Using a multi-level quantum system, we demonstrate Rabi oscillations between states belonging to different realizations of quasi-harmonic oscillators. The Mn ions diluted in a MgO matrix have tunable equally-spaced $S_z$ spin states [1,2]. The hyperfine field is large enough to separate sets of states $\{I_z, S_z=-5/2\ldots+5/2\}$ of consecutive $I_z$ values, sets which are coupled. This coupling is strong enough and the coherence times of the electro-nuclear states are large enough, to induce a level repulsion of corresponding dressed states which we measure using a two-tone technique [3]. We will discuss methods to study quantum spin resonances and Rabi oscillations using on-chip techniques for high magnetic fields, in particular a combination of microwave antenna with SQUID readout (Fig.1). A study on a variety of low and high-spin species will be presented.

References

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