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Spectroscopy of Strongly-Coupled Spins Using Spin-Lock Induced Crossing STEPHEN DEVIENCE, Harvard University, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics, MATTHEW ROSEN, Harvard Medical School — We present a novel pulse sequence called Spin-Lock Induced Crossing (SLIC) for the manipulation of strongly-coupled spins, based on the splitting and shifting of dressed-state energy levels in response to spin-locking. We demonstrate how SLIC can be used to acquire spectra from groups of spins with unresolvable resonance lines. Performing NMR with SLIC at 6.5 mT, we measured a J-coupling spectrum for both hydrated and dehydrated ethanol, without the addition of a heteronucleus, thereby making chemical identification possible despite the lack of resolvable chemical shifts. We also demonstrated how SLIC can perform spin operations between dressed states. Performing NMR at 4.7 T, we used SLIC to create long-lived nuclear spin singlet states in two nearly-equivalent proton pairs. We discuss how SLIC might be applied to novel spin measurements and quantum memories in the solid state.

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