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**Preparation of Non-equilibrium Nuclear Spin States in Quantum Dots** MICHAEL GULLANS, JACOB KRICH, Harvard University, JACOB TAYLOR, MIT, BERTRAND HALPERIN, AMIR YACOBY, MICHAEL STOPA, MIKHAIL LUKIN, Harvard University — We examine how dynamical nuclear polarization (DNP) in quantum dots can lead to the emergence of novel non-equilibrium configurations of the lattice nuclear spins. Specifically, by integrating out the electron spin dynamics and course graining the evolution over one DNP cycle we derive an effective master equation for the nuclear spins, which we then solve using time-dependent mean field theory. This analysis provides a preliminary theoretical explanation for the observation of both reduced [1], and enhanced [2], Overhauser gradient magnetic fields seen in recent experiments.

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