Physical Research Laboratory, Ahmedabad

Colloquium 15-09

Speaker: **Prof. B. P. Das**

Distinguished Professor, Indian institute of Astrophysics, Bangalore.

Title: **"Electric Dipole Moment of the Electron: Present Status and Future Prospects"**

Time: **Wednesday, 06 May 2015, 16.00 hrs.**

Venue: **K. R. Ramanathan Auditorium, PRL**

Abstract

The observation of a permanent electric dipole moment (EDM) of a physical system is a signature of the simultaneous violations of parity (P) and time-reversal (T) symmetries. T violation implies the violation of the combined symmetries of charge conjugation and parity;i.e. CP violation via the CPT theorem. The origin of CP violation is still not well understood. This phenomenon has only been observed in the K and B mesons, and the results are essentially in agreement with the predictions of Kobayashi and Maskawa in the framework of the standard model of particle physics. However, this model cannot explain the matter-antimatter asymmetry in the universe for which CP violation is a prerequisite. In addition, its prediction of the electron EDM is several orders of magnitude below its current limit. Indeed the electron EDMs is an excellent probe of new physics beyond the standard model. The talk will focus on the EDM of the electron. After touching upon the connection of the electron EDM with the standard model, its manifestation in atoms and molecules will be highlighted. The symbiotic relationship between atomic/molecular theory and experiment in determining the electron EDM will be emphasised. The present status and the future prospects of the search for the electron EDM will be presented and their implications for physics beyond the standard model will be discussed.

The Speaker

Prof. B. P. Das graduated with B.Sc. (Honours) in Physics from IIT Kharagpur in 1974, received his M.S. in 1976 and Ph.D. in 1981 from the State University of New York at Albany, USA. He was a Postdoctoral Fellow at the University of California, Riverside and Max Planck Institute, Munich. He has held faculty positions at Colorado State University, Utah State University, Oxford University and IIT Bombay before joining the Indian Institute of Astrophysics (IIA), Bangalore as Professor in 1993. He served IIA as the Acting Director for a year during July 2012 - July 2013 and is currently a Distinguished Professor at IIA, Bangalore. His primary research interest is in the interface of atomic and particle physics. His theoretical work on atomic parity violation in combination with the measurement of this phenomenon led to one of the first successful tests of the standard model (SM) of particle physics. His findings on time-reversal violations in atoms in recent years has provided new insights into physics beyond the SM. His group has provided theoretical support to experimentalists at NIST, Boulder led by this year's physics Nobel Prize winner, David Wineland to establish the aluminium ion clock as the world's current most accurate clock. He has worked on the behaviour of matter at ultracold temperatures (billionth of a degree above absolute zero) and predicted the existence of the supersolid state of matter. He has more than 120 publications in the peer reviewed journals and has contributed to many book chapters. Prof. Das is a Fellow of the Amercan Physical Society. He will be joining soon as a Professor at Tokyo Institute of Technology (TIT), Tokyo, Japan to pursue his next academic career.

Tea at 15:30 hrs.

ALL ARE WELCOME