

Seminar

"Quantum assisted" magnetic resonance across length scales

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The development of atom-like quantum sensors in wide bandgap materials, for instance Nitrogen Vacancy (NV) centers in diamond, has thrown up exciting new possibilities for the sensing of materials, molecules and biological systems through optical means. In particular I will describe the development of "quantum-assisted" magnetic resonance probes based on the NV center that allows sensing of nano- and meso-scale volumes at high spatial and frequency resolution. This is achieved by using the quantum sensors to forge the "marriage of NMR and light", allowing chemical specificity of NMR with the resolution and throughput governed by optics.

I will also highlight an alternate use of the quantum sensors to create highly non-equilibrium spin populations in nuclear spin systems in order to "hyperpolarize" them, boosting their magnetic resonance signatures by several orders of magnitude. This allows quantum sensors to greatly enhance conventional macro-scale MRI and NMR, enabling compelling new directions for miniature quantum-enhanced spectrometer devices for high-throughput chemical analysis and imaging.

Tuesday, Mar 26th 2019

4:00 PM (Tea/Coffee at 3:30 PM)

Seminar Hall, TIFR-H