INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A & 2B, Raja S. C. Mullick Road, Jadavpur, Kolkata-700 032

School of Physical Sciences

SEMINAR NOTICE

Title : **Exploratory synthesis and novel magnetism of magnetically frustrated systems and magnetic topological materials**

Speaker : **Dr. Santanu Pakhira,** ***Ames National Laboratory - US Department of Energy, Ames, Iowa, USA***

Date : **August 31, 2022 (Wednesday)**

Time : **17:00 hours (IST)**

Venue : **Online Mode using Zoom Platform**
Zoom link of the seminar:
https://zoom.us/j/97021270635
Meeting ID: 970 2127 0635
Passcode: 259853

P.T.O.

Abstract:

Quantum magnets always offer a fertile ground to explore and discover different exotic and novel phenomena in the research field of condensed matter physics and material science. Frustrated magnetic systems are one such example where multiple exchange interactions having competing energy scales coexist. Although frustration in local moment system is well-understood and has gained considerable interests due to the possibility of generating unique quantum states like spin-liquids, spin-ices, spin-glasses, etc., such scenario in itinerant system is hardly explored. 122-type cobalt pnictides are itinerant quantum magnets and are described to consist of competing magnetic interactions. CaCo2-yAs2 is a unique itinerant magnetic system with strong frustration and exhibits A-type antiferromagnetic (AFM) ordering below *T*N ~ 52 K. Both electron- and hole-doping onto the Co-site through Fe and Ni substitutions strongly suppress the AFM ordering in the system followed by a carrier-tuned Stoner transition. In the absence of long-range magnetic ordering, frustration-driven strong quasi-1D ferromagnetic quantum spin-fluctuations develop in both Fe- and Ni-doped CaCo2-yAs2 along with non-Fermi-liquid behavior. Isostructural analogue SrCo2As2 does not order magnetically down to at least 50 mK, but stripe AFM spin fluctuations exist. We found that minimal Pd substitutions trigger long-range AFM order in the system. On the other hand, very recently, different Eu-based geometrically frustrated triangular lattice compounds have been reported to host novel topological electronic states with ultrahigh mobility. Understanding the complex interplay of magnetism and band topology is quite important to interpret various observations in those materials. One such topological Dirac semimetal EuMg2Bi2 forms in trigonal crystal structure and exhibits A-type AFM order below *T*N = 6.7 K. In the AFM state, an unusual low-field induced spin reorientation in the three-fold AFM domains is observed for the compounds associated with a weak in-plane anisotropy. *H-T* magnetic phase diagram is constructed from the combined results of magnetic, heat capacity, resistivity, and neutron diffraction data. The phase boundary between the AFM and PM states is consistent with the molecular-field-theory prediction for spin $S = 7/2$.

All are cordially invited to attend the seminar