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Ananya Adhikari

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EDUCATION AND TRAINING

[28/08/2017 – Current] **PhD in Physics**

Florida Atlantic University https://www.fau.edu/

Address: 777 Glades Road, Physics Department, Florida Atlantic University, 33431, Boca Raton, FL, United States |

[2017 – 2018] **MS in Physics**

Florida Atlantic University https://www.fau.edu/

City: Boca Raton, FL | **Country:** United States |

[2014 – 2016] **MS in Physics**

Indian Institute of Technology Guwahati https://www.iitg.ac.in/

City: Guwahati, Assam | **Country:** India |

[2011 – 2014] **BS in Physics**

Hooghly Mohsin College (The University of Burdwan) https://www.buruniv.ac.in/Demo/index_bucc.php

City: Chinsurah, WB | **Country:** India |

HONOURS AND AWARDS

[2024] **The Bjorn Lamborn Scholarship in Physics (Graduate) Awarding institution:** Florida Atlantic University Physics Department

[2023] **Dr. John Samuel Faulkner Award for PhD Students in Physics Awarding institution:** Florida Atlantic University Physics Department

[2017] **Provost's Fellowship Awarding institution:** Florida Atlantic University Physics Department

[2011] **Felicitation for performance in WBCHSE Higher Secondary Exam Awarding institution:** Chief Minister of West Bengal and Hooghly Zila Parishad

PUBLICATIONS

Neutron Star Simulations with the Nmesh program

Reference: A. Adhikari, W. Tichy, L. Ji

In preparation

Dark matter admixed binary neutron stars mergers: Independently spinning baryonic and dark matter

Reference: A. Adhikari, F. Herschelman, H. Rüter, E. Giangrandi, W. Tichy, T. Dietrich, Violetta Sagun

In preparation

Gravitational waves from mergers of precessing binary neutron stars with large eccentricities

Reference: M. Pirog, A. Adhikari, W. Tichy, F. Torshizi

In preparation

Toward Moving Puncture Simulations with the Generalized Harmonic System

Reference: L. Ji, A. Adhikari, W. Tichy

In preparation

[2023] **Second release of the CoRe database of binary neutron star merger waveforms**

Reference: A. Gonzalez, et al. , Class. Quantum Grav. 40 085011 (2023).

[2023] **The new discontinuous Galerkin methods based numerical relativity program Nmesh**

Reference: W. Tichy, L. Ji, A. Adhikari, A. Rashti, M. Pirog, Class. Quantum Grav. 40, 025004 (2023).

[2022] **Investigating GW190425 with numerical-relativity simulations**

Reference: R. Dudi, et al., Phys. Rev. D106, 084039 (2022).

[2018] **Fluctuation-dissipation relation in accelerated frames**

Reference: A. Adhikari, K. Bhattacharya, C. Chowdhury, B. Majhi, Phys. Rev. D97, 045003 (2018).

CONFERENCES & SEMINARS

[03/04/2024 – 06/04/2024] **American Physical Society (APS) April Meeting 2024** SAFE Credit Union Convention Center, Sacramento, CA, USA.

Presentation Title: "Neutron Star Evolutions with the Nmesh Program"

Link: https://meetings.aps.org/Meeting/APR24/Session/J05.8

[15/04/2023 – 18/04/2023] **American Physical Society (APS) April Meeting 2023** Hilton Minneapolis, Minneapolis, MN, USA.

Presentation Title: "Neutron Star Tests with the Nmesh Program"

Link: https://ui.adsabs.harvard.edu/abs/2023APS..APRG10005A

[31/03/2023 – 01/04/2023] **39th Pacific Coast Gravity Meeting** Cahill Center for Astronomy and Astrophysics, Caltech, Pasadena, CA, USA.

Presentation Title: "Neutron Star Tests with the Nmesh Program"

Link: http://www.tapir.caltech.edu/~pcgm39/Schedule/

[09/04/2022 – 12/04/2022] **American Physical Society (APS) April Meeting 2022** New York Marriott Marquis Hotel, New York, NY, USA.

Presentation Title: "Relativistic blast wave and single neutron star tests with the Nmesh Code"

Link: https://ui.adsabs.harvard.edu/abs/2022APS..APRS07007A

[17/04/2021 – 20/04/2021] **American Physical Society (APS) April Meeting 2021** Virtual Meeting Presentation

Presentation Title: "Scalar wave and shock propagation tests with the Nmesh code"

Link: https://ui.adsabs.harvard.edu/abs/2021APS..APRS08004A

PROJECTS

[2018 – Current] **Optimizing, testing, and developing the Nmesh program**

Discontinuous Galerkin method-based numerical relativity (NR) program Nmesh, written in C, specifically focusing on handling hydrodynamic shocks and non-smooth features and optimizing Nmesh's capability of simulating neutron stars to obtain higher accuracy efficient results.

[2022 – Current] **Simulating binary neutron stars (BNSs) with dark matter core**

Sgrid Program generated NR initial data for BNSs with a dark matter core and the 2 fluids spinning independently, simulated with the BAM NR program, and analyzing the gravitational wave (GW) signals to gain new insight into the properties of dark matter and baryonic matter and their interactions.

[2022 – Current] **Simulating precessing eccentric BNS systems**

Simulations with precessing eccentric BNS Sgrid initial data with the BAM code using the entropy-limited hydrodynamics approach of using linearly combined high-order and low-order fluxes and studying the resulting GW signals.

[2018 – 2022] **Analysing the LIGO GW observation event GW190425**

Analysis of LIGO GW observation event GW190425 by modeling it as a BNS merger event and studying the effect of different Equations of State on various aspects such as the GW signal, remnant mass after merger, etc, using the BAM NR program.

[2022 – Current] **Simulating single Black holes with the new C3GH system**

Working on single black hole simulations with Nmesh, focusing on testing and optimizing convergence of the numerical results.

[2016 – 2017] **Fluctuation-dissipation treatment of Unruh or Hawking radiation.**

Conducted research related to conformal theory to demonstrate how well-known non-equilibrium statistical phenomenon corresponding to the fluctuation-dissipation theorem holds for the Unruh or Hawking radiation.

[2015 – 2016] **Spontaneous symmetry breaking of Goldstone modes**

Studied some preliminary dynamics of Goldstone modes due to spontaneous symmetry breaking of scalar electrodynamics, such as coupling the gauge fields with the Goldstone modes.

DIGITAL SKILLS

My Digital Skills

C Programming | Python Programming | C++ programming | Bash Scripting | Java Programming | Mathematica | Matlab | Linux (Debian) | Microsoft Word | Microsoft Office | Latex

WORK EXPERIENCE

[28/08/2017 – Current]

Graduate PhD Candidate in Physics

Physics Department, Florida Atlantic University

Address: 777 Glades Road, Physics Department, Florida Atlantic University, 33431, Boca Raton, FL, United States

- Test and help develop the C-based numerical general relativistic program, Nmesh.
- Generate general relativistic initial data with the Sgrid Program and evolve them with the BAM program.
- Mentor an undergraduate student with generating initial data for spinning BNS with dark matter core using the Sgrid program and then evolving them with the BAM program.
- Mentor a doctoral student in simulating precessing eccentric BNS Sgrid initial data with the BAM code using the entropy-limited hydrodynamics approach during 2024.
- Help prepare research proposals for computational time on supercomputers through XSEDE and ACCESS.

[28/08/2017 – Current]

Graduate Teaching Assistant

Physics Department, Florida Atlantic University

Address: 777 Glades Road, Physics Department, Florida Atlantic University, 33431, Boca Raton, FL, United States

- Teach General Physics and College Physics I and II laboratory courses, including theory explanation, demonstration of experimental procedure, carrying out discussions and clarifying queries of students, grading of lab reports and designing and grading quizzes.
- Set up equipment for weekly lab-sessions for all students and TAs for all experiments.
- Developed course material General Physics and College Physics I and II laboratory courses, that are used by all teaching assistant and students since 2020.

- Helped develop course structure and policies for online General Physics and College Physics I and II laboratory courses during 2020-2021.
- Assisted training new GTAs for General Physics and College Physics I and II laboratory courses as Senior GTA in 2022.
- Managed and maintained equipment supply and status and overall well-functioning of General Physics and College Physics I and II laboratories and trained new GTAs to perform lab setup during 2019-2022.

NETWORKS & MEMBERSHIPS

[2021 – Current] **American Physical Society (APS)**

VOLUNTEERING

[2022] **Eye Donation Pledge Camp** SBA Foundation, Hooghly, WB, India

Link: https://sbafoundation.in/eye-donation-2022/

[2021] **Social Outreach Project** SBA Foundation, Dhatal Adibasipara, WB, India

Link: https://sbafoundation.in/outreach/

[2018] **Middle School and High School Regional Science Olympiad Competition** Florida Atlantic University, Boca Raton, FL, USA

[2017] **Expo for High School Students** Florida Atlantic University, Boca Raton, FL, USA

[2017 – 2023] **Annual Pumpkin Drop and Physics Carnival** Florida Atlantic University, Boca Raton, FL, USA