CURRICULUM VITAE

Suryanarayan Mondal

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Chandpur Uttarpara,
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EDUCATION

SSC (2007)   Majilpur J. M. Training School (Affiliated to West Bengal Board of Secondary Education), South 24 Parganas, West Bengal, India.

HSC (2009)   Majilpur J. M. Training School (Affiliated to West Bengal Council of Higher Secondary Education), South 24 Parganas, West Bengal, India.

BSc (2012)   Department of Physics, Ramakrishna Mission Vidyamandira (Affiliated to Calcutta University), Howrah, West Bengal, India.

MSc (2014)   Department of Physics, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India.

PhD (2021)   *Thesis:* 'Multiplicity of muon in $2\,\text{m} \times 2\,\text{m}$ detector and charge ratio of cosmic muon at Madurai'
Homi Bhabha National Institute, Anushaktinagar, Mumbai, India.

WORK EXPERIENCE

Postdoctoral Researcher

University of Pisa, Largo Bruno Pontecorvo, Pisa, Italy 56127 (Oct 2021 –)

- I am now involved in the BelleII Collaboration, more specifically, in upgrade group. An all-pixel vertex detector is under proposal as a replacement of the present one. With smaller pixel size, it is capable of higher occupancy and vertex resolution. I am studying the physics performance using simulation in a few benchmark decay channels.

Research Scholar

Tata Institute of Fundamental Research, Mumbai, Maharashtra, India 400005 (Aug 2014 – Aug 2021)

- I was involved in India-based Neutrino Observatory (INO). My works were solely contributed towards the proposed Iron Calorimeter (ICAL) detector. This future underground facility is going to be dedicated for the study of the oscillation parameters from atmospheric neutrinos along with the mass ordering. Resistive Plate Chambers (RPCs) with glass electrodes are chosen as the sensitive detector in INO-ICAL to sense the signature of the muons produced in the charged-current interaction of neutrinos. Many prototype detector stacks were thus planned to study the performance of the RPCs and the electronics along with the data acquisition systems. I clocked a presence in commissioning two prototypes, gaining experience and contributing in some key aspects.

- Involved in the mechanical facets of commissioning the detectors.

- Formulated and implemented a easy-to-use system to estimate the leak tightness of RPC gaps.

- Developed an algorithm to fetch events with multiple tracks in the detector. Also isolated the events occurring due to the random coincidences in order to test the CORSIKA simulation.

- Worked in developing a method to reconstruct muon momentum from the data obtained in the magnetised mini-ICAL detector consisting of 10 layers of RPCs for the measurement of the charge ratio of low energy muon at the earth surface.

- Grasp in GEANT4, CERN-ROOT, CORSIKA.

STATEMENT OF RESEARCH

My main research interest rests in the high-energy physics, especially in the design of the detector components, develop those, commission in a large detector system and then extract physics out of the whole system.

Modern particle detector setups are complex. These setups consist of various kinds of particle detectors. The GEANT4 simulation toolkit is proven to be effective in these cases, simulating the properties and response of the various components. This simulation provides a crucial role in understanding the feasibility and the physics potential of the experiment.

Once these detector setups are commissioned, it is hard to access the individual components. Hence much interest is given towards the characterisation of each detector before integrating in the setup. This process is generally repetitive and thus should require least presence of human and minimal time. I am interested in designing user-friendly test rigs to map the necessary traits of a detector.

As the detectors grow larger, the number of data-channels also increases accordingly. So processing the events in order to extract the useful information by avoiding noises (namely, track-finding) becomes more challenging. Along with this, an algorithm to reconstruct track parameters is required to optimise specific to the detector setup.

The prototype detector setups, 12-layer RPC stack and magnetised mini-ICAL, are of tracker type. Both the setups gave me plenty of opportunity to gain knowledge on the aforesaid topics. Apart from that I learned about the difficulties and hold-ups while commissioning a detector setup and also gained experience of the solutions.

I had developed the leak test system from scratch and it is now used by the whole INO collaboration. Similarly during the commissioning of miniICAL I had solved many challenging problems, e.g., how to unbolt the aluminium strips from the commissioned miniICAL magnet system without dismantling the whole magnet. These aluminium strips were bolted to the magnet system for the smooth movement of the RPC trays in each layer, but due to the magnetic field, the whole system shrinks beyond our estimation, buckling those strips. During commissioning of RPC detector at miniICAL, it was found that few RPC can not hold pressure more than 10mm of water column, which is necessary for stable operation of the RPC. I had temporarily solved that button popup issue by installing suitable mylar balloon over the RPC trays.

My concept of a FTIR detector setup to monitor the INO gas system would have been much cheaper than a commercial one, but could not finish due to shortage of the components.

My current involvement in the BelleII project gave me additional opportunity to boost my knowledge in the accelerator based experiments. Here I got to learn about the schemes and frameworks of the software tools used along with the physics goals. An all-pixel vertex detector is under proposal as a replacement of the present one in the BelleII detector. With smaller pixel size, it is capable of higher occupancy and vertex resolution. I am studying the physics performance using simulation in a few benchmark decay channels.

LIST OF PUBLICATIONS

a. Published:

1. Suryanarayan Mondal et al., *Leak test of Resistive Plate Chamber gap by monitoring absolute pressure*, *Journal of Instrumentation, Vol* **14** (April 2019) P04009

2. Suryanarayan Mondal et al., *Study of Particle Multiplicity of Cosmic Ray Events using* $2\,m \times 2\,m$ *Resistive Plate Chamber Stack at IICHEP-Madurai*, *Experimental Astronomy*, (19 November 2020) 1–16

b. Conference/Symposium

1. G. Batignani et al., *Simulation of an all-layer monolithic pixel vertex detector for the Belle II upgrade*, *NIMA, Volume* **1045** (January 2023) 167616

2. S. Mondal et al., *Leak Rate Estimation of a Resistive Plate Chamber Gap by Monitoring Absolute Pressure in 13th Workshop on Resistive Plate Chambers and Related Detectors (RPC2016)*, *Journal of Instrumentation, Volume* **11** (Nov 2016) C11009

3. Suryanarayan Mondal et al., *Estimation of Leak of a Resistive Plate Chamber by Monitoring Absolute Pressure in XXII DAE High Energy Physics Symposium*, *Springer Proceedings in Physics, Volume* **203** (May 2018) 851-853

4. Suryanarayan Mondal et al., *Study of Particle Multiplicity by* $2\,m \times 2\,m$ *Resistive Plate Chamber Stack at IICHEP-Madurai in XXIII DAE High Energy Physics Symposium*, *Springer Proceedings in Physics, Volume* **261** (May 2021) 1155–1158

5. Suryanarayan Mondal et al., *Cosmic Muon Momentum Spectra at Madurai in XXIV DAE High Energy Physics Symposium*, *Springer Proceedings in Physics, Volume* **277** (October 2022) 743–747

6. G. Majumder and S. Mondal, *Design, construction and performance of magnetised mini-ICAL detector module in The 39th International Conference on High Energy Physics (ICHEP2018)*, *Proceedings of Science, Volume* **340** (2019) 360

7. S. Pethuraj et al., *Measurement of Angular Distribution and Integrated Flux of Cosmic Ray Muons Using* $2\,m \times 2\,m$ *RPC Stack at IICHEP Madurai in XXII DAE High Energy Physics Symposium*, *Springer Proceedings in Physics, Volume* **203** (2018) 845-846

8. G. Majumder et al., *Development of a Resistive Plate Chamber with Heat Strengthened Glass in XXII DAE High Energy Physics Symposium*, *Springer Proceedings in Physics, Volume* **203** (2018) 575-578

9. G. Majumder et al., *Development of a Resistive Plate Chamber with heat strengthened glass in 13th Workshop on Resistive Plate Chambers and Related Detectors (RPC2016)*, *Journal of Instrumentation, Volume* **11** (2016) C09019

Conferences/Workshops

1. Attended the course of *Japan-Asia Youth Exchange program in Science (SAKURA Exchange Program in Science)* administered by Japan Science and Technology Agency and held at Osaka university, Osaka, Japan during 29–04 December, 2015.

2. Attended *13th Workshop on Resistive Plate Chambers and Related Detectors (RPC2016)* held at Ghent University, Ghent, Belgium during 22–26 February, 2016.
   Poster Presented: LEAK RATE ESTIMATION OF A RESISTIVE PLATE CHAMBER GAP BY MONITORING ABSOLUTE PRESSURE.

3. Attended *National Symposium on Particles, Detectors & Instrumentation (NSPDI 2017)* held at Tata Institute of Fundamental Research, Mumbai, India during 4-7 October, 2017.
   Poster Presented: ESTIMATION OF LEAK OF A RESISTIVE PLATE CHAMBER BY MONITORING ABSOLUTE PRESSURE.

4. Attended *XXII DAE-BRNS High Energy Physics Symposium* held at University of Delhi, Delhi, India during 12-16 December, 2016.
   Poster Presented: ESTIMATION OF LEAK OF A RESISTIVE PLATE CHAMBER BY MONITORING ABSOLUTE PRESSURE.

5. Attended *XXIII DAE-BRNS High Energy Physics Symposium* held at IIT Madras, Chennai, India during 10-14 December, 2018.
   Poster Presented: MUON MULTIPLICITY IN $2\,\mathrm{m} \times 2\,\mathrm{m}$ RPC AND COMPARISON WITH CORSIKA SIMULATION.

6. Attended *XXIV DAE-BRNS High Energy Physics Symposium* held at NISER, Bhubaneswar, India during 14-18 December, 2020.
   Poster Presented: CORRELATION OF MUONS ARRIVAL TIMES FROM TWO DIFFERENT COSMIC SHOWERS.
   Talk Presented: COSMIC MUON MOMENTUM SPECTRA AT MADURAI.

Personal Details

Mother's Name:	Minakshi Jana
Father's Name:	Lakshmi Narayan Mondal
Date of Birth:	12 March 1990
Place of Birth:	Jaynagar Majilpur, West Bengal, India
Hobbies:	Trekking, Motorcycling

Mother's Name: Minakshi Jana

Father's Name: Lakshmi Narayan Mondal