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1D-1D Tunneling in Vertically Coupled Quantum Wires E. BIELEJEC, S. K. LYO, J. A. SEAMONS, J. L. RENO, M. P. LILLY, Sandia National Laboratories — We report tunneling measurements between two vertically coupled quantum wires in a GaAs/AlGaAs double quantum well structure with a 7.5 nm barrier. Split gates above and below the electron bilayer define each quantum wire and allow separately controlled 1D densities. Separate contacts are achieved with additional depletion gates. Parallel conductance as a function of split gate voltages provides a map of the 1D subband occupation; tunneling measurements can be made with any combination of subbands occupied in each wire. The full tunneling spectroscopy is measured using both a voltage between the wires and parallel magnetic field to explore the energy and momentum dependence of the tunneling. We observe a number of features, such as resonance peaks at high parallel magnetic fields, that can be explained within the framework of non- interacting 1D systems. These resonance features change in a systematic way as the number of occupied subbands changes. Other characteristics of the data such as very broad tunnel resonances as a function of the interwire voltage may require many-body interactions for a complete description of the tunneling physics. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04- 94AL85000.

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