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Electrical control of single hole spins in InSb nanowire quantum dots VLAD PRIBIAG, STEVAN NADJ-PERGE, JOHAN VAN DEN BERG, SERGEY FROLOV, TU Delft, SEBASTIEN PLISSARD, TU Eindhoven, ERIK BAKKERS, LEO KOUWENHOVEN, TU Delft — The spin-orbit interaction provides an efficient handle for all-electric control of individual spins in quantum dots. Recently, III-V semiconductor nanowires, which have a strong spin-orbit coupling, have emerged as a promising platform for spin-based qubits. Previous work has been focused on the electrical control of electron spins in InAs nanowires. In contrast, spin-dependent quantum transport with holes has so far remained largely unexplored. Here, we demonstrate gate tuning from the few-electron double dot to the few-hole double-dot regimes in InSb nanowires and observe Pauli spin-blockade for both electrons and holes. We use electric-dipole spin resonance (EDSR) to determine the effective g-factors of the two types of carriers. EDSR control over the hole spins is promising for driving coherent rotations of hole-spin qubits. These hole qubits are expected to be less sensitive to hyperfine-mediated decoherence effects than electron-spin qubits as a result of the p-wave symmetry of the hole wavefunction.

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