Abstract Submitted
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Phosphorus Donors in Highly Strained Silicon[1] M. S. BRANDT, H. HUEBL, A. R. STEGNER, M. STUTZMANN, Walter Schottky Institut, Garching, Germany, G. VOGG, F. BENSCH, Fraunhofer IZM, Muenchen, Germany, E. RAULS, Aarhus Universitet, Aarhus, Denmark, U. GERSTMANN, Universite Pierre et Marie Curie, Paris, France — Donors in strained Si layers have been proposed for quantum computing applications. The lifting of the six-fold valley degeneracy, characteristic for unstrained Si, leads to a suppression of the Kohn-Luttinger oscillations in strained layers which would otherwise limit the exchange interaction of neighboring qubits. Via electrically detected magnetic resonance, we have determined the hyperfine interaction of phosphorus donors in fully strained Si thin films grown on virtual $Si_{1-x}Ge_x$ substrates with $x \leq 0.3$, extending the regime investigated earlier by a factor of 20 to higher strains. For highly strained epilayers, hyperfine interactions as low as 0.8 mT are observed [1], significantly below the limit predicted by valley repopulation. Within a Green's function approach, density functional theory shows that the additional reduction is caused by the volume increase of the unit cell and a relaxation of the Si ligands of the donor. [1] H. Huebl et al., Phys. Rev. Lett. **97**, 166402 (2006).

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