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Probing individual environmental nuclear spins coupled to electronic spin defects with dynamical decoupling pulse sequences QUIRIN UNTERREITHMEIER, SHIMON KOLKOWITZ, STEVEN BENNETT, MIKHAIL LUKIN, Harvard University — Solid-state spin qubits are promising candidates for quantum computation and quantum communication applications, for which long coherence times are a prerequisite. In the case of single Nitrogen-Vacancy (NV) centers, the coherence times are often limited by interactions with the surrounding nuclear environment. In this poster we present recent experimental results demonstrating the detection of individual nuclear spins weakly coupled to single electronic spin defects beyond the "T2-star" limit using dynamical decoupling pulse sequences. We take advantage of the coherent nature of the hyperfine interaction to probe the nuclear environment of individual NV centers, and to identify the nearby nuclear spins and determine their coupling strengths and relative positions to the NV. We observe coupling strengths ranging from 2 MHz down to 46 kHz, well below the limit imposed by "T2-star," and observe multiple nuclei coupled to a single NV. We discuss potential applications of this technique in magnetometry and quantum information science.

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