

Anuj Kankani

PhD Candidate in Physics, West Virginia University ·
Expected graduation May 2027

Department of Physics & Astronomy
West Virginia University, Morgantown, WV
anuj.kankani@mail.wvu.edu
Website · GitHub · INSPIRE-HEP
ORCID 0000-0002-7422-9137

RESEARCH Gravitational Waveform Modeling · Numerical Relativity · General Relativistic Particle-in-Cell (GRPIC) Simulations

EDUCATION

-
- 2021–27** **West Virginia University** — PhD in Physics
expected Advisor: Sean T. McWilliams · GPA 3.9/4.0 · Morgantown, WV
- 2017–21** **Texas A&M University** — BS in Physics (Honors)
Minors in Computer Science and Astrophysics · GPA 3.84/4.0 · College Station, TX

PUBLICATIONS

Three papers in preparation: direct waves (GW) · black-hole scattering (NR) · black-hole jets (GRPIC).

- PRL**
2026
SUBMITTED **The Direct Wave is Not a Meaningful Test of Horizon Properties**
Anuj Kankani and Sean T. McWilliams · submitted to *Physical Review Letters* · arXiv:2607.02380
- PRD**
2026
SUBMITTED **Direct Waves in Black-Hole Binary Mergers: Insights from the Backwards One Body Model**
Anuj Kankani and Sean T. McWilliams · submitted to *Physical Review D* · arXiv:2603.15474
- JOSS**
SUBMITTED **gwBOB: A Python Package for Analytical Merger-Ringdown Gravitational Waveforms**
Anuj Kankani, Angel Morales, Suchindram Dasgupta and Sean T. McWilliams ·
submitted to *Journal of Open Source Software*
- PRD**
2025
SUBMITTED **BOB the (Waveform) Builder: Optimizing Analytical Black-Hole Binary Merger Waveforms**
Anuj Kankani and Sean T. McWilliams · submitted to *Physical Review D* · arXiv:2510.25012
- PRD**
2025 **Modeling Relative Peak Times of Gravitational Wave Harmonics**
Anuj Kankani and Sean T. McWilliams · Phys. Rev. D **112**, 124051 (2025) · arXiv:2506.17492
- PRD**
2024 **Testing the Boundary-to-Bound Correspondence with Numerical Relativity**
Anuj Kankani and Sean T. McWilliams · Phys. Rev. D **110**, 064033 (2024) · arXiv:2404.03607
- PRE**
2021 **Optimization and benchmarking of the thermal cycling algorithm**
A. Barzegar, **A. Kankani**, S. Mandrà & H. G. Katzgraber · Phys. Rev. E **104**(3), 035302 (2021)

SOFTWARE

-
- PRIMARY DEVELOPER** **gwBOB** github.com/AnujKankani/BackwardsOneBody
Open-source, user-friendly Python package implementing the Backwards One Body waveform model, with tools for analysis and NR comparison.
- CO-DEVELOPER** **LisaWave-JAX** IN DEVELOPMENT
JAX-based LISA data-analysis tools for massive black holes and galactic binaries.
- CONTRIBUTOR** **Einstein Toolkit** einstein toolkit.org
Open-source high-performance-computing codebase for numerical relativity.
- CONTRIBUTOR** **Entity** entity-toolkit.github.io/wiki
Kokkos-based General Relativistic Particle-in-Cell code for plasma astrophysics.
- CONTRIBUTOR** **NRPy** github.com/nrpy/nrpy
Python-based symbolic code-generation toolkit for relativistic astrophysics.

CONFERENCES & WORKSHOPS

- 2026 Plasmas Around Black Holes and Neutron Stars (SCEECS)**
POSTER Driving Temperature Anisotropies in the Jets of Black Holes
- 2026 16th International LISA Symposium**
CONTRIBUTED TALK BOB the (Waveform) Builder + Direct Waves
- 2026 APS Global Physics Summit**
CONTRIBUTED TALK BOB the (Waveform) Builder: Optimizing Analytical Black-Hole Binary Merger Waveforms
- 2026 Center for Gravitational Waves and Cosmology Symposium**
CONTRIBUTED TALK Modeling Extreme Gravity: From Relativistic Plasmas to Gravitational Waves
- 2025 Prospects in Theoretical Physics — Gravitational Waves from Theory to Observation**
ATTENDED
- 2025 APS Global Physics Summit**
CONTRIBUTED TALK Merger-Ringdown Modeling of Gravitational Waves Beyond the Dominant Mode
- 2025 AAS Winter Meeting**
CONTRIBUTED TALK Understanding the Origins of Black Hole Superkicks
- 2024 North American Einstein Toolkit Workshop**
30-MINUTE TALK Understanding the Origins of Black Hole Superkicks
- 2024 Penn State Neighborhood Workshop**
CONTRIBUTED TALK Understanding the Origins of Black Hole Superkicks
- 2024 APS April Meeting**
CONTRIBUTED TALK Testing the Boundary to Bound States Dictionary with Numerical Relativity
- 2023 AAS Winter Meeting**
POSTER Effect of Baryons on the Dynamical-Friction Timescale of Merging Dark Matter Halos
- 2022 APS April Meeting**
CONTRIBUTED TALK Effect of Baryons on the Dynamical-Friction Timescale of Merging Dark Matter Halos

AWARDS & FELLOWSHIPS

- 2025 Mohindar Seehra Research Award**
Departmental award recognizing outstanding research efforts in Physics.
- 2024–2025 NASA WV Space Grant Graduate Fellowship**
For the proposal “Modeling Black Hole Mergers with a Dynamical Background Spacetime”.
- 2021–2024 Ruby Distinguished Doctoral Fellow**
Awarded to outstanding doctoral students in STEM fields at West Virginia University.

INVOLVEMENT, SERVICE & OUTREACH

- COLLABORATION** **LISA Consortium** — member of the waveform and astrophysics working group.
- DEPARTMENT** **Astronomy Journal Club** (Organizer) — organized and led the department’s weekly journal club, facilitating discussions on recent research in astronomy and astrophysics.
- DEPARTMENT** **Physics and Astronomy Graduate Student Organization** — regularly involved in STEM outreach such as Physics Demo Day and the pumpkin drop contest.
- OUTREACH** **Physics outreach** — talks to middle- and high-school groups about black holes and gravitational waves; regular volunteer at physics outreach events such as Physics Demo Day; writes articles on astrophysics for local organizations.
- SERVICE** **200 hours of community service** completed as a graduate student — focused on environmental restoration and STEM outreach.