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Electron spin relaxation by hyperfine interaction in a double quantum dot[1] ALEX JOHNSON, JASON PETTA, JACOB TAYLOR, CHARLES MARCUS, MIKHAIL LUKIN, Harvard University, AMIR YACOBY, Harvard University and Weizmann Institute, MICAH HANSON, ART GOSSARD, University of California at Santa Barbara — We use a pulsed-gate technique to measure singlet-triplet relaxation in a GaAs/AlGaAs few-electron double quantum dot at low magnetic field. Electrostatic pulses are applied to probe the time dynamics of the (1,1) to (0,2) charge state transition, while average dot occupation is measured by nearby quantum point contact charge sensors. In the (0,2) configuration only a spin singlet is allowed, blocking the transition from (1,1) if a triplet state is initially formed, but relaxation is strongly enhanced near zero magnetic field. We attribute this enhancement to different nuclear environments in each dot, and extract an average effective Overhauser field of 3 mT. This implies a spin dephasing time of 30 ns in this system.

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