



## Physical Research Laboratory, Ahmedabad

### COLLOQUIUM - 12-34

**Speaker:** Prof. A. Surjalal Sharma

Director, Goddard Planetary Heliophysics Institute, University of Maryland.

**Title:** Multiscale Phenomena of the Earth's Magnetosphere

#### Abstract

The Earth's magnetosphere exhibits multiscale behavior, spanning a wide range of scales from the electron skin depth ( $\sim$  km) to the global scale ( $200 R_E \sim 10^5$  km). On the largest scale the global simulations using the MHD model provide the dominant features of the macro-scale features. On the shortest scale the electron-MHD and PIC simulations provide the details of the processes, such as magnetic reconnection, that initiate the meso- and macro-scale phenomena. An integrated approach based on the two-fluid plasma model can provide a seamless description of the multiscale phenomena on the micro-, meso- and macro-scales, and can be a framework for the understanding of ESA/Cluster and NASA/MMS missions. On the other hand the recent approach of data-enabled modeling, based on the nonlinear dynamical systems theory, yields models which are independent of modeling assumptions and complements the numerical simulations. The capabilities of numerical simulations to yield physical insights and of the data-enabled approach to yield dynamical and statistical behavior complement each other and provide a framework for the understanding of multiscale phenomena in general.

#### The Speaker

Prof. A. Surjalal Sharma did his B.Sc. (1970) and M.Sc. (1972) in Physics from the University of Delhi. He obtained his Ph.D. degree from the Physical Research Laboratory – Gujarat University (1976). During 1977-80, he was a Post-Doctoral Associate at the Laboratory of Plasma Studies, Cornell University, Ithaca, New York. He then returned to India and worked as Research Associate at PRL (1980 – 1983) and Fellow at IPR (1983-87). Since 1987 he has been at the University of Maryland. In 2011 he has assumed the Directorship of Goddard Planetary Heliophysics Institute in the University of Maryland. His main areas of research are Space Plasma Physics and Nonlinear Dynamics. He is a recipient of University of Maryland Distinguished Research Scientist Prize (2011), Distinguished Scientist Award from Manipur Association for Promotion of Science (2008) and NASA Group Achievement Award (1998). He has edited 05 books and is an editor for Nonlinear Processes in Geophysics, European Geosciences Union / American Geophysical Union.

**Wednesday: 21 November, 2012, 16:00 hrs.**

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

**Tea at 15:30 hrs.**

**ALL ARE WELCOME**



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**A YEAR OF NEW SCIENCE, NEW DISCOVERIES and DEEPER SOCIETAL COMMITMENT**