STEVEN P. HARRIS

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WORK HISTORY

NP3M Fellow

- Iowa State University *August 2025 - present*
- Center for Exploration of Energy & Matter, Indiana University *September 2023 - present*

Postdoc, Institute for Nuclear Theory, University of Washington *September 2020 - August 2023*

EDUCATION

Washington University in St. Louis *August 2015 - May 2020*
Ph.D. Physics (May 2020)
Adviser: Mark Alford
A.M. Physics (May 2017)

Carnegie Mellon University *August 2011 - May 2015*
B.S. Physics
University and College Honors

PAPERS

1. S. P. Harris and C. J. Horowitz, *Bulk viscosity from neutron decays to dark baryons in neutron star matter*, 2509.25838
2. S. P. Harris, *Symmetry energy expansion and the peak value of the bulk viscosity*, *Phys. Rev. C* **112** (2025) 035806, [2505.12133]
3. T. Zhao, P. B. Rau, A. Haber, S. P. Harris, C. Constantinou and S. Han, *Suppression of Composition g-modes in Chemically Equilibrating Warm Neutron Stars*, *Astrophys. J.* **993** (2025) 161, [2504.12230]
4. S. P. Harris, B. Fore and S. Reddy, *Bulk viscosity of nuclear matter with pions in the neutrino-trapped regime*, *Phys. Rev. C* **111** (2025) 015802, [2407.18890]
5. E. Gau, F. Hajkarim, S. P. Harris, P. S. B. Dev, J.-F. Fortin, H. Krawczynski et al., *New constraints on axion-like particles from IXPE polarization data for magnetars*, *Phys. Dark Univ.* **46** (2024) 101709, [2312.14153]
6. P. S. B. Dev, J.-F. Fortin, S. P. Harris, K. Sinha and Y. Zhang, *First Constraints on the Photon Coupling of Axionlike Particles from Multimessenger Studies of the Neutron Star Merger GW170817*, *Phys. Rev. Lett.* **132** (2024) 101003, [2305.01002]
7. E. R. Most, A. Haber, S. P. Harris, Z. Zhang, M. G. Alford and J. Noronha, *Emergence of Microphysical Bulk Viscosity in Binary Neutron Star Postmerger Dynamics*, *Astrophys. J. Lett.* **967** (2024) L14, [2207.00442]
8. P. S. B. Dev, J.-F. Fortin, S. P. Harris, K. Sinha and Y. Zhang, *Light scalars in neutron star mergers*, *JCAP* **01** (2022) 006, [2111.05852]
9. M. G. Alford, A. Haber, S. P. Harris and Z. Zhang, *Beta Equilibrium Under Neutron Star Merger Conditions*, *Universe* **7** (2021) 399, [2108.03324]

10. E. R. Most, S. P. Harris, C. Plumberg, M. G. Alford, J. Noronha, J. Noronha-Hostler et al., *Projecting the likely importance of weak-interaction-driven bulk viscosity in neutron star mergers*, *Mon. Not. Roy. Astron. Soc.* **509** (2021) 1096–1108, [2107.05094]

11. J.-F. Fortin, H.-K. Guo, S. P. Harris, E. Sheridan and K. Sinha, *Magnetars and axion-like particles: probes with the hard X-ray spectrum*, *JCAP* **06** (2021) 036, [2101.05302]

12. S. P. Harris, J.-F. Fortin, K. Sinha and M. G. Alford, *Axions in neutron star mergers*, *JCAP* **07** (2020) 023, [2003.09768]

13. M. G. Alford and S. P. Harris, *Damping of density oscillations in neutrino-transparent nuclear matter*, *Phys. Rev. C* **100** (2019) 035803, [1907.03795]

14. M. G. Alford and S. P. Harris, *Beta equilibrium in neutron star mergers*, *Phys. Rev. C* **98** (2018) 065806, [1803.00662]

15. M. G. Alford, S. P. Harris and P. S. Sachdeva, *On the stability of strange dwarf hybrid stars*, *Astrophys. J.* **847** (2017) 109, [1705.09880]

REVIEW ARTICLES

1. J.-F. Fortin, H.-K. Guo, S. P. Harris, D. Kim, K. Sinha and C. Sun, *Axions: From magnetars and neutron star mergers to beam dumps and BECs*, *Int. J. Mod. Phys. D* **30** (2021) 2130002, [2102.12503]

CONFERENCE PROCEEDINGS

1. R. Pinsker, R. Prater, C. Moeller, M. Porkolab, O. Meneghini, E. Jaeger et al., *Off-Axis Current Drive with Very High Harmonic Fast Waves for DIII-D*, in *IAEA FEC*, no. TH/P2-38, 2014

BOOK CHAPTERS

1. S. P. Harris, *Bulk Viscosity in Dense Nuclear Matter*. CRC Press, 7, 2024. 2407.16157

WHITE PAPERS

1. MUSES collaboration, R. Kumar et al., *Theoretical and experimental constraints for the equation of state of dense and hot matter*, *Living Rev. Rel.* **27** (2024) 3, [2303.17021]

2. A. Sorensen et al., *Dense nuclear matter equation of state from heavy-ion collisions*, *Prog. Part. Nucl. Phys.* **134** (2024) 104080, [2301.13253]

3. A. Lovato et al., *Long Range Plan: Dense matter theory for heavy-ion collisions and neutron stars*, 2211.02224

4. J. L. Feng et al., *The Forward Physics Facility at the High-Luminosity LHC*, *J. Phys. G* **50** (2023) 030501, [2203.05090]

THESIS

1. S. P. Harris, *Transport in Neutron Star Mergers*, Ph.D. thesis, Washington U., St. Louis, 2020. 2005.09618

PRESENTATIONS

1. September 2025: INT Workshop: Nuclear Physics in Mergers - Going Beyond the Equation of State (U Washington) *The neutron lifetime anomaly, dark baryons, and their impact on neutron star mergers*
2. July 2025: Dark Matter & Stars (Queen's U, Kingston, Canada) *The neutron lifetime anomaly, dark baryons, and their impact on neutron star mergers*
3. June 2025: NP3M Summer School (Indiana U) *The neutron lifetime anomaly, dark baryons, and relativistic mean field theories*
4. May 2025: France/VIRGO group (online) *The neutron lifetime anomaly, dark baryons, and their impact on neutron star mergers*
5. March 2025: APS Global Physics Summit (Anaheim) *The neutron lifetime anomaly, dark baryons, and their impact on neutron star mergers*
6. November 2024: MUSES Seminar (online) *Bulk viscosity in matter with multiple equilibration channels: thermal pions and dark baryons*
7. October 2024: APS DNP Meeting (Boston) *Bulk viscosity from neutron decays to dark sector particles in neutron star merger conditions*
8. September 2024: INT Workshop: EOS Measurements with Next-Generation Gravitational-Wave Detectors (U Washington) *Bulk viscosity in neutron star merger remnants from neutron decays to dark baryons*
9. August 2024: XVIth Quark Confinement and the Hadron Spectrum (Cairns, Australia) *QCD and new physics in extreme astrophysical environments - in neutron stars and their mergers*
    - Panel discussion with Susan Gardner and Anthony Thomas, chaired by Nicole Bell
10. August 2024: XVIth Quark Confinement and the Hadron Spectrum (Cairns, Australia) *Constraints on axionlike particles from GW170817*
11. April 2024: Iowa State University Nuclear Theory Seminar, *Bulk viscosity from neutron light and dark decays*
12. April 2024: APS April Meeting (Sacramento) *Constraints on axionlike particles from GW170817*
13. April 2023: APS April Meeting (Minneapolis) *Impact of thermal pions on the bulk viscosity of nuclear matter*
14. October 2022: AstroCoffee (Frankfurt/online) *The role of scalar particles in neutron star mergers*
15. July 2022: INT Program "Neutron-rich matter on heaven and earth" (U Washington) *Thermal pion contribution to the bulk viscosity of dense matter*
16. June 2022: PPC (Washington University in St. Louis), *New physics with neutron star mergers*
17. March 2022: Theory seminar (Kent State/online), *Bulk viscosity and thermal transport in neutron star mergers*
18. February 2022: Theory seminar (TRIUMF/online), *Bulk viscosity and thermal transport in neutron star mergers*
19. May 2021: Pheno (U Pittsburgh / online), *Axions and scalars in neutron star mergers*
20. May 2021: PPC (U Oklahoma / online), *BSM physics in magnetars and neutron star mergers*
21. May 2021: Third nuclear & particle theory meeting (Washington University in St. Louis/online), *BSM physics in neutron star mergers*

22. January 2021: University of Utah high energy theory journal club (online), *Axions production in magnetars*
23. September 2020: Nuclear lunch (Washington University in St. Louis/online), *Bulk viscosity in neutron star mergers*
24. May 2020: Second nuclear & particle theory meeting (Washington University in St. Louis/ online), *Axion cooling of neutron star mergers*
25. May 2020: Pheno Symposium (Pittsburgh / online), *Axion cooling of neutron star mergers*
26. April 2020: APS April meeting (DC / online), *Axion cooling of neutron star mergers*
27. June 2019: Merging Visions (KITP), *Bulk viscosity in neutrino-transparent nuclear matter* (poster)
28. May 2019: JINA Frontiers meeting (Michigan State U), *Bulk viscosity in neutrino-transparent nuclear matter* (poster)
29. April 2019: APS April meeting (Denver), *Bulk viscosity in neutrino-transparent nuclear matter*
30. March 2019: First nuclear & particle theory meeting (Washington University in St. Louis), *Bulk viscosity in neutron star mergers*
31. Sept 2018: Midwest theory get-together (Argonne), *Beta equilibrium in neutron star mergers*
32. June 2018: National nuclear physics summer school (Yale), *Beta equilibrium and the Urca process in neutron star mergers* (poster)
33. April 2018: APS April meeting (Columbus), *Beta equilibrium in neutron star merger conditions*
34. Sept 2017: Midwest theory get-together (Argonne), *Beta equilibrium and the Urca process*
35. Sept 2016: Midwest theory get-together (Argonne), *When is a hybrid star stable?*
36. Oct 2014 APS DPP meeting (New Orleans), *Transition from high harmonic fast wave to whistler/helicon regime in tokamaks* (poster)

TEACHING

1. Teaching Assistant (Introductory Physics I & II labs), Washington University (Jan - Dec 2016)
2. Teaching Assistant (Introductory Physics II), Carnegie Mellon (Jan - May 2014)

SERVICE/COMMITTEES

1. Have reviewed articles for: Physical Review Letters, Physical Review D, JCAP, Astronomy & Astrophysics, Universe, Symmetry, Particles, Astrophysics & Space Science.
2. Organized NP3M seminar series (October 2025 - present)
3. Organized INT brownbag seminars (November 2021 - June 2023)
4. Organized Nuclear astro/particle astro/cosmology (NAPAC) meetings at INT (September 2021 - June 2023)
5. Washington University (nuclear theory) faculty search committee, grad student member (Spring 2018)
6. Washington University grad student seminar co-host (Aug 2016 - May 2017)

OUTREACH

1. June 2025: Ran a tutorial session at the NP3M Summer School at Indiana University

2. Sept 2020: Lecture for PHYS4213 particle physics class at University of Oklahoma, *Nuclear & particle physics in neutron stars* (Zoom)

AWARDS

1. Best graduate student poster, Washington University physics research symposium (Sept 2019)