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Measurement of spin relaxation time in InGaAs double quantum dots VICTORIA RUSSELL, University of Cambridge & Toshiba Reseacrh Europe Limited, KARL PETERSSON, IAN FARRER, FRANCOIS SFIGAKIS, University of Cambridge, STUART HOLMES, Toshiba Research Europe Limited, CRISPIN BARNES, DAVID ANDERSON, GEB JONES, CHARLES SMITH, DAVID RITCHIE, MICHAEL PEPPER, University of Cambridge — A proposed spin qubit consists of a single electron residing in a material of selected electron g-factor. For successful implementation the spin relaxation time, T_1, must be sufficiently long to enable multiple operations. Previously, double quantum dots (DQD) have been used for the detection of spin states. We report measurements of T_1 in a DQD in $In_xGa_{1-x}As$ (x = 0.1, 0.2) with g-factors of ≈ -0.9 and -1.6 respectively, displaying larger spin-orbit (SO) coupling effects. DQDs are measured in the Pauli spin blockade regime using RF charge detection techniques. Using high frequency pulses applied to electrostatically defined gates T_1 is calculated from resulting visibility of the triplet spin state. Magnetic field probes the effect of the SO compared to the hyperfine interaction on T_1. With larger g-factor, splitting of the singlet-triplet energy levels, so supressing hyperfine-mediated relaxation, occurs at comparatively smaller magnetic field and may compensate for increased SO effects. Thus T_1 in InGaAs is shown to be sufficient for quantum computation applications.

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