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Realization of a double quantum dot in an isotopically purified ^{28}Si 2DES ANDREAS WILD, JUERGEN SAILER, GERHARD ABSTREITER, Walter Schottky Institut, Technische Universitaet Muenchen, Germany, J.W. AGER, E.E. HALLER, Department of Materials Science and Engineering, University of California at Berkeley, USA, STEFAN LUDWIG, Fakultät für Physik, Ludwig-Maximilians Universitaet Muenchen, Germany, JOHANNES KIERIG, DOMINIQUE BOUGEARD, Institut für Experimentelle und Angewandte Physik, Universitaet Regensburg, Germany — The Si/SiGe material system shows great promise for the realization of electron spin qubits due to the weak hyperfine interaction in natural silicon [2]. The electron spin coherence time is expected to further increase for spins embedded in a nuclear spin-refined ^{28}Si host crystal. In this contribution, we report on the realization and characterization of a 2DES in a MBE grown hybrid ^{28}Si/SiGe heterostructure with a record mobility of $5.5 \cdot 10^4 cm^2/Vs$ at an electron density of $3 \cdot 10^{11}/cm^2$ in which the electron-nuclear spin overlap is greatly suppressed [1]. Based on this heterostructure, we present the first double quantum dot device in isotopically purified silicon. Our device can be operated down to the few electron regime and by using an additional global topgate above the quantum dot gates, the overall charge noise performance can be optimized significantly. This recent progress is fundamental for further experiments towards e.g. measurements of spin relaxation times in ^{28}Si.

[1] J. Sailer et al., Phys. status solidi RRL 3, 61 (2009)
[2] A. Wild et al., New J. Phys. 12, 113019 (2010)

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