

Seminar

Spin dynamics of molecular electron qubits at clock transition

Krishnendu Kundu

HBCSE-TIFR, Mumbai

In quantum information sciences (QIS), molecular electron spin is a promising candidate for qubits. Yet, their quantumness, or coherence, can be destroyed by the influence of random magnetic fields in the surroundings. Clock Transitions (CTs) between spin states offer a promising route for preserving coherence, exploiting energy levels' insensitivity to external magnetic fields. I will talk about two examples from lanthanide systems to illustrate this concept. Firstly, a molecular holmium nanomagnet demonstrates the disappearance of magnetic fluctuations from nuclear spins precisely at a CT, thereby enhancing electron spin coherence lifetime. Secondly, a Lutetium complex exhibits gigantic hyperfine interaction, significantly enhancing electron spin coherence at CT. Additionally, I will also discuss recent hardware advancements, such as frequency-swept pulses in the high-field EPR regime, enabling improved control over quantum operations on qubits.

Monday, May 6th 2024

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFR-H