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Probing magnetic interactions in molecule-based materials using high-pressure electron paramagnetic resonance K. THIRUNAVUKKUARASU, National High Magnetic Field Laboratory (NHMFL), Tallahassee, Florida, USA, C.C. BEEDLE, NHMFL, Tallahassee, Florida, USA, S. WINTER, Department of Chemistry, University of Waterloo, Ontario, Canada, A. KOVALEV, S. TOZER, NHMFL, Tallahassee, Florida, USA, R.A. OAKLEY, Department of Chemistry, University of Waterloo, Ontario, Canada, S. HILL, NHMFL and Department of Physics, Florida State University, Tallahassee, Florida, USA — Multi-frequency electron paramagnetic resonance (EPR) spectroscopy is a powerful technique for investigating magnetic exchange interactions in quantum matter. EPR spectroscopy when combined with techniques such as high pressure will enable us to probe various quantum phase transitions that give rise to novel electronic and magnetic phases in correlated electron systems. However, this particular combination of experimental tools has remained uncommon for several decades. Recently, our group has successfully implemented high pressure technique together with EPR spectroscopy. Cavity-based high-frequency EPR measurements can now be performed in the frequency range from 40 GHz to 200 GHz at temperatures down to 1.6 K under quasi-hydrostatic pressures up to 30 kbar. With the application of pressure, the inter-atomic/molecular correlations can be tuned continuously to reveal the nature of magnetic anisotropy and exchange interaction. In this talk, the realization of high pressure EPR spectroscopy will be briefly described using one of the molecule-based materials such as single-molecule magnet, organic radical-based ferromagnet etc., as an example.

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