

Banajit Barman

PhD Researcher in Experimental High-Energy Physics

✉ banajit.barman@cern.ch

ORCID  Inspire HEP  GitHub  Google Scholar  Website 

Education

- **PhD in Experimental High-Energy Physics** *Feb 2022 – Till present*
Gauhati University, India
 - Collaborator in the ALICE experiment at CERN, Switzerland.
 - Supervisor: *Prof. Buddhadeb Bhattacharjee.*
 - Thesis: *Studies on light flavored particle production in RUN3 pp collisions using ALICE-TOF detector and MC data.*
- **Master of Science (MSc) in Physics** *2019 – 2021*
Gauhati University, India
 - Specialization: Nuclear Physics and Electronics.
- **Bachelor of Science (BSc) in Physics** *2016 – 2019*
Nalbari College, under Gauhati University, India.

Research Interest

- Relativistic hadronic collisions experiments and phenomenology.

As an active researcher within the ALICE Collaboration, my primary focus lies in unraveling the collective dynamics of the Quantum Chromodynamics (QCD) medium, currently driving my experimental analysis using the newly collected LHC Run 3 data. My work bridges experimental data analysis and phenomenological modeling, specifically targeting the emergence of medium-like behaviors in small and light-ion collision systems at the LHC energies. By leveraging both experimental measurements and Monte Carlo event generators, I aim to disentangle the effects of true thermalized media from other QCD mechanisms. Beyond offline physics analysis, I actively participated in ALICE data taking during Run 3, serving as a Shift Leader for 30 days and an Experiment Control System (ECS) operator for 12 days during this Run. Furthermore, I contributed directly to detector performance by involving in particle identification (PID) quality assurance for the Time Projection Chamber (TPC) and Time-Of-Flight (TOF) detectors, ensuring the robustness of the data required for precision physics analysis.

ALICE Paper/Analysis Note

- **Production of π^\pm , K^\pm , and p (\bar{p}) in pp collisions at $\sqrt{s} = 13.6$ TeV**, ALICE Collaboration.
Publication page (internal) (With Collaboration Review 1 Review)
Analysis note (internal)
- **Production and Nuclear Modification factor of light flavoured particles in OO collision at $\sqrt{s_{NN}} = 5.36$ TeV**
Analysis note (internal)

Selected Publications

1. Tonmoy Sharma, **Banajit Barman**, and Buddhadeb Bhattacharjee. “**Production of heavy flavored particles in $p + p$ collisions: A unified model description for ALICE and LHCb Measurements.**” *Physical Review C* **113**, 034918 (2026).

2. **Banajit Barman**, Nur Hussain, and Buddhadeb Bhattacharjee. “**Baryon number transportation over full rapidity space in pp collisions at energies available at the CERN Large Hadron Collider.**” *Physical Review C* **111**, 014905 (2025).
3. Pranjal Sarma, **Banajit Barman**, and Buddhadeb Bhattacharjee. “**Effect of color reconnection on multiplicity-dependent charged particle production in PYTHIA-generated pp collisions at the LHC energies.**” *The European Physical Journal A* **59**(4), 76 (2023).

Talk/ Presentation & Proceedings

Proceedings

- **Banajit Barman** and Buddhadeb Bhattacharjee. “**On transportation of baryon number in pp collisions at $\sqrt{s} = 0.9$ and 7 TeV.**” *Journal of Subatomic Particles and Cosmology* **4**, Article 100121 (2025).
- D. Choudhury, **B. Barman**, B. Bhattacharjee, et al. (ALICE Collaboration). “**Light-flavoured particle production in pp collisions at 13.6 TeV with ALICE at the LHC.**” *DAE Symposium on Nuclear Physics* **67**, 993–994 (2024).

Talk / Poster Presentations

- **Production of light-flavoured particles in ALICE Run 3 data for pp collisions.** 10th Asian Triangle Heavy-Ion Conference (ATHIC 2025), Berhampur, India. *Jan 2025*
[Contribution Link] (Talk)
- **On Transportation of Baryon Number in pp Collision at $\sqrt{s} = 0.9$ and 7 TeV.** 10th Asian Triangle Heavy-Ion Conference (ATHIC 2025), Berhampur, India. *Jan 2025*
[Contribution Link] (Talk)
- **Particle identification in O2Physics.** O2 Analysis Tutorial 3.0, CERN, Switzerland. *Nov 2023*
[Contribution Link] (Talk)
- **Multiplicity-dependent K , p production in pp collisions at 13.6 TeV using ALICE TPC and TOF detectors.** Quark Matter 2023, Houston, TX, USA. *Sep 2023*
[Contribution Link] (Poster)
- **Particle identification in LHC Run 3 pp collisions at $\sqrt{s} = 13.6$ TeV using the ALICE TPC and TOF detectors.** ICPAQGP-2023, Puri, Odisha, India. *Feb 2023*
[Contribution Link] (Talk)

Skills

- **Programming:** Proficient in C++, Python, Julia and Parallel computing with experience in data analysis.
- **Data Analysis Tools:** Expertise in O2 framework (based on c++17) of ALICE experiment and ROOT by CERN.
- **Collaboration:** Teamwork experience as a CERN ALICE collaboration member.

Achievements/Awards

- Awardee of Breakthrough Prize in Fundamental Physics (2025) – ALICE Collaboration
- Junior Research Fellowship (JRF), India (2022 – till now)
- Graduate Aptitude Test in Engineering (GATE) – Physics (2022)
- Ishan Uday Scholarship (2016-2019)