Physical Research Laboratory, Ahmedabad

Colloquium 19-07

Speaker: **Prof. K. P. Subramanian**
Honorary Scientist, Atomic, Molecular and Optical Physics Division, PRL

Title: **"Quadrupole mass analyzer: Mathematical principle and COMSOL simulation"**

Time: **Wednesday, 10 April 2019, 16.00 hrs.**

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

Abstract

Mass spectrometry is widely regarded as the most sensitive and specific general purpose analytical technique. Among a variety of techniques used in mass spectrometry, Quadrupole mass analyzer (QMA) has emerged as a common and handy gadget in many laboratories world over. While the principle behind conventional mass analyzers is dispersion, in QMAs mass filtering is based on stable Vs unstable oscillations of ions in a quadrupole RF field. For a given values of parameters defining the AC and DC fields inside a quadrupole, it can be seen that oscillations of ions within a certain mass range are sustained, whereas oscillations of all other ions outside this band are divergent and are removed from the beam. Therefore, QMA is regarded as a mass filter, than a spectrometer.

In this colloquium, the history of QMA will be briefly discussed. The basic mathematical steps for analyzing the ion trajectory in a quadrupole field will be presented. The 'filtering property' will be explained in the context of properties of Mathiue Function, which is the governing equation for the function of QMA. From here, the steps towards consolidating these mathematical ideas into a working instrument will be illustrated with an example. Finally, COMSOL simulation of the instrument also will be presented.

The Speaker

Prof. K.P. Subramanian was associated with the Laboratory Astrophysics Group of PRL (at present the AMOPH Division) and has worked on many experimental atomic and molecular physics programs of PRL. He has worked on a variety of experimental programs such as electron spectroscopy, electron scattering, radiative life time measurement, ion-momentum spectroscopy, laser produced plasmas and LIBS. He is involved in the development of the SWIS instrument of ASPEX payload, onboard ADITYA-L1 satellite. Since the inception of the Indian Society of Atomic and Molecular Physics in PRL, he had served the society in various positions and still continue to serve as an Ex-officio member. Currently, he is serving PRL as Honorary Scientist with the AMOPH Division and the APSEX project.

Tea at 15:30 hrs
ALL ARE WELCOME