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**Spin-orbit coupling quenches dynamic nuclear polarization in GaAs double quantum dots** JOHN NICHOL, SHANNON HARVEY, MICHAEL SHULMAN, ARIJEET PAL, EMMANUEL RASHBA, BERTRAND HALPERIN, Harvard University, VLADIMIR UMANSKY, Weizmann Institute of Science, AMIR YACOBY, Harvard University — Dynamic nuclear polarization (DNP) occurs in a wide variety of condensed matter systems and enables the transfer of angular momentum from electron to nuclear spins via the hyperfine interaction. In semiconductor devices, DNP is exploited for coherent electron spin manipulation, but the mechanisms limiting the maximum-achievable polarization in gate-defined quantum dots to only a few percent remain incompletely understood. We demonstrate here that spin-orbit coupling quenches DNP in a GaAs double quantum dot, even though the spin-orbit length is much larger than the interdot spacing. The observed suppression of DNP is consistent with theoretical models. These results demonstrate the surprising competition between the hyperfine and spin-orbit interactions in GaAs double quantum dots and highlight the importance of field orientation for efficient DNP.

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