



# Physical Research Laboratory, Ahmedabad

## Colloquium 18-04

**Speaker:** Dr. Kishore Dutta

Faculty, Handique Girls' College, Guwahati

**Title:** "Critical phenomena in Uranium Ferromagnetic superconductors"

**Time:** Wednesday, 14 March 2018, 16.00 hrs.

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

### Abstract

The recent discovery of superconductivity below 1K within a limited pressure range in uranium ferromagnetic superconductors triggered many experimental and theoretical investigation on the coexistence of superconductivity and ferromagnetism, revealing their detail electric and magnetic properties. The Curie temperatures for paramagnetic to ferromagnetic (PM-FM) phase transition in these compounds are found to depend strongly on pressure, indicating that magnetic energy is coupled to the lattice. The recent experimental results for critical behavior related to their PM-FM phase transition does not belong to any known universality classes of critical phenomena. In order to capture their critical behavior related to PM-FM phase transition, spin-lattice coupling needs to be considered in the critical theory. Through renormalization-group analysis of such a model Hamiltonian, it is shown that it can capture well the experimentally determined critical exponents for such compounds. This talk will also discuss the importance of magneto elastic interaction in the vicinity of quantum critical points in strongly correlated systems.

### The Speaker

Dr. Kishore Dutta is working as a faculty at Handique Girls' College Guwahati. He did his PhD from the IIT Guwahati on theoretical aspects of anisotropic turbulence. After his PhD he carried out research work on classical as well as quantum turbulence dynamics, critical phenomena in strongly correlated condensed matter systems, and the application of non-equilibrium statistical approaches to biological and ecological problems. At present he is working on (a) Turbulent statistics in superfluid  $^3\text{He}$  (b) Quantum phase transition in strongly correlated magnetic systems and (c) Dynamics of biological pattern formation.

Tea at 15:30 hrs.  
**ALL ARE WELCOME**

