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Abstract: Coherent light-matter interactions in luminescent lanthanide complexes

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The coherent interaction between light and matter is a fundamental mechanism useful for developing quantum information processing (QIP) applications. Molecule-based quantum systems are one of the materials systems that have been used to create coherent spin-photon interfaces. Recent developments include the demonstration of ultra-narrow linewidths associated with optical transitions of luminescent lanthanide complexes.

By taking advantage of the narrow linewidths, efficient nuclear spin-polarization in hyperfine levels, storage of photons in a lanthanide molecular crystal, and controlled ion-ion interactions have been demonstrated, all useful for harnessing QIP applications. This talk will provide a concise introduction to the spectroscopic properties of lanthanide complexes and an overview of this emerging area of research.

Biography:

Senthil Kumar Kuppusamy received his PhD at the Indian Institute of Technology-Madras (IIT-M) in Chennai, India in 2011. Since March 2022, Kuppusamy is a Project Leader at the Institute of Quantum Materials and Technologies (IQMT) at Karlsruhe Institute of Technology (KIT) in Germany. He has received the Best thesis award (Prof. Werner prize) in Inorganic and Analytical Chemistry in June 2011 and more recently received Outstanding reviewer award in 2019 by the Journal of Physics: Condensed Matter.