

## **ICTS Seminar**

- Title** : Gravitomagnetism and Pulsar Beam Precession near a Kerr Black Hole
- Speaker** : Prashant Kocherlakota, Tata Institute of Fundamental Research, Mumbai
- Date** : Tuesday, May 21, 2019
- Time** : 3:30 PM
- Venue** : Chern Lecture Hall, ICTS Campus, Bangalore
- Abstract** : A rotating black hole causes the spin-axis of a test object to precess due to geodetic and gravitomagnetic (frame-dragging) effects. I will begin with how this precession arises by discussing the evolution equation of its intrinsic spin angular momentum, which is governed by the Fermi-Walker transport law. Then, to provide a concrete example of why this effect could be important, I will proceed with a study of how spin-precession affects pulsar observations. Pulsars are spinning neutron stars that emit beams of radiation, and when present around a supermassive black hole, serve as a realistic astrophysical approximation of a test spinning object. Towards this end, I will obtain the complete evolution of the beam vectors of pulsars moving on equatorial circular orbits in the Kerr spacetime, relative to asymptotic fixed observers, and establish that such spin-precession effects can indeed significantly modify observed pulse frequencies. In specific, we find that the observed pulse frequency rises sharply as the orbit shrinks, potentially providing a new way to locate horizons of Kerr black holes, even if observed for a very short time period. Potentially, measurements of such effects could serve as an independent estimate of the black hole spin parameter.