

Elias Roland Most

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Research Interests

- **Theoretical Astrophysics.** Relativistic Astrophysics, General Relativity, Neutron Stars, Black Holes, Compact Binary Coalescence, Gravitational Waves, Multi-messenger Astrophysics, Dense Matter Equation of State, Neutron Star Magnetospheres, Relativistic Magnetohydrodynamics, Out-of-Equilibrium Fluid Dynamics.
- **Computational Physics.** Numerical Relativity, Computational Fluid Dynamics and Magnetohydrodynamics, Adaptive Mesh Refinement, High-Performance Computing.

Current Employment

Assistant Professor of Theoretical Astrophysics, 2023–
California Institute of Technology, Pasadena, CA, USA.

Professional Experience

Visiting Associate in Theoretical Astrophysics, 2022–2023
California Institute of Technology, Pasadena, CA, USA.

Postdoctoral Fellow (Associate Research Scholar), 2020–2023
John Archibald Wheeler Fellow, 2022–2023
Princeton Center for Theoretical Science, Princeton University, NJ, USA.
Three year fellowship jointly with the Princeton Gravity Initiative.

Postdoctoral Fellow (Associate Research Scholar), 2020–2023
Princeton Gravity Initiative, Princeton University, NJ, USA.
Five year fellowship.

Postdoctoral Fellow (Long-term Member), 2020–2023
School of Natural Sciences, Institute for Advanced Study, Princeton, NJ, USA.
Five year membership in the Astrophysics group.

Predocctoral Fellow (Research Analyst), 2019–2020
Center for Computational Astrophysics, Flatiron Institute, Simons Foundation, New York, NY, USA.
Five month fellowship. Mentor: Dr. Alexander Philippov

Education

Doctorate (Physics), *Goethe University Frankfurt*, Germany. 2017–2020
Thesis title: *Probing dense matter with binary neutron star mergers.*
Adviser: Prof. Luciano Rezzolla Grade: summa cum laude

Master of Science (Physics), *Goethe University Frankfurt*, Germany. 2014–2017
Thesis title: *Collapse to black holes of rotating magnetised neutron stars.*
Adviser: Prof. Luciano Rezzolla

Natural Sciences Tripos, Part III (Physics), *University of Cambridge*, 2013–2014
UK.

Erasmus Student Exchange
Research project: *Investigating the effects of ray-theoretic approximations in seismic tomography.*
Adviser: Dr. David Al-Attar

Bachelor of Science (Physics), *University of Göttingen*, Germany. 2010–2013
Thesis title: *On models of cosmological inflation using the Higgs field.*
Adviser: Prof. Laura Covi

Awards

John Archibald Wheeler Fellowship, *Center for Theoretical Science*, Princeton University, **2022**

Thesis award, *Freunde und Förderer der Goethe Universität*, Frankfurt am Main, Germany, **2021**

Awarded for the best PhD thesis in the natural sciences at Goethe University.

Giersch Excellence Award, *Giersch Foundation & HGS-HIRe Graduate School*, Frankfurt am Main, Germany, **2020**

Awarded for an excellent doctoral thesis.

Joint Postdoctoral Prize Fellowship, **2020**
Center for Theoretical Science & Gravity Initiative, Princeton University.

Postdoctoral Fellowship, *Institute for Advanced Study*, Princeton, **2020**

NASA Hubble Fellowship Program: Einstein Fellowship (declined), **2020**

Postdoctoral Fellowship (declined), *Perimeter Institute*, Waterloo, Canada, **2020**

Flatiron Predoctoral Fellowship, *Simons Foundation*, New York, NY, USA, **2019**

James B. Hartle Award, *International Society on General Relativity and Gravitation*, **2019**

Best student talk (session B2) at GR22/Amaldi13 conference.

Giersch Excellence Grant, *Giersch Foundation*, Frankfurt am Main, Germany, **2018**
Awarded for outstanding progress in the doctoral thesis.

Travel Grant, *Willkomm Foundation*, Frankfurt am Main, Germany, **2018**
Support for a conference trip to Shanghai.

PhD Scholarship, *HGS-HIRe Graduate School*, Frankfurt am Main, Germany, **2017–2020**

Three year PhD scholarship.

Scholarship, *German Academic Scholarship Foundation*, Bonn, Germany, **2010–2016**
Highly competitive scholarship for academic excellence.

Grants

Gravitational Physics - Theory, NSF, PI, Total: **\$300,000**, **2023-2026**
NSF-PHY2309210: *WoU-MMA: Aspects of Numerical Relativity and Relativistic Astrophysics*.

Astronomy and Astrophysics Research Grants, NSF, PI, Total: **2023-2026**
\$598,710.

NSF-AST2307394: *Collaborative Research: WoU-MMA: Coherent radio and x-ray precursor transients to gravitational wave events: Simulations in general relativity and kinetic theory*.

Cyberinfrastructure for Sustained Scientific Innovation (CSSI), **2021-2026**
NSF,

Senior Investigator (PI: N. Yunes), Total: **\$4,421,367**,
Subaward (PI: E.R. Most): **\$114,700** (2023-2025).

NSF-2103680: *Frameworks: MUSES, Modular Unified Solver of the Equation of State*.

Compute Time Grants

Compute Time Grant, *NSF Frontera*, Co-I (PI: A. Philippov), **986,918** **2023-2024**
SUs.

AST21006: *Simulations of reconnection-powered flares in magnetospheres of magnetars, binary neutron stars and black holes (renewal)*

Compute Time Grant, *XSEDE*, PI, **4,816,896** core-hours, **2022-2023**

TG-PHY210074: *Pushing Neutron Mergers to the Extreme*

Compute Time Grant, NSF Frontera, Co-I (PI: A. Philippov), **789,264 2022-2023** SUs.

AST21006: *Simulations of reconnection-powered flares in magnetospheres of magnetars, binary neutron stars and black holes (renewal)*

Compute Time Grant, XSEDE, PI, **1,800,000 core-hours**. **2021-2022**

TG-PHY210074: *Pushing Neutron Star-Black Hole Coalescences to the Extreme*

Compute Time Grant, XSEDE, PI, **50,000 SUs**. **2021-2022**

TG-PHY210053: *Investigating systematic nuclear physics biases in disk mass estimates from compact object coalescence (Startup)*

Compute Time Grant, NSF Frontera, Co-I (PI: A. Philippov), **798,336 2021-2022** SUs.

AST21006: *Simulations of reconnection-powered flares in magnetospheres of magnetars, binary neutron stars and black holes*

Compute Time Grant, NSF Frontera, Co-I (PI: A. Philippov), **300,000 2020-2021** SUs.

AST20008: *Investigating electromagnet precursors to neutron star merger gravitational wave events*

Compute Time Grant, NSF Frontera, Co-I (PI: A. Philippov), **6,000 2020-2021** SUs.

AST20001: *Investigating electromagnet precursors to neutron star merger gravitational wave events (Startup)*

AstroLab Code Optimisation Grant, LRZ , Garching, Germany. **2019-2020**
12-month high level high-performance computing support for code optimization.

Publications

I have published **44 refereed papers** (20 as first, 12 as second and 12 as contributing author). **Four** additional papers are currently under review. As of July 2023, my works have gained **>2,600 citations** with an **h-index 20** (retrieved from Google Scholar).

48. J. Nättilä, J. Y.-K. Cho, J. W. Skinner, **E. R. Most**, B. Ripperda. *Neutron Star Atmosphere-Ocean Dynamics*. 2306.08186 , (submitted)
47. MUSES Collaboration, R. Kumar et al. (incl. **E. R. Most**). *Theoretical and Experimental Constraints for the Equation of State of Dense and Hot Matter*. 2303.17021 , (submitted)
46. **E. R. Most**, A. A. Philippov. *Reconnection-powered fast radio transients from coalescing neutron star binaries*. Phys. Rev. Lett., 130, 245201, 2023
45. **E. R. Most** and E. Quataert. *Flares, jets and quasi-periodic outbursts from neutron star merger remnants*. Astrophys. J. Lett., 947 L15, 2023
44. C. A. Raithel and **E. R. Most** *Degeneracy in the inference of phase transitions in the neutron star equation of state from gravitational wave data*. Phys. Rev. Lett., 130, 201403, 2023
43. M. Chabanov, S. D. Tootle, **E. R. Most**, and L. Rezzolla. *Crustal magnetic fields do not lead to large magnetic-field amplifications in binary neutron-star mergers* . Astrophys J. Lett., in press, 2023.
42. J. F. Mahlmann, A. A. Philippov, V. Mewes, B. Ripperda, **E. R. Most**, L. Sironi. *Three-dimensional dynamics of strongly twisted magnetar magnetospheres: Kinking flux tubes and global eruptions* Astrophys. J. Lett., 947 L34, 2023
41. A. Hegade K.R., **E. R. Most**, J. Noronha, H. Witek, N. Yunes. *How Do Axisymmetric Black Holes Grow Monopole and Dipole Hair?* Phys. Rev. D, 107, 10, 104047, 2023
40. A. Pandya, **E. R. Most**, F. Pretorius. *Causal, stable first-order viscous relativistic hydrodynamics with ideal gas microphysics* Phys. Rev. D, 106, 12, 123036, 2022

39. C. A. Raithel and **E. R. Most** *Tidal Deformability Doppelgangers: II. Implications of a low-density phase transition in the neutron star equation of state.* arXiv:2208.04295, (submitted)
38. **E. R. Most**, A Haber, S. P. Harris, Z. Zhang, M. G. Alford, J. Noronha. *Emergence of microphysical viscosity in binary neutron star post-merger dynamics.* arXiv:2207.00442, (submitted).
37. **E. R. Most**, A. A. Philippov. *Electromagnetic precursor flares from the late inspiral of neutron star binaries.* Mon. Not. R. Astron. Soc., 515, 2, 2710–2724, 2022.
36. Y. Yuan, A. M. Beloborodov, A. Y. Chen, Y. Levin, **E. R. Most**, A. Philippov. *Magnetar bursts due to Alfvén wave nonlinear breakout.* Astrophys. J., 933:174, 2022.
35. **E. R. Most**, A. Motornenko, J. Steinheimer, V. Dexheimer, M. Hanauske, L. Rezzolla, H. Stoecker. *Probing neutron-star matter in the lab: Similarities and differences between binary mergers and heavy-ion collisions.* Phys. Rev. D, 107 4, 043034, 2023.
34. A. Pandya, **E. R. Most**, F. Pretorius. *Conservative finite volume scheme for first-order viscous relativistic hydrodynamics* Phys. Rev. D 105 12, 123001, 2022.
33. A. Hegade K.R., **E. R. Most**, J. Noronha, H. Witek, N. Yunes. *How Do Spherical Black Holes Grow Monopole Hair?* Phys. Rev. D 105, 6, 064041, 2022.
32. C. A. Raithel* and **E. R. Most*** *Characterizing the breakdown of quasi-universality in the post-merger gravitational waves from binary neutron star mergers.* Astrophys. J. Lett., 933:L39, 2022
31. L. J. Papenfort, **E. R. Most**, S. Tootle and L. Rezzolla. *Impact of extreme spins and mass ratios on the post-merger observables of high-mass binary neutron stars .* Mon. Not. R. Astron. Soc., 513, 3, 3646–3662, 2022.
30. **E. R. Most**, J. Noronha, A. A. Philippov. *Modeling general-relativistic plasmas with collisionless moments and dissipative two-fluid magnetohydrodynamics.* Mon. Not. R. Astron. Soc., 514, 4, 4989–5003, 2022.
29. H. Olivares, I. Peshkov, **E. R. Most**, F. Guercilena, L. J. Papenfort. *A new first-order formulation of the Einstein equations exploiting analogies with electrodynamics.* Phys. Rev. D., 105 12, 124038, 2022.
28. **E. R. Most**, J. Noronha. *Dissipative Magnetohydrodynamics for Non-Resistive Relativistic Plasmas: An implicit second-order flux-conservative formulation with stiff relaxation.* Phys. Rev. D, 104, 10, 103028, 2021.
27. S. D. Tootle, L. J. Papenfort, **E. R. Most**, L. Rezzolla. *Quasi-universal behaviour of the threshold mass in unequal-mass, spinning binary neutron-star mergers.* Astrophys. J. Lett., 922:L19, 2021.
26. **E. R. Most***, C. A. Raithel *. *Impact of the nuclear symmetry energy on the post-merger phase of a binary neutron star coalescence.* Phys. Rev. D, 104, 12, 124012, 2021, (*: equal contribution).
25. **E. R. Most**, S. P. Harris, C. Plumberg, M. G. Alford, J. Noronha, J. Noronha-Hostler, F. Pretorius, H. Witek, N. Yunes. *Projecting the likely importance of weak-interaction-driven bulk viscosity in neutron star mergers.* Mon. Not. R. Astron. Soc., 509 (1), 1096–1108, 2022.
24. **E. R. Most**, L. J. Papenfort, S. Tootle, L. Rezzolla. *On accretion disks formed in MHD simulations of black hole-neutron star mergers with accurate microphysics.* Mon. Not. R. Astron. Soc., 506 (3), 3511–3526, 2021.
23. V. Skoutnev, **E. R. Most**, A. Bhattacharjee, A. A. Philippov. *Scaling of Small-Scale Dynamo Properties in the Rayleigh-Taylor Instability.* Astrophys. J., 921:75, 2021.
22. B. Ripperda, J. F. Mahlmann, A. Chernoglazov, J. M. TenBarge, **E. R. Most**, J. Juno, Y. Yuan, A. A. Philippov, A. Bhattacharjee. *Weak Alfvénic turbulence in relativistic plasmas I: asymptotic solutions.* J. Plasma Phys., 87:905870512, 2021.
21. J. M. TenBarge, B. Ripperda, A. Chernoglazov, A. Bhattacharjee, J. F. Mahlmann, **E. R. Most**, J. Juno, Y. Yuan, A. A. Philippov. *Weak Alfvénic turbulence in relativistic plasmas I: asymptotic solutions.* J. Plasma Phys., 87:905870614, 2021.

20. L. J. Papenfort, S. D. Tootle, P. Grandclement, **E. R. Most**, and L. Rezzolla. *A new public code for initial data of unequal-mass, spinning compact-object binaries*. Phys. Rev. D 104, 024057, 2021.
19. **E. R. Most**, L. J. Papenfort, S. Tootle, L. Rezzolla. *Fast ejecta as a potential way to distinguish black holes from neutron stars in high-mass gravitational-wave events*. Astrophys. J., 912:1, 80, 2021.
18. A. Nathanail, **E. R. Most**, and L. Rezzolla. *GW170817 and GW190814: tension on the maximum mass*. Astrophys. J. Lett, 908 L28, 2021, *Featured in AAS Nova.*
17. **E. R. Most**, L. J. Papenfort, L. R. Weih, L. Rezzolla. *A lower bound on the maximum mass if the secondary in GW190814 was once a rapidly spinning neutron star*. Mon. Not. R. Astron. Soc. Lett., 499 (1), L82-L86, 2020. **Citations: 70.**
16. **E. R. Most**, L. R. Weih, L. Rezzolla. *The heavier the better: how to constrain mass ratios and spins of high-mass neutron-star mergers*. Mon. Not. R. Astron. Soc. Lett., 496, L16-L21, 2020.
15. **E. R. Most** and A. A. Philippov. *Electromagnetic precursors to gravitational wave events: Numerical simulations of flaring in pre-merger binary neutron star magnetospheres*. Astrophys. J. Lett., 893, L6, 2020. *Featured in AAS Nova.*
14. **E. R. Most**, L. J. Papenfort, V. Dexheimer, M. Hanauske, H. Stöcker, and L. Rezzolla. *On the deconfinement phase transition in neutron-star mergers*. Eur. Phys. J. A , 56:59, 2020.
13. **E. R. Most**, L. J. Papenfort, and L. Rezzolla. *Beyond second-order convergence in simulations of magnetised binary neutron stars with realistic microphysics*. Mon. Not. R. Astron. Soc., 490:3588–3600, 2019.
12. **E. R. Most**, L. J. Papenfort, A. Tsokaros, and L. Rezzolla. *Impact of High Spins on the Ejection of Mass in GW170817*. Astrophys. J. 884:40, 2019.
11. **E. R. Most**, L. J. Papenfort, V. Dexheimer, M. Hanauske, S. Schramm, H. Stöcker, and L. Rezzolla. *Signatures of Quark-Hadron Phase Transitions in General-Relativistic Neutron-Star Mergers*. Phys. Rev. Lett., 122:061101, 2019, **Citations: 200.**
Featured as Editors' suggestion.
10. H. Olivares, O. Porth, J. Davelaar, **E. R. Most**, C.M. Fromm, Y. Mizuno, Z. Younsi, L. Rezzolla. *Constrained transport and adaptive mesh refinement in the Black Hole Accretion Code*. Astron. & Astrophys. 629, A61, 2019.
9. B. Ripperda, F. Bacchini, O. Porth, **E. R. Most**, H. Olivares, A. Nathanail, L. Rezzolla, J. Teunissen, R. Keppens. *General relativistic resistive magnetohydrodynamics with robust primitive variable recovery for accretion disk simulations*. Astrophys. J. Supp. 244:1, 2019.
8. M. Hanauske, J. Steinheimer, A. Motornenko, V. Vovchenko, L. Bovard, **E. R. Most**, L.J. Papenfort S. Schramm, H. Stöcker. *Neutron Star Mergers: Probing the EoS of Hot, Dense Matter by Gravitational Waves*. Particles 2:1,44-56, 2019.
7. V. Dexheimer, C. Constantinou, **E. R. Most**, L. J. Papenfort, M. Hanauske, S. Schramm, H. Stöcker, and L. Rezzolla. *Neutron-Star-Merger Equation of State*. Universe, 5:5, 129, 2019.
6. L. R. Weih, **E. R. Most**, and L. Rezzolla. *Optimal neutron-star mass ranges to constrain the equation of state of nuclear matter with electromagnetic and gravitational-wave observations*. Astrophys. J., 881:73, 2019.
5. **E. R. Most**, L. R. Weih, L. Rezzolla, and J. Schaffner-Bielich. *New Constraints on Radii and Tidal Deformabilities of Neutron Stars from GW170817*. Phys. Rev. Lett., 120(26):261103, 2018, **Citations: 470.**
4. **E. R. Most**, A. Nathanail, L. Rezzolla. *Electromagnetic Emission from Blitzars and Its Impact on Non-repeating Fast Radio Bursts*. Astrophys. J., 864:117, 2018.
3. L. Rezzolla, **E. R. Most**, and L. R. Weih. *Using Gravitational-wave Observations and Quasi-universal Relations to Constrain the Maximum Mass of Neutron Stars*.

Astrophys. J. Lett., 852:L25, 2018, **Citations: 522.**

2. L. R. Weih, **E. R. Most**, and L. Rezzolla. *On the stability and maximum mass of differentially rotating relativistic stars.* Mon. Not. R. Astron. Soc., 473:L126–L130, 2018. **Citations: 50.**

1. A. Nathanail, **E. R. Most**, and L. Rezzolla. *Gravitational collapse to a Kerr-Newman black hole.* Mon. Not. R. Astron. Soc., 469:L31–L35, 2017. **Citations: 43.**

Colloquia and Seminars

Brandeis Physics Colloquium, Brandeis University, Boston, MA. **02/2023**

Invited colloquium on *Neutron star mergers: From gravity to nuclear and plasma physics.*

VandyGRAF Seminar, Vanderbilt University, Nashville, TN . **11/2022**

Invited seminar on *Neutron star mergers: From gravity to nuclear and plasma physics.*

Astrophysics Seminar, New York University, New York, NY . **09/2022**

Invited seminar on *Neutron star mergers: From gravity to nuclear and plasma physics.*

Astrophysics Seminar, University of Milano-Bicocca, Milano, Italy (virtual) **03/2022**

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Invited seminar on *Neutron star mergers: Probes of dense matter and electromagnetic precursors*

Special Physics Colloquium, Cornell University, Ithaca, NY. **03/2022**

Invited colloquium on *Neutron star mergers: From gravitational waves to the most extreme plasmas in the universe.*

LEPP Seminar, Cornell University, Ithaca, NY. **03/2022**

Invited seminar on *Deciphering the engine of multi-messenger gravitational wave events.*

LIGO Seminar, Caltech, Pasadena, CA (virtual). **02/2022**

Invited seminar on *Modeling the engine of multi-messenger gravitational wave events.*

Astroplasma Seminar, Princeton University, Princeton, NJ. **12/2021**

Invited seminar on *Modeling dissipative effects in general-relativistic plasmas and beyond.*

Nuclear Physics Seminar, University of Illinois, Urbana, IL. **11/2021**

Invited seminar on *Neutron star mergers: Massive stars, symmetry energy and cosmic collisions in the lab.*

STAG Seminar, University of Southampton, Southampton, UK (virtual). **11/2021**

Invited seminar on *Neutron star mergers: Fast ejecta, magnetic fields and dense matter.*

Nuclear Physics Seminar, Kent State University, Kent, OH (virtual). **11/2021**

Invited seminar on *Neutron star mergers: Nuclear matter and out-of-equilibrium dynamics.*

CITA Seminar, University of Toronto, Toronto, Canada (virtual). **11/2021**

Invited seminar on *Neutron star mergers: Fast ejecta, magnetic fields and dense matter.*

Physics & Astronomy Colloquium, West Virginia University, Morgantown, WV (virtual). **10/2021**

Invited colloquium on *Probing dense matter with binary neutron star mergers.*

Theoretical Physics Seminar, Friedrich-Schiller-University, Jena, Germany (virtual). **10/2021**

Invited seminar on *Neutron star mergers: Fast ejecta, magnetic fields and dense matter.*

Theoretical Particle Physics Seminar, Johns Hopkins University, Baltimore, USA. **09/2021**

Invited seminar on *Probing dense matter with binary neutron star mergers.*

Astroparticle Seminar, Niels-Bohr-Institute, Copenhagen, Denmark, (virtual). **09/2021**

Invited seminar on *Probing dense matter with binary neutron star mergers.*

Informal Seminar Series, Institute for Advanced Study, Princeton, NJ, USA. **03/2021**

Invited seminar *On the maximum mass of neutron stars and electromagnetic precursor emission from inspiralling neutron star binaries.*

Astrophysics seminar, Cornell University, Ithaca, NY, USA, (virtual). **03/2021**

Invited seminar on *Binary neutron star mergers: Fast ejecta and prospects for electromagnetic precursor signals.*

Houston/UIUC/Kent Nuclear Physics Journal Club, (virtual meeting). **01/2021**

Invited seminar on *Fast ejecta as a potential way to distinguish black holes from neutron stars in high-mass gravitational-wave events.*

Princeton Gravity Initiative Lunch Talk, Princeton University, Princeton, NJ, USA. **09/2020**

Invited seminar on *Neutron star mergers: On the impact of high spins in multi-messenger gravitational wave events.*

Princeton Center for Theoretical Science Lunch Talk, Princeton University, Princeton, NJ, USA. **09/2020**

Invited seminar on *Probing dense matter with neutron star mergers.*

Stavanger Virtual Seminar, University of Stavanger, Stavanger, Norway. **09/2020**

Invited seminar on *Neutron star mergers: What recent gravitational wave events have taught us about the equation of state.*

Computational Relativity Seminar, Max-Planck-Institute for Gravitational Physics, Potsdam, Germany. **02/2020**

Invited seminar on *Constraints on nuclear physics and electromagnetic precursors from neutron star mergers.*

Astrophysics, Gravitation and Cosmology Seminar, University of Illinois at Urbana/Champaign, Urbana, IL, USA. **02/2020**

Invited seminar on *Constraints on nuclear physics and electromagnetic precursors from neutron star mergers.*

Nuclear Physics Seminar, Kent State University, Kent, OH, USA. **02/2020**

Invited seminar on *Constraints on nuclear physics from neutron star mergers.*

HEP Seminar, Columbia University, New York, NY, USA. **12/2019**

Invited seminar on *Constraints on nuclear physics and electromagnetic precursors from neutron star mergers.*

Bahcall Lunch Talk, Institute for Advanced Study, Princeton, NJ, USA. **12/2019**

Invited talk on *Electromagnetic precursors from neutron star mergers.*

Princeton Gravity Initiative Lunch Talk, Princeton University, Princeton, NJ, USA. **12/2019**

Invited seminar on *Constraints on nuclear physics and electromagnetic precursors from neutron star mergers.*

Strong Gravity Seminar, Perimeter Institute, Waterloo, Canada. **11/2019**

Invited seminar on *How neutron star mergers can be used to study hadron-quark phase transitions.*

HEP Seminar, Penn State University, State College, PA, USA. **11/2019**

Invited seminar on *How neutron star mergers can be used to study hadron-quark phase transitions.*

String Theory Seminar, Institute for Theoretical Physics, Utrecht, The Netherlands. **03/2019**

Invited seminar on *First-order phase transitions in neutron star mergers.*

Conferences and Workshops

Modeling Plasmas around Black Holes, Leiden, Netherlands. **09/2023**

Invited talk on *Modeling dynamos and kinetic physics in GRMHD simulations.*

Astrophysics of Fast Radio Bursts II, New York, NY. **09/2023**

Invited talk on *Fast Radio Transients from merging neutron star binaries*.
Einstein Toolkit Workshop 2023, Rochester, NY. **07/2023**
Invited talk on *Simulating extreme plasmas in neutron star mergers*.

INT Neutron Rich Matter on Heaven and Earth, Seattle, WA. **07/2023**
Invited talk on *Kilohertz QPOs in short gamma-ray bursts: A hypermassive neutron star origin?*.

ASTRONUM 2023: International Conference on Numerical Modeling of Space Plasma Flows, Pasadena, CA. **06/2023**
Invited talk on *Simulating extreme plasmas in neutron star mergers*.

KITP Workshop on Relativistic Fluids, Santa Barbara, CA. **06/2023**
Invited talk on *Two-fluid formulations of relativistic dissipative plasmas*.

MUSES Collaboration workshop, Urbana, IL. **05/2023**
Invited participant for *the MUSES users groups*.

Multi-messenger Modeling of Neutron Star Mergers, Princeton, NJ. **05/2023**
Invited talk on *Flares, jets and quasi-periodic outbursts from neutron star mergers*.

APS April Meeting 2023, Minneapolis, MN. **04/2023**
Contributed talk on *Electromagnetic precursors from the late inspiral of black hole - neutron star binaries*.

DSA-2000 Science Conference, Pasadena, CA. **03/2023**
Contributed talk on *Fast-Radio Precursor Transients to Neutron Star Mergers*.

PCTS Workshop: Improving Black Hole Accretion Models with Plasma Theory, Princeton, NJ. **02/2023**
Invited talk on *Beyond ideal: Towards the inclusion of kinetic effects in GRMHD simulations*.

APS Division of Plasma Physics Meeting 2022, Spokane, WA, (virtual). **10/2022**
Contributed talk on *Formulating two-fluid dissipative magnetohydrodynamics for general-relativistic plasmas*.

GSI Post-merger workshop, Darmstadt, Germany. **10/2022**
Invited talk on *Neutron star mergers: Aspects of nuclear and plasma physics*.

CIPANP 2022: Intersections of Particle and Nuclear Physics, Orlando, FL. **08/2022**
Invited talk on *Neutron star mergers: From gravity to nuclear physics*.

PAX 2022, Cambridge, MA. **07/2022**
Panel convener and panelist for *Nuclear physics with next-generation ground-based gravitational wave detectors*.

Plasmas in Strong Gravity Workshop, Aspen, CO. **07/2022**
Invited discussion on *MHD simulations of compact objects*.

INT Neutron Rich Matter on Heaven and Earth, Seattle, WA. **07/2022**
Invited talk on *Simulations of neutron star mergers*.

GR23, Beijing, China, (virtual). **07/2022**
Contributed talk on *Reconnection-powered radio transients from binary neutron star coalescence*.

INT r-process and EOS workshop, Seattle, WA, (virtual). **05/2022**
Invited talk on *Bulk viscosity in neutron star mergers*.

ICASU inaugural workshop, Urbana, IL. **05/2022**
Invited talk on *Simulations of compact binary mergers: From gravity to nuclear physics*.

MUSES Collaboration workshop, Urbana, IL. **05/2022**
Invited participant for *the MUSES users groups*.

APS April Meeting 2022, New York, NY. **04/2022**
Invited talk on *Simulating extreme plasmas in neutron star mergers and beyond*.

APS Division of Plasma Physics Meeting 2021, Pittsburgh, PA . **11/2021**

Contributed talk on *Dissipative magnetohydrodynamics for non-resistive relativistic plasmas*.
APS Division of Nuclear Physics Meeting 2021, (virtual) . **10/2021**
Invited talk on *Unraveling the Properties of Ultradense Matter with Neutron Star Merger Simulations*.
APS Division of Nuclear Physics Meeting 2021, (virtual) . **10/2021**
Contributed talk on *Dissipative magnetohydrodynamics for non-resistive relativistic plasmas*.
A Virtual Tribute to Quark Confinement and the Hadron Spectrum 08/2021
2021, Stavanger (virtual) .
Contributed talk on *Probing the slope of the nuclear symmetry energy with neutron star mergers*.
Probing Nuclear Physics With Neutron Star Mergers, ECT* . **07/2021**
Contributed talk on *Assessing the impact of bulk viscosity on neutron star merger*.
Marcel Grossmann Meeting 2021. **07/2021**
Contributed talk on *Fast ejecta as a potential way to distinguish neutron stars from black holes in the lower mass gap*.
Aspen Workshop. **06/2021**
Participant in *Exploring Extreme Matter in the Era of Multimessenger Astronomy: from the Cosmos to Quarks*.
APS April Meeting 2021. **04/2021**
Contributed talk on *Fast ejecta as a potential way to distinguish neutron stars from black holes*.
Workshop of the APS Topical Group on Hadron Physics. **04/2021**
Invited talk on *The role of exotic hadronic degrees of freedom in neutron-star mergers*.
CompOSE (PHAROS WG1+WG2) Workshop, Barcelona (virtual **02/2021**
meeting).
Invited panelist on *WHAT WE NEED for an improvement of our CompOSE data base for the equation of state and transport properties of neutrons stars*.
AAS237, virtual meeting. **01/2021**
Contributed talk on *Electromagnetic precursors to neutron star mergers*.
Athena Developer Workshop, Center for Computational Astrophysics, Flat- **10/2020**
iron Institute, New York, NY, USA.
Invited talk on *Update on resistive GRMHD and force-free strategies* (jointly with J. Mählmann & B. Ripperda).
Midwest Relativity Meeting, Notre Dame University, virtual meeting. **10/2020**
Contributed talk on *Electromagnetic precursors to neutron star mergers*.
From heavy-ion collisions to neutron stars, Illinois Center for Advanced **08/2020**
Studies of the Universe, virtual meeting.
Invited panelist on *Dynamical phenomena in ultradense matter*.
GR22/Amaldi13 International Conference, Valencia, Spain. **07/2019**
Contributed talk on *Signatures From First-Order Phase Transitions In Neutron Star Mergers*.
The Radiating Universe Workshop, Tsung-Dao Lee Institute, Shanghai, **05/2019**
China.
Invited talk on *Multi-messenger aspects of gravitational wave sources*.
First EPS Conference on Gravitation, La Sapienza University, Rome, **02/2019**
Italy.
Contributed talk on *What neutron star mergers and their gravitational wave signal can teach us about matter under extreme conditions*.
Pharos WG1+WG2 meeting, University of Coimbra, Portugal. **09/2018**
Contributed talk on *Constraining the equation of state with GW170817*.
The Exploding Universe Workshop, Tsung-Dao Lee Institute, Shanghai, **05/2018**
China.

- Invited talk** on *Binary neutron star mergers: A status report from Frankfurt*.
Fire and Ice Workshop, Saariselkä, Finland. **04/2018**
Invited talk on *Constraints on neutron star properties from GW170817*.
MICRA Meeting 2017, Michigan State University, East Lansing, USA. **07/2017**
 Contributed talk on *Neutrino and magnetic effects on neutron star mergers*.
NewCompStar Conference 2017, Polish Academy of Sciences, Warsaw, **03/2017**
 Poland.
 Contributed talk on *Fast radio bursts from collapsing neutron stars*.
 ◦ Attended six summer schools on gravitational wave and neutron star physics. Participated in 10 workshops on high-performance computing at various German supercomputing centers.

Teaching Experience

- Lecturer**, ICERM, Brown University, Providence, RI. **2022**
 Two day course on *Relativistic Hydrodynamics* at the Numerical Relativity Community Summer School.
Tutor(TA), Institute for Theoretical Physics, Frankfurt am Main, Germany. **2018**
 Supervisions for the course *Advanced Introduction to C++, Scientific Computing and Machine Learning*.
Tutor(TA), Institute for Theoretical Physics, Frankfurt am Main, Germany. **2016**
 Supervisions for the course *Theoretical Physics I*.
Tutor(TA), Institute for Theoretical Physics, Göttingen, Germany. **2013**
 Supervisions for the course *Mathematics for Physicists I*.
Tutor(TA), Institute for Theoretical Physics, Göttingen, Germany. **2012**
 One-week revision course for *Mathematics for Physicists I*, included preparation of course materials.

Mentoring Experience

I have collaborated and worked with several graduate students on a variety of topics.

Caltech:

- **Tuojin Yin** (Cal-Bridge, WAVE Fellow), topic: Lifetime of post-merger remnants, on-going.
- **Yoonsoo Kim** (adviser: S.A. Teukolsky), topic: General-relativistic force-free electrodynamics using discontinuous galerkin methods, on-going.

Princeton:

- **Lawrence Edmond IV** (Simons-National Society of Black Physicists Fellow), topic: Gravitational waves from neutron star – black hole mergers, 2022.
- **Goni Halevi** (adviser: J. Stone), topic: Neutron star – black hole post-merger disks, 2021-2023.
- **Abhishek Hegade** (adviser: N. Yunes), topic: Understanding the entropy evolution and scalar hair growth during the collapse of neutron stars in modified theories of gravity, 2021-2022.
- **Alex Pandya** (adviser: F. Pretorius), topic: First-order conformal relativistic viscous fluid dynamics, 2021-2023.
- **Valentin Skoutnev** (adviser: A. Bhattacharjee), topic: Rayleigh-Taylor dynamo in neutron star mergers, 2020-2021.

Frankfurt:

- **Samuel Tootle** (adviser: L. Rezzolla), topic: Binary neutron star mergers with spin, 2020-2021.

Leadership and Service

Co-organizer, *Multi-messenger Modeling of Neutron Star Mergers*, PCTS, Princeton University. **2023**

Three day international workshop.

Co-organizer, *Numerical Relativity Community Call*. **2022–**

Co-organizer, *Numerical Relativity Community Summer School*, ICERM, Brown University. **2022**

One week summer school for graduate students and junior postdocs.

Co-organizer, *Neutron star physics workshop (Connecting Surface flows and observation)*, PCTS, Princeton University. **2022**

Four day international (hybrid) workshop.

Undergraduate Mentor, *Physics Department*, Princeton University. **2021–2023**

Co-organizer, *Princeton Gravity Initiative Seminar Series*, Princeton University. **2021–2022**

Co-organizer, *Plasma Physics Learning Seminar*, Institute for Advanced Study. **2021**

Co-organizer, *Gravitational Waves Learning Seminar*, Institute for Advanced Study. **2020–2021**

Student tour guide, *Einstein Inside Exhibition*, Goethe University Frankfurt. **2016**

Giving guided tours to local high school students.

Alternative civilian service (Zivildienst), *Dieburg*. **2009-2010**

Nine month assistant position at a local high school for children with special needs.

Referee: ApJ, ApJL, CQG, MNRAS, MNRASL, PRD, PRL.