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Measurement of Valley Splitting in a Si/SiGe 2DEG Point Contact L.M. MCGUIRE, K.A. SLINKER, S. GOSWAMI, University of Wisconsin-Madison, J.O. CHU, IBM Research Division, T. J. Watson Research Center, M.A. ERIKSSON, University of Wisconsin-Madison — We measure the valley splitting as a function of magnetic field in a Si/SiGe two-dimensional electron gas (2DEG) point contact defined by metal top-gates. Using a pair of point contacts on a quantum dot, and a two-point measurement technique, we apply a small ac bias to the source-drain and measure the differential current as we pinch off the channel by applying a negative voltage to the top-gate. As the voltage on the top-gate is varied in zero magnetic field, we observe the conventional steps at conductance values of multiples of $\frac{4e^2}{h}$. By applying a perpendicular magnetic field, we lift both the spin and valley degeneracies, and we see corresponding steps in conductance at every $\frac{e^2}{h}$. By fitting the conductance as a function of magnetic field, we can extract both the subband spacing and the valley splitting energy. Temperature dependence and source-drain spectroscopy plots are shown. At high magnetic fields, step-like features appear at non-integer conductance values in addition to the integer steps. Research made possible by ARDA, the NSA, and NSF.

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