

## **Seminar**

### **Non-reciprocal transport and rectification effects in superconducting niobium devices**

**Shamashis Sengupta**

**Université Paris-Saclay, France**

Certain asymmetric conductors exhibit non-reciprocal transport properties, characterised by the fact that the resistance for current flow is different for two opposite polarities. A broad range of solid-state systems, including both semiconductors and superconductors, are known to exhibit such properties. A prominent signature of non-reciprocity is the generation of a voltage signal with DC and even harmonic components when an AC current is applied. In most instances, non-reciprocal behaviour is seen in the presence of an applied magnetic field, therefore requiring the breaking of both inversion and time reversal symmetries. We have conducted experiments with superconducting Nb films and observed the spontaneous generation of DC voltage resulting from the rectification of environmental fluctuations. The devices used in our experiments are not designed to be asymmetric. The rectification effect observed here can be attributed to an unconventional mechanism of non-reciprocal transport resulting from a spontaneous breaking of inversion symmetry. The unconventional nature is further confirmed by the fact that the rectified signal is symmetric with respect to the magnetic field, in stark contrast to most other systems reported in literature.

***Tuesday, Jan 9<sup>th</sup> 2024***

***16:00 Hrs (Tea / Coffee 15.45 Hrs)***

***Auditorium, TIFR-H***