Arghya Ranjan Das

PhD candidate, Experimental High-Energy Physics

Purdue University · CMS Collaboration (CERN) · Fermilab

CONTACT

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INSPIRE-HEP

AWARDS

LPC Guests & Visitors (G&V) Program Award
2025 · Awarded by the LPC Guests and Visitors Program, funded by the U.S. CMS Operations program.

Dr. Rolf Scharenberg Summer Graduate Fellowship
2024 · Funded by Wendell and Nancy Lutz.

KVPY Fellowship
2018–23 · The highest undergraduate-level fellowship awarded by the Government of India.

SKILLS

ADVANCED PHYSICS COURSES

Particle Physics II, General Relativity, Fundamentals of Astrophysics, QFT I, Electromagnetic Theory, Quantum Mechanics I & II, Statistical Mechanics, Nuclear & Particle Physics, Mathematical Methods of Physics, Classical Mechanics

MATHEMATICS

Differential/Integral Calculus, Linear Algebra, Tensor Algebra, Statistics

PROGRAMMING

C/C++, Python, Mathematica, MATLAB

EDUCATION

Ph.D. in Physics — Aug 2023–present
Purdue University
Advisor: Miaoyuan Liu · CGPA 3.98/4.0

M.S., Physics — Aug 2022–Jul 2023
Indian Institute of Science (IISc)
with Banibrata Mukhopadhyay, black-hole astrophysics
Physics CGPA 9.5/10 (Overall 9.0/10)

B.S. (Research), Physics — Aug 2018–Jul 2022
Indian Institute of Science (IISc)
with Banibrata Mukhopadhyay, modified general relativity
Physics CGPA 9.4/10 (Overall 8.9/10)

RESEARCH INTERESTS

- **Particle physics** — CMS Collaboration, Run-3 collision data
- **Astrophysics & gravitation** — black holes, QPOs, modified gravity
- **ML-on-silicon** — smart pixels, pruning, quantization
- **Real-time triggers** — microsecond decision systems, 40 MHz
- **Foundations** — the measurement problem, emergence of spacetime

PUBLICATIONS

[1] SmartPixels Collaboration — Muon Collider. **On-Detector Machine Learning for Beam-Induced Background Rejection at a 10 TeV Muon Collider.** *arXiv preprint* (2026).
arXiv:2608.21327

[2] SmartPixels Collaboration. **On-chip probabilistic inference for charged-particle tracking at the sensor edge.** *arXiv preprint* (2026).
arXiv:2602.15946

[3] NGT Collaboration. **PQuantML: A Tool for End-to-End Hardware-aware Model Compression.** *arXiv preprint* (2026).
arXiv:2603.26595

[4] SmartPixels Collaboration. **Robustness of the smartpixels classifier for different simulated sensor geometries and non-ideal detector conditions.** *Nucl. Instrum. Meth. A 1092* (2026).
doi:10.1016/j.nima.2026.171897

[5] DarkQuest Collaboration. **Performance measurements of the electromagnetic calorimeter and readout electronics system for the DarkQuest experiment.** *Nucl. Instrum. Meth. A 1080* (2025).
doi:10.1016/j.nima.2025.170792 arXiv:2502.20590

ML & TECHNICAL

TensorFlow, Keras, PyTorch, NumPy, Pandas, JAX, ROOT

LANGUAGES

English (fluent), Bengali (native), Hindi

EXTRACURRICULAR

Water life-saving, Hiking

SERVICE & OUTREACH

ML Hackathon Challenge (poster)
2024 · NSF HDR ML Challenge

Radio Astronomy Workshop
2022 · PRAVEGA 2022, IISc (hosted by Naxxatra)

Square Kilometre Array (SKA)
2019 · Vigyan Samagam (DAE / DST / NCSM)

WORKSHOPS & SCHOOLS

Fast Machine Learning for Science
2024 · Purdue University (Oct 15–18, 2024)

Physics at the Early Universe
2022 · ICTS

Undergraduate Research Showcase
2019 · IISc

Vijyoshi National Science Camp
2017, 2018 · KVPY × INSPIRE

Jagadish Bose National Science Talent Program
2016

[6] SmartPixels Collaboration. **Sensor Co-design for smartpixels.** *arXiv preprint* (2025).
arXiv:2510.06588

[7] SmartPixels Collaboration. **Characterization of a 28 nm smartpixels ASIC With On-Chip ML for Particle Tracking Detectors.** *arXiv preprint* (2025).
arXiv:2510.07485

[8] A. R. Das, B. Mukhopadhyay. **QPOs in Compact Sources as a Nonlinear Hydrodynamical Resonance: Determining Spin of Compact Objects.** *Astrophys. J. 955* (2023).
doi:10.3847/1538-4357/acf1fb arXiv:2308.09759

[9] A. R. Das, B. Mukhopadhyay. **Asymptotically flat vacuum solution for a rotating black hole in a modified gravity theory.** *Eur. Phys. J. C 82* (2022).
doi:10.1140/epjc/s10052-022-10899-5 arXiv:2203.07690

TEACHING & MENTORSHIP

PHYS 570AI – Physics and AI — Fall 2025
Graduate Teaching Assistant · Purdue University

ASTR 263 – Descriptive Astronomy: The Solar System — Spring 2024 · 2025
Graduate Teaching Assistant · Purdue University

ASTR 264 – Descriptive Astronomy: Stars and Galaxies — Fall 2024
Graduate Teaching Assistant · Purdue University

PHYS 233 – Physics for Life Sciences — Fall 2023
Graduate Teaching Assistant · Purdue University

MENTORSHIP

Ana Sofia Calle — Spring 2024 – Spring 2025
Undergraduate · EAFIT University

Conan Haller — Fall 2025
Undergraduate · University of Illinois Urbana-Champaign

Brian Rodgers — Summer – Fall 2025
Undergraduate · University of Illinois Urbana-Champaign

REFERENCES

Available on request.