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Tunable g-factors and spin orbit coupling strength in SiGe single-hole transistors G. KATSAROS, P. SPATHIS, CEA-Grenoble, France, M. STOFFEL, IFW-Dresden, Germany, F. FOURNEL, M. MONGILLO, CEA-Grenoble, France, V. BOUCHIAT, CNRS Grenoble, France, F. LEFLOCH, CEA-Grenoble, France, A. RASTELLI, O. SCHMIDT, IFW-Dresden, Germany, S. DE FRANCESCHI, CEA-Grenoble, France — A prominent branch of spintronics aims at exploiting the electronic spin degree of freedom either for encoding and manipulating quantum information or for switching the state of transistors in a more efficient way. While ground-breaking achievements could be made mainly on GaAs-based heterostructures, the importance of exploring alternative material systems with favourable properties such as long spin coherence is now widely recognized. Here we report for the first time the realisation of single-hole transistors based on individual self-assembled SiGe quantum dots. We observe a variety of low-temperature transport regimes depending on the strength of quantum confinement and the tunnel coupling to the leads. Transport spectroscopy reveals largely anisotropic hole g factors with pronounced dependence on gate voltage and magnetic field. Quantitative evidence of a strong spin-orbit coupling is obtained from the observation of field-induced avoided crossings between energy levels with different spin quantum number. Interestingly, the coupling strength is found to vary (and even vanish) with the field direction, in line with recent theoretical predictions.

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