Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Triangulating the source of tunneling resonances in a point contact with nanometer scale sensitivity N.C. BISHOP, Sandia National Labs, C. BORAS PINILLA, Universidad Industrial de Santander-Colombia, H.L. STALFORD, University of Oklahoma, R.W. YOUNG, G.A. TEN EYCK, J.R. WENDT, K. ENG, M.P. LILLY, M.S. CARROLL, Sandia National Labs — We observe resonant tunneling in split gate point contacts defined in a double gate enhancement mode Si-MOS device structure. We determine the capacitances from the resonant feature to each of the conducting gates and the source/drain two dimensional electron gas regions. In our device, these capacitances provide information about the resonance location in three dimensions. Semi-classical electrostatic simulations of capacitance, already used to map quantum dot size and position [Stalford et al., IEEE Nanotechnology], identify a combination of location and confinement potential size that satisfy our experimental observations. The sensitivity of simulation to position and size allow us to triangulate possible locations of the resonant level with nanometer resolution. We discuss our results and how they may apply to resonant tunneling through a single donor. This work was supported by the Laboratory Directed Research and Development program at Sandia National Laboratories. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000.

N.C. Bishop
Sandia National Labs

Date submitted: 07 Dec 2010 Electronic form version 1.4