</b> , Massachusetts Institute of Technology <b>Upperclass Merit Scholarship</b> , California Institute of Technology	<b>2023–2025</b> <b>2021–2026</b> <b>2012–2015</b> <b>2011</b> <b>2005–2006</b>
TEACHING EXPERIENCE	<b>Professor</b> , University of Mississippi Phys. 213, General physics I Phys. 401, Electromagnetism I Phys. 402, Electromagnetism II	<b>Spring 2021</b> <b>Falls 2019–2022</b> <b>Springs 2019–2021</b>

Phys. 436, Intro to cosmology	Fall 2023
Phys. 463/4, Senior research project	Fall 2020, Spring 2021, Fall 2023
Phys. 503/630, Graduate reading course	Spring 2019, Falls 2020–2021
Phys. 709, Graduate classical dynamics I	Fall 2018
Phys. 721, Graduate electrodynamics I	Springs 2022–2024
Phys. 722, Graduate electrodynamics II	Falls 2022–2023
Phys. 750, General relativity II	Spring 2020

**Guest Lecturer**, California Institute of Technology

Ph236, General relativity	Fall 2017
Ph237, Gravitational Waves	Spring 2016

**Guest Lecturer**, Massachusetts Institute of Technology

8.901, Graduate Astrophysics I	Spring 2011
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**Teaching Assistant**, Massachusetts Institute of Technology

8.942, Cosmology	Fall 2011
8.901, Graduate Astrophysics I	Spring 2011
8.286, The Early Universe	Fall 2009

**Teaching Assistant**, California Institute of Technology

Ph 7, Nuclear and Quantum Physics Lab	Spring 2005
Ph 5, Analog Electronics for Physicists	Fall 2004

MENTORING/  
SUPERVISION**Postdoctoral researchers**

Károly Csukás	Fall 2021–present
José Tomás Gálvez Gherzi	Fall 2019–Spring 2021
Now faculty at Universidad de Ingeniería y Tecnología, Peru	

**Graduate students**

David Bronicki, University of Mississippi	Fall 2019–Summer 2023
Subhayu Bagchi, University of Mississippi	Fall 2019–present
Aniket Khairnar, University of Mississippi	Fall 2019–present
Akshay Khadse, University of Mississippi	Fall 2018–present
Lorena Magaña Zertuche, University of Mississippi	Fall 2018–present
Joe Rivest, University of Mississippi	Fall 2018–present
Sashwat Tanay, University of Mississippi	Fall 2018–Summer 2022
Now a postdoc at LUTH, Meudon, France	
Maria (Masha) Okounkova, Caltech	Fall 2015–Summer 2019
Now faculty at Pasadena City College	
Baoyi Chen, Caltech	Fall 2016–Summer 2018

**Undergraduate students**

Wayne Zhao, Harvard	Summer 2016
Now a graduate student at Princeton	

PROFESSIONAL  
ACTIVITIES,  
OUTREACH, AND  
SERVICE

<b>LISA Consortium, Full member</b>	<b>2020–Present</b>
UMiss LISA Group leader	<b>2020–Present</b>
<b>Simulating eXtreme Spacetimes collaboration</b>	<b>2015–Present</b>
Executive committee member	<b>2018–Present</b>
<b>American Physical Society, member</b>	<b>2010–Present</b>
Division of Gravitational Physics	
Secretary/Treasurer	<b>2023–2026</b>
Executive Committee Member-at-Large	<b>2016–2019</b>
Division of Astrophysics	
<b>Conference organizer</b>	
Nonlinear Aspects of General Relativity, Princeton PCTS	<b>October 2023</b>
Numerical Relativity Community Summer School, ICERM	<b>August 2022</b>
Week-long international summer school, 150 participants	
Workshop on New frontiers in strong gravity, Benasque	<b>July 2022</b>
Two week international workshop, 100 participants	
Workshop on Numerical Relativity beyond General Relativity, Benasque	<b>June 2018</b>
Week-long international workshop, 59 participants	
34 <sup>th</sup> Pacific Coast Gravity Meeting (PCGM), Caltech	<b>March 2018</b>
Two-day conference, ~ 125 participants	
Workshop on Unifying Tests of General Relativity, Caltech	<b>July 2016</b>
Three day workshop, 52 participants	
<b>Seminar organizer</b>	
TAPIR seminar, Caltech	<b>Fall 2015–Spring 2018</b>
General Relativity Informal Tea-Time Series (GRITTS), MIT	<b>Fall 2011–Spring 2012</b>
MKI Journal Club, MIT	<b>Fall 2007–Spring 2010</b>
<b>Conference session chair; Judge for best student speaker award</b>	
April APS meeting, NY, NY	<b>April 2022</b>
Midwest relativity meeting, Grand Rapids, MI	<b>October 2019</b>
April APS meeting, Columbus, OH	<b>April 2018</b>
34 <sup>th</sup> Pacific Coast Gravity Meeting (PCGM), Caltech	<b>March 2018</b>
33 <sup>rd</sup> Pacific Coast Gravity Meeting (PCGM), UCSB	<b>March 2017</b>
“April” APS meeting, Washington D.C.	<b>January 2017</b>
32 <sup>nd</sup> Pacific Coast Gravity Meeting (PCGM), CSU Fullerton	<b>April 2016</b>
Theoretical Astrophysics in Southern California (TASC), CSU Fullerton	<b>November 2015</b>
<b>Journal referee</b>	
American Journal of Physics, Classical and Quantum Gravity, Journal of Cosmology and Astroparticle Physics, Journal of Open Source Software, General Relativity and Gravitation, Monthly Notices of the Royal Astronomical Society, Physics Letters B, Physical Review D, Physical Review Letters, Physical Review X, Reviews of Modern Physics, The Astrophysical Journal Letters, The Physics Teacher	

**Agency work**

Reviewer for NSF, NASA

**Outreach**

Oxford Science Café	April 2019
Lecture: “The truth about black holes”	
Guest on the <i>Starts With a Bang</i> podcast	March 25, 2019
Episode 42: Black holes and gravitation	
Invited speaker for Latin American Webinar on Physics	March 13, 2019
Webinar 75: “Testing Einstein with numerical relativity”	
Caltech astronomy public lecture series speaker	March 2018
Lecture: “The truth about black holes”	
Astronomy on Tap public lecture series speaker and volunteer	2016–2018
Close to a monthly basis	
Caltech astronomy public lecture series panelist and emcee	2016–2018
Approximately every three months	
Invited guest lecture on black holes and gravitational waves	November 2017
<i>Science of Space and Time</i> , Hampshire College	
Invited video Q&A session, public high school physics class	June 2017
<i>The Nova Project</i> school, Seattle	
Guest on <i>The Titanium Physicists Podcast</i>	
Episode 80: Picturing the Bach Hole	August 21, 2019
Episode 64: The edges of Einstein	April 25, 2016
Episode 62: Black Bells	February 1, 2016
Quora Q&A Session on gravitational waves and first detection	February 17, 2016
83.9k+ views, 20.8k+ followers	
Invited guest host, public screening of <i>COSMOS</i> with Q&A,	March/June 2014
Science Cabaret/Cornell	
Invited public talk at <i>Frontiers of Cornell Astronomy</i> ,	November 2013
Cornell Friends of Astronomy	
Invited video chat, <i>Topics in Physics</i> course,	July 2013
Stanford Education Program for Gifted Youth	

COMPUTER SKILLS Expert in MATHEMATICA. Proficient in C/C++, Python, Bash, Javascript. Experience in Java, Haskell. Proficient at \*nix and HPC. Markup languages: L<sup>A</sup>T<sub>E</sub>X, HTML, CSS, Markdown.

**Software**—Most contributions can be found at <https://github.com/duetosymmetry>. Member of the *Simulating eXtreme Spacetimes* (SXS) collaboration, contributor to the Spectral Einstein Code (SpEC). Member of the *Black Hole Perturbation Toolkit*. Author of `qnm` python package (<https://github.com/duetosymmetry/qnm>). Core collaborator on xACT (<http://xact.es>) abstract tensor calculus package for MATHEMATICA. Coauthor of xTERIOR package for exterior differential geometry under xACT. Co-maintainer of community contributions at <http://contrib.xact.es>. Developed `arXiv-keys` browser extension/add-on for Chrome/Firefox. Author of `orcidlink` and coauthor of `gridpapers` packages for L<sup>A</sup>T<sub>E</sub>X.

PUBLICATION  
SUMMARY

**h-index** —As of 2024-06-03: 61 (according to Google Scholar), or 53 (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

61. Mitman, K., Boyle, M., **Stein, L. C.**, *et al.*, (2024) *A Review of Gravitational Memory and BMS Frame Fixing in Numerical Relativity*, [[arXiv:2405.08868](#)].
60. Zhu, H., (9 authors), **Stein, L. C.**, (2024) *Imprints of Changing Mass and Spin on Black Hole Ringdown*, [[arXiv:2404.12424](#)].
59. 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*, [[arXiv:2403.10278](#)].


ACCEPTED  
PUBLICATIONS

58. **Stein, L. C.**, (2024) *Can a radiation gauge be horizon-locking?*, [[arXiv:2404.10113](#)].

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

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 Ring-down 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](#)].



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) “Simplic” 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](#)].

UNREFEREED  
PUBLICATIONS

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](#)].
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

## INVITED TALKS

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|--|----------------|
| 52. UNC physics department colloquium                                  | February 2024  |
| 51. UIUC astrophysics seminar  | December 2023  |
| 50. Harvard CMSA GR seminar  | October 2023   |
| 49. UMass Amherst, Amherst Center for Fundamental Interactions seminar | September 2023 |
| 48. Albert Einstein Institute, “Connecting the Dots” panel discussion  | June 2023      |
| 47. Queen Mary Univ. of London, Gravitational memory workshop          | June 2023      |
| 46. Utah State University, Theoretical Physics Talks,                  | March 2023     |
| 45. Iowa State, Physics and astronomy department colloquium,           | October 2022   |
| 44. UT Austin, Weinberg Institute seminar,                             | October 2022   |
| 43. Vanderbilt, Physics and astronomy department colloquium,           | September 2022 |
| 42. ICERM, Advances in CS Classical and Quantum Gravity,               | May 2022       |
| 41. Flatiron CCA, Ringdown workshop, invited overview talk,            | February 2022  |
| 40. DAMTP (University of Cambridge), HEP/GR colloquium,                | January 2022   |
| 39. SISSA, Current challenges in gravitational physics workshop,       | April 2021     |
| 38. Flatiron CCA, Gravitational wave astronomy group seminar,          | January 2021   |
| 37. University of Birmingham, astrophysics seminar                     | September 2020 |
| 36. Albert Einstein Institute, ACR division seminar                    | July 2020      |
| 35. Black Hole Perturbation Toolkit, Spring 2020 workshop              | May 2020       |
| 34. American Physical Society Meeting                                  | April 2020     |
| 33. UVA, physics department colloquium                                 | November 2019  |



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|---|------------------------|
| 32. UT Dallas, physics department colloquium                                      | October 2019           |
| 31. Northwestern University, CIERA astrophysics seminar                           | May 2019               |
| 30. ETH-ITS Zurich, “New horizons for gravity” workshop                           | May 2018               |
| 29. UC San Diego, astrophysics seminar  | March 2018             |
| 28. UC Berkeley, 4D particle physics seminar                                      | March 2018             |
| 27. Kyoto University, YKIS2018a Symposium   | February 2018          |
| 26. Oakland University physics seminar  | February 2018          |
| 25. University of Wisconsin-Milwaukee gravity seminar                             | January 2018           |
| 24. Caltech/JPL Gravitational-Wave (CaJAGWR) seminar                              | January 2018           |
| 23. ICN UNAM, Relativity seminar  | December 2017          |
| 22. University of Mississippi, Astrophysics seminar                               | November 2017          |
| 21. University of Florida, Astrophysics seminar                                   | November 2017          |
| 20. University of Nottingham, Mathematical Physics seminar                        | July 2017              |
| 19. Sapienza University of Rome, New Frontiers in Gravitational-Wave Astrophysics | June 2017              |
| 18. Rochester Institute of Technology, CCRG seminar                               | March 2017             |
| 17. Penn State, IGC seminar   | March 2017             |
| 16. University of Mississippi, Strong Gravity/Binary Dynamics workshop            | February/March 2017    |
| 15. SUNY Stony Brook, “The universe through gravitational waves”                  | December 2016          |
| 14. University of Pennsylvania, New Frontiers in Gravitational Radiation workshop | December 2016          |
| 13. Cambridge MA, Event Horizon Telescope collaboration meeting                   | November/December 2016 |
| 12. Northwestern University CIERA, “Fellows at the Frontiers”                     | August/September 2016  |
| 11. Princeton University, GR@100++ panel discussion                               | April 2016             |
| 10. Cambridge MA, Einstein fellows symposium                                      | October 2014           |
| 9. Perimeter Institute, Strong gravity seminar                                    | October 2014           |
| 8. Cornell University, Friends of astronomy outreach event                        | November 2013          |
| 7. Cambridge MA, Einstein fellows symposium                                       | October 2013           |
| 6. SUNY Geneseo, Physics colloquium   | October 2013           |
| 5. University of Maryland, UMD gravity seminar                                    | October 2013           |
| 4. Yale University, YCAA seminar  | September 2013         |
| 3. Kyoto University, YITP long-term workshop                                      | June 2013              |
| 2. Cambridge MA, Einstein fellows symposium                                       | October 2012           |
| 1. Cornell University, Relativity lunch   | November 2011          |

CONTRIBUTED TALKS (SELECTED)	23. American Physical Society Meeting	April 2024
	22. American Physical Society Meeting	April 2023
	21. LISA Symposium XIV	July 2022
	20. American Physical Society Meeting	April 2021
	19. American Physical Society Meeting	April 2019
	18. American Physical Society Meeting	April 2018
	17. Pacific Coast Gravity Meeting	March 2017
	16. American Physical Society Meeting	<del>April</del> January 2017
	15. Testing Gravity 2017	January 2017
	14. 21 <sup>st</sup> International meeting on GR (GR21)	July 2016
	13. American Physical Society Meeting	April 2016
	12. Eastern Gravity Meeting	May 2015
	11. American Physical Society Meeting	April 2015
	10. NEB 16 Recent developments in gravity	September 2014
	9. American Physical Society Meeting	April 2014
	8. XXVII Texas symposium on relativistic astrophysics	December 2013
	7. 20 <sup>th</sup> International meeting on GR (GR20)	July 2013
	6. Eastern Gravity Meeting	June 2013
	5. American Physical Society Meeting	April 2013
	4. Caltech TAPIR Seminar	December 2011
	3. Eastern Gravity Meeting	June 2011
	2. American Physical Society Meeting	April 2011
	1. American Physical Society Meeting	April 2010

## REFERENCES

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