भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद

Physical Research Laboratory, Ahmedabad

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PRL Ka Amrut Vyakhyaan-34

Wednesday, 23 March 2022

@ 04:00 PM (IST)

"Quark-Gluon Plasma: the perfect and most vortical fluid"

Prof. Bedangadas Mohanty

School of Physical Sciences,

National Institute of Science Education and Research (NISER), Bhubaneswar

https://youtu.be/LCq4ZNVJxI0

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Title: "Quark-Gluon Plasma: the perfect and most vortical fluid"

Speaker: Prof. Bedangadas Mohanty

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Abstract

The fundamental constituents of visible matter are quarks, gluons, and leptons. The quarks and gluons are not found to exist in a free state in nature. They are confined inside particles called hadrons. However, they were believed to be in a free state in the micro-second old Universe.

We will discuss the formation of such a primordial matter of de-confined quarks and gluons in the laboratory and some of its interesting properties.

The Speaker

Prof. Bedangadas Mohanty is an experimental high energy physicist at the National Institute of Science Education and Research, Bhubaneswar and at the Homi Bhabha National Institute in Mumbai. He earned his M.Sc. in Physics from the Utkal University, Bhubaneswar with the first rank, and his Ph.D. from the Institute of Physics, Bhubaneswar.

Prof. Bedangadas Mohanty's contributions have pushed the frontiers of our knowledge of the strong nuclear force. Known as an energetic leader, he has driven the programs in the STAR experiment at Brookhaven National Lab (USA) and at the ALICE experiment at the European Organization for Nuclear Research (CERN, Switzerland) where he directed efforts towards elucidating important physics results. The quark-gluon plasma (QGP) formed at high nuclear densities and high temperatures cools down to ordinary hadronic matter via a phase transition. By studying fluctuations in net baryon number, Prof. Mohanty measured the temperature (around a trillion Kelvin) at which this happens and is currently searching for the possibility of a QCD critical point in the phase diagram. The implications of some of his measurements are far-reaching and go beyond nuclear physics.

He has held Fellowships and post-doctoral positions at the Variable Energy Cyclotron Centre (Kolkata) and at the Lawrence Berkeley National Laboratory (USA). He has won the Shanti Swarup Bhatnagar Prize (2015), the Swarna Jayanti Fellowship (2010-11), the INSA Young Scientist Medal (2003), INFOSYS Prize in Physical Sciences 2021. Prof. Mohanty is a Fellow of the American Physical Society-USA, J C Bose National Fellow, fellow of the National Academy of Sciences India, fellow of the Indian Academy of Sciences and, fellow of the Indian National Science Academy.

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About PRL

The Physical Research Laboratory (PRL), known as the “cradle of space science” in India, is one of the premier research institutes founded in 1947 by Prof. Vikram Sarabhai, a renowned Cosmic Ray Scientist, a great visionary and institution builder. PRL played a seminal role in producing a highly motivated cadre of space scientists and the technologists of highest international repute. The first scientific rocket launched from Thumba on 21st November-1963 and many other rockets launched thereafter contained payloads developed at PRL. Dr. Sarabhai initiated many of these scientific and technical activities at PRL which eventually led to the formation of the Indian Space Research Organization (ISRO). Therefore, PRL is known as the “cradle of space science” in India. Further, the research in the area of Plasma Physics expanded to the formation of the Institute of Plasma Research (IPR).

As an institution PRL is unique in that it conducts fundamental research in a wide range of research areas from the Earth to the cosmos, and comprising Astronomy and Astrophysics; Solar Physics; Space and Atmospheric Sciences; Theoretical Physics; Geosciences; Atomic, Molecular and Optical Physics, Astrochemistry; and Planetary Sciences and Space Exploration. PRL is one of the rare research institutes of international repute wherein research in such diverse fields of sciences is carried out using several state-of-the-art experimental facilities that exist under one umbrella.

Along with the ongoing research, several new initiatives have been taken up during the last few years. The Multi-Application Solar Telescope (MAST) at Udaipur Solar Observatory has been operationalized. PRL initiated scientific programmes in frontier areas of research, which include a search for exo-planets, laboratory studies of interstellar grains, laboratory synthesis of cold astromolecules and experimental studies in the field of quantum optics. PRL is also developing several scientific payloads as a part of ISRO’s larger vision and contributing to roadmap for competitive scientific exploration of the solar system and beyond. In particular, PRL has been contributing significantly not only in building instruments for space missions, such as Chandrayaan-1, Chandrayaan-2, AstroSat and upcoming Aditya-L1, Chandrayaan-3 and planetary and space missions, but also by bringing out new and insightful science results.

PRL contributes to several national and international research programmes and to human resource development through its Doctoral and Post-Doctoral Programmes, capacity building programmes, such as UN Course on Space Science, and science and engineering internship programmes. PRL contributes significantly to society through its Outreach Programmes by periodically organizing science exhibitions and Open Houses, planned visits of students of various school and college to PRL, and popular talks at various institutions to not only share the excitements of the advancements of contemporary scientific findings but also to encourage students to take up sciences as their research career.

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