

The Ringdown Register

CURRICULUM VITÆ OF ANUJ KANKANI · GRAVITATIONAL AND HIGH-ENERGY ASTROPHYSICS

Gravitational Waveform Modeling — Numerical Relativity — General Relativistic Particle-in-Cell Simulation

VOL. I — No. 1

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PRICE FIVE CENTS

WEST VIRGINIA UNIVERSITY · DEPARTMENT OF PHYSICS & ASTRONOMY

KANKANI MODELS BLACK-HOLE MERGERS AND THE PLASMA THAT SURROUNDS THEM

SEVEN PUBLICATIONS, SIX OF THEM FIRST-AUTHORED, WITH THREE
MORE IN PREPARATION

PRIMARY DEVELOPER OF gwBOB — CONTRIBUTOR TO THE EINSTEIN TOOLKIT, TO ENTITY
AND TO NRPy — CO-DEVELOPER OF LISAWAVE-JAX

Doctoral Candidate at West Virginia University — Expected 2027 — Advisor, Sean T. McWilliams

ANUJ KANKANI is a doctoral candidate in the Department of Physics & Astronomy at West Virginia University, Morgantown, under Sean T. McWilliams, expecting to graduate in 2027.

He works on gravitational waveform modeling, numerical relativity, and General Relativistic Particle-in-Cell (GRPIC) simulations. He took his BS in Physics (Honors) at Texas A&M University in May 2021, with

minors in Computer Science and Astrophysics.

Of his seven publications, four are submitted and under review; the three on the direct wave and the BOB waveform model are set out at the foot of this page. Three others are refereed and in print — two in *Physical Review D*, one in *Physical Review E* — and appear on Page Two, which prints the complete record of all

seven. Six of the seven carry his name first.

He is the primary developer of gwBOB, an open-source Python package implementing the Backwards One Body waveform model, contributes to the Einstein Toolkit, to Entity and to NRPy, and co-develops LisaWave-JAX. All five are on Page Three.

He is a member of the LISA Consortium, in its waveform and astrophysics working group. His service

and outreach are on Page Three; his engagements, on Page Four.

THIS OFFICE

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TERMS OF STUDY

WEST VIRGINIA UNIVERSITY

PhD in Physics — in progress
Expected graduation 2027. Advisor:
Sean T. McWilliams. Grade-point
average 3.9 / 4.0.

TEXAS A&M UNIVERSITY

BS in Physics (Honors)
College Station, Texas. August
2017 – May 2021. Minors in Com-
puter Science and Astrophysics.
Grade-point average 3.84 / 4.0.

HONOURS CONFERRED

RUBY DISTINGUISHED DOCTORAL FELLOW 2021– 2024

Awarded to outstanding doctoral
students in STEM fields at West
Virginia University.

NASA WV SPACE GRANT GRADUATE FELLOWSHIP 2024–2025

For the proposal “Modeling Black
Hole Mergers with a Dynamical
Background Spacetime.”

MOHINDAR SEEHRA RESEARCH AWARD 2025

Departmental award recognizing
outstanding research efforts in
Physics.

LATEST DISPATCHES

Three papers submitted and under review. The complete record of all seven appears on Page Two.

UNDER REVIEW · 2026

THE DIRECT WAVE IS NOT A MEANINGFUL TEST OF HORIZON PROPERTIES

SUBMITTED TO *PHYSICAL
REVIEW LETTERS*

Anuj Kankani and Sean T.
McWilliams

ARXIV:2607.02380

**

First author · Not yet refereed

UNDER REVIEW · 2026

DIRECT WAVES IN BLACK-HOLE BINARY MERGERS: INSIGHTS FROM THE BACKWARDS ONE BODY MODEL

SUBMITTED TO *PHYSICAL
REVIEW D*

Anuj Kankani and Sean T.
McWilliams

ARXIV:2603.15474

**

First author · Not yet refereed

UNDER REVIEW · 2025

BOB THE (WAVEFORM) BUILDER: OPTIMIZING ANALYTICAL BLACK- HOLE BINARY MERGER WAVEFORMS

SUBMITTED TO *PHYSICAL
REVIEW D*

Anuj Kankani and Sean T.
McWilliams

ARXIV:2510.25012

**

First author · Not yet refereed

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THE COMPLETE RECORD

NOTICE TO THE READER. *All seven papers appear below, each with its standing in the rule above it: three refereed and in print, with volume and article numbers, and four submitted and not yet refereed. The three dis-patches on Page One are repeated here, so this column may be read alone.*

SUBMITTED — UNDER REVIEW

THE DIRECT WAVE IS NOT A MEANINGFUL TEST OF HORIZON PROPERTIES

SUBMITTED TO *Physical Review Letters*

Anuj Kankani and Sean T. McWilliams

ARXIV:2607.02380 · FIRST AUTHOR · PAGE ONE

SUBMITTED — UNDER REVIEW

DIRECT WAVES IN BLACK-HOLE BINARY MERGERS: INSIGHTS FROM THE BACKWARDS ONE BODY MODEL

SUBMITTED TO *Physical Review D*

Anuj Kankani and Sean T. McWilliams

ARXIV:2603.15474 · FIRST AUTHOR · PAGE ONE

SUBMITTED — UNDER REVIEW

BOB THE (WAVEFORM) BUILDER: OPTIMIZING ANALYTICAL BLACK-HOLE BINARY MERGER WAVEFORMS

SUBMITTED TO *Physical Review D*

Anuj Kankani and Sean T. McWilliams

ARXIV:2510.25012 · FIRST AUTHOR · PAGE ONE

SUBMITTED — UNDER REVIEW

GWBOB: A PYTHON PACKAGE FOR ANALYTICAL MERGER-RINGDOWN GRAVITATIONAL WAVEFORMS

SUBMITTED TO *Journal of Open Source Software*

Anuj Kankani, Angel Morales, Suchindram Dasgupta and Sean T. McWilliams

FIRST AUTHOR

REFEREED — IN PRINT

MODELING RELATIVE PEAK TIMES OF GRAVITATIONAL WAVE HARMONICS

PHYS. REV. D 112, 124051 (2025)

Anuj Kankani and Sean T. McWilliams

ARXIV:2506.17492 · FIRST AUTHOR

REFEREED — IN PRINT

TESTING THE BOUNDARY-TO-BOUND CORRESPONDENCE WITH NUMERICAL RELATIVITY

PHYS. REV. D 110, 064033 (2024)

Anuj Kankani and Sean T. McWilliams

ARXIV:2404.03607 · FIRST AUTHOR

REFEREED — IN PRINT

OPTIMIZATION AND BENCHMARKING OF THE THERMAL CYCLING ALGORITHM

PHYS. REV. E 104(3), 035302 (2021)

A. Barzegar, A. Kankani, S. Mandrà and H. G. Katzgraber

SECOND AUTHOR

IN PREPARATION. *Three further papers are presently in preparation. Titles and journals are not yet settled; particulars will follow in a later edition.*

SOFTWARE & CODE

Five open-source projects · Primary developer of one, co-developer of another, contributor to three

KANKANI DEVELOPS GWBOB, AN OPEN-SOURCE WAVEFORM PACKAGE

PRIMARY DEVELOPER OF THE PYTHON IMPLEMENTATION OF THE BACKWARDS ONE BODY MODEL

CONTRIBUTOR TO THE EINSTEIN TOOLKIT, TO ENTITY AND TO NRPy — CO-DEVELOPER OF LISAWAVE-JAX

Kankani is the primary developer of gwBOB, an open-source Python package implementing the Backwards One Body waveform model.

It ships tools for analysis and for comparison against numerical relativity, and is published at github.com/AnujKankani/BackwardsOneBody. A paper describing the package is submitted to the *Journal of Open Source Software*, and appears

in the record on Page Two. Alongside it he contributes to three further codes and co-develops a fourth, set out below.

OTHER CODES AND ROLES

—◆—

Einstein Toolkit

CONTRIBUTOR

Open-source high-performance-computing codebase for numerical relativity.

einstein toolkit.org

—◆—

Entity

CONTRIBUTOR

Kokkos-based General Relativistic Particle-in-Cell code for plasma astrophysics.

entity-toolkit.github.io/wiki

—◆—

NRPy

CONTRIBUTOR

Python-based symbolic code-generation toolkit for relativistic astrophysics.

github.com/nrpy/nrpy

—◆—

LisaWave-JAX

CO-DEVELOPER — IN DEVELOPMENT

JAX-based LISA data-analysis tools for massive black holes and galactic binaries.

CIVIC NOTICES

Consortium membership, departmental service, outreach and community work.

LISA CONSORTIUM.—Member of the waveform and astrophysics working group.

—◆—

ASTRONOMY JOURNAL CLUB — ORGANIZER.—Organized and led the department’s weekly journal club, facilitating discussions on recent research in astronomy and astrophysics.

—◆—

COMMUNITY SERVICE — 200 HOURS.—Two hundred hours of community service completed as a graduate student, focused on environmental restoration and STEM outreach.

—◆—

PHYSICS AND ASTRONOMY GRADUATE STUDENT ORGANIZATION.—Regularly involved in STEM outreach such as Physics Demo Day and the pumpkin drop contest.

—◆—

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.

ENGAGEMENTS AND APPEARANCES

Twelve meetings and workshops — nine talks, two posters, one attended.

FOUR MEETINGS IN 2026

CONTRIBUTED TALKS ON THE BOB MODEL AND ON DIRECT WAVES — A POSTER ON TEMPERATURE ANISOTROPIES IN THE JETS OF BLACK HOLES

PLASMAS AROUND BLACK HOLES AND NEUTRON STARS (SCEECS). POSTER: <i>“Driving Temperature Anisotropies in the Jets of Black Holes”</i>	APS GLOBAL PHYSICS SUMMIT. CONTRIBUTED TALK: <i>“BOB the (Waveform) Builder: Optimizing Analytical Black-Hole Binary Merger Waveforms”</i>	CENTER FOR GRAVITATIONAL WAVES AND COSMOLOGY SYMPOSIUM. CONTRIBUTED TALK: <i>“Modeling Extreme Gravity: From Relativistic Plasmas to Gravitational Waves”</i>
16TH INTERNATIONAL LISA SYMPOSIUM. CONTRIBUTED TALK: <i>“BOB the (Waveform) Builder + Direct Waves”</i>		

THREE ENGAGEMENTS 2025 <i>Merger-ringdown modeling beyond the dominant mode; superkicks at the winter meeting; one workshop attended</i> PROSPECTS IN THEORETICAL PHYSICS — GRAVITATIONAL WAVES FROM THEORY TO OBSERVATION. ATTENDED. APS GLOBAL PHYSICS SUMMIT. CONTRIBUTED TALK: <i>“Merger-Ringdown Modeling of Gravitational Waves Beyond the Dominant Mode”</i> AAS WINTER MEETING. CONTRIBUTED TALK: <i>“Understanding the Origins of Black Hole Superkicks”</i>	THREE TALKS 2024 <i>Superkicks carried to two workshops; the boundary-to-bound dictionary at the April meeting</i> NORTH AMERICAN EINSTEIN TOOLKIT WORKSHOP. THIRTY-MINUTE TALK: <i>“Understanding the Origins of Black Hole Superkicks”</i> PENN STATE NEIGHBORHOOD WORKSHOP. CONTRIBUTED TALK: <i>“Understanding the Origins of Black Hole Superkicks”</i> APS APRIL MEETING. CONTRIBUTED TALK: <i>“Testing the Boundary to Bound States Dictionary with Numerical Relativity”</i>
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EARLIER APPEARANCES	
AAS WINTER MEETING, 2023. POSTER: <i>“Effect of Baryons on the Dynamical-Friction Timescale of Merging Dark Matter Halos”</i>	APS APRIL MEETING, 2022. CONTRIBUTED TALK: <i>“Effect of Baryons on the Dynamical-Friction Timescale of Merging Dark Matter Halos”</i>

TERMS OF CORRESPONDENCE		
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COLOPHON AND STATEMENT OF THE PRESS	
<i>The Ringdown Register</i> is not a newspaper. It is the curriculum vitæ of Anuj Kankani, set in the manner of a broadsheet front page of the eighteen-nineties. The title is invented; no publication of that name exists, and none is imitated. Every fact printed in these columns is drawn from that curriculum vitæ, and nothing has been added for effect — there are no quotations, no correspondents, no reports, and no	assessment of the work beyond what its author has stated. The volume number, the price line and the ornaments are costume; the dateline is the day of setting. Set in Old English Text MT for the nameplate, Bodoni MT for headlines, Engravers MT for standing heads, and Times New Roman for text and decks. Composed in HTML and printed to PDF. Morgantown, West Virginia, August 2026.