Amit Pal

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Education

National Institute of Science Education and Research (NISER) *Bhubaneswar, India*
Doctor of Philosophy in Experimental High Energy Physics Aug 2019 - Present
Supervisor: Prof. Sanjay Kumar Swain, NISER, India
Co-supervisor: Dr. Bryan Ramson, Fermilab, U.S.A

Jadavpur University *Kolkata, India*
Master of Science in Physics Aug 2017 - July 2019

Jadavpur University *Kolkata, India*
Bachelor of Science in Physics (Hons.) Aug 2014 - July 2017

Research Experience

Seasonal variation of cosmic muon from simulation and NOvA Near Detector data

- Used CORSIKA simulator to generate cosmic showers
- To get different showers for different months, different atmospheric parameters are extracted from GDAS and used in CORSIKA
- Used ART framework and Geant simulation under NovaSoft for particle propagation and track reconstruction
- Observed seasonal variation in single muon and multi-muon event rates, with rates being highest in summer and lowest in winter for an infinite size detector
- Found opposite behavior for the single and multi-muon event (single muon rate is higher in summer whereas multi-muon rate is higher in winter) when passes through NOvA near detector geometry
- Observed similar behavior for different primary particles showers (P, He, C)

Neutrino Interaction

- Conducted a comprehensive review of current knowledge on interaction cross sections of neutrinos with matter across different energy scales
- Explored a wide range of processes, including neutrino electron elastic scattering, quasi-elastic scattering, deep inelastic scattering, and resonant pion production
- Performed theoretical calculations of neutrino interaction cross sections for elastic, quasi-elastic, and deep inelastic scattering

Teaching and Mentoring

Teaching Assistantship at NISER:

- Introductory Physics
- Mathematical Methods
- General Physics Lab I & II

Guiding student:

- Mentored Suchismita Sahoo for a Master's project on "Study of cosmic ray properties from simulation"

Skills

Spoken Languages: Bengali (Native), English (Professional), Hindi (Conversational)

Programming Languages: C++, Fortran, Python

Software related to data analysis: ROOT

Frameworks: Fermilab ART Framework

MC generation: CORSIKA, NuWro

Others: Git, LaTeX

Conferences and School

NuFact 2024 - The 25th International Workshop on Neutrinos from Accelerators — *Sep 16-21, 2024*
Presented a talk titled ***"Seasonal Variation in Cosmic Muon Rate at the NOvA Experiment"*** — ANL, USA
Presented a poster titled **"Impact of the HF-CRPA Model on Neutrino Oscillation Parameter Measurements in NOvA"**

57th Annual Users Meeting — *July 9-12, 2024*
Presented a poster titled ***"Impact of HF-CRPA CCQE model on the latest NOvA results"*** — Fermilab, USA

School on Statistical Methods and Machine Learning in High Energy Physics — *Aug 28 - Sept 8, 2023*
Actively participated and did a project on ***"Prompt and non-prompt*** J/ψ **identification from dimuons using LGBM and DNN"** — ICTS-TIFR Bengaluru, India

International Meeting on High Energy Physics (IMHEP-II) — *Feb 16-22, 2023*
Presented a talk titled ***"Seasonal variation of cosmic muon at the NOvA near detector"*** — IOP Bhubaneswar, India

XXV DAE-BRNS High Energy Physics Symposium 2022 — *Dec 12-16, 2022*
Presented a poster titled ***"Seasonal variation of cosmic muon at the NOvA near detector"*** — IISER Mohali, India

Winter school on Cosmic Neutrino Observations at Ultra-High Energy — *Dec 16-24, 2019*
Actively participated in this school — IIT Kanpur, India

Academic achievements and Awards

- Awarded DST Innovation in Science Pursuit for Inspired Research (INSPIRE) - **Scholarship for Higher Education (SHE)** — *2014-2019*
- Qualified **National Eligibility Test (NET) Junior Research Fellow (JRF)**: All India Rank 159 — *Dec 2018*
- Qualified **Graduate Aptitude Test in Engineering (GATE)**: All India Rank 268 — *2019*
- Qualified **Joint Entrance Screening Test (JEST)**: All India Rank 603 — *2019*

Positions of Responsibility

Good Runs expert: — *Dec 2022 - Present*

- Serve as a Good Runs Expert in the Data Quality group for the NOvA experiment.
- Review and analyze detector conditions to identify and verify good data runs for scientific analysis
- Develop and maintain a system for identifying and categorizing bad data to ensure the accuracy and reliability of scientific results.

Referees

Sanjay Kumar Swain

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