

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Homi Bhabha Road, Mumbai-400 005

September 2, 2021

ASET Colloquium (Online)

Speaker : **Prof. Bedanga Mohanty (NISER, Bhubaneswar)**

Title : **Search for Lightly Ionizing Particles**

Date & Time : **Friday 03 September 2021 at 16:00 hrs.**

Venue : **Lecture Theater (<https://zoom.us/j/91427966752>)**

Abstract :

Robert Millikan's historic experiment showed that the charge on the matter comes in discrete units. The standard model (SM) does not include free fractionally charged particles since the quarks are bound within hadrons. However, extensions of SM allow for unbound quarks, non-integer-charged bound states of quarks, or new leptons with fractional charge. Often, they are called lightly ionizing particles (LIPs) as they would lose energy in detectors at a slower rate than known minimum ionizing particles. So far, they have not been observed experimentally. Direct searches are particularly interesting because energetic cosmic rays may produce LIPs with masses inaccessible to collider experiments. A clear observation of fractional charge would be very important since depending on the type of particle observed, it might mean that confinement breaks down under some circumstances or that entirely new classes of particles exist. Using the CDMSlite detectors of SuperCDMS, we have been able to explore and exclude a large area in the charge, mass, and velocity parameter space of LIPs. The results will be discussed in the talk. The prospects of improving the sensitivity with further R&D on novel detectors will also be presented.

About the Speaker:

Bedangadas Mohanty is a Professor of Physics and Dean of Faculty Affairs at the School of Physical Sciences, NISER, Bhubaneswar. Recently, he was a Scientific Associate at the experimental physics division, CERN working in ALICE. He is a member of the SuperCDMS collaboration for dark matter search. Bedangadas did his Masters from Utkal University, Bhubaneswar (1996), Ph.D. from Institute of Physics, Bhubaneswar (2002), and Postdoc at Lawrence Berkeley National Laboratory, USA. He was at the Variable Energy Cyclotron Centre, Kolkata during (2002-2012). Bedangadas won many awards and honours for his academic excellence. J C Bose National Fellowship (2017), Fellow of all three National Science Academies (2017), Bhatnagar Prize (2015), Swarna Jayanti Fellowship (2010-11), DAE Outstanding Research Investigator award (2010), DAE Young Scientist award (2006), INSA Young Scientist medal (2003), to name only a few. He is the Editor of the International Journal of Modern Physics E.



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