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**The central spin problem: electron spin qubit evolution due to coherently evolving nuclear spins** IZHAR NEDER, MARK RUDNER, HENDRIK BLUHM, BERTRAND HALPERIN, AMIR YACOBY, Harvard University — In recent years, electron spin qubits in solid state quantum dots have emerged as promising candidates for the implementation of quantum information processing. We study the dephasing of two electron spins in a double quantum dot system due to the evolution of the underlying nuclear spins, as was measured in a recent spin echo experiments. We develop a semi-classical model for such a system, by treating the Overhauser field induced by the nuclear spins as a classical time-dependent vector. Comparing the outcome of this model to experimental echo signal of the electron qubit allows us to identify MNR-like signatures from the nuclear spin evolution, such as spin diffusion, coherent nuclear Larmor precession and the spread of the Larmor frequencies by various mechanisms.

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