Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Calculated tunneling rates for single electron charging events in Vertical "Enhancement Mode" quantum dot devices. RICHARD ROSS, MARK GYURE, HRL Laboratories, LLC, CHRIS ANDERSON, Dep't of Mathematics, UCLA — We report on calculations of tunneling rates associated with single electron charging events in vertical "enhancement mode" quantum dot device structures. These devices consist of two vertically stacked quantum well layers. A pair of surface depletion gates define a Quantum Point Contact (QPC) and a single localized enhancement gate creates a quantum dot (QD) in the upper quantum well. Single electron charging events in this device occur via tunneling between the vertically separated QD and QPC states. Tunneling rates are computed using Fermi's Golden Rule based on numerical eigenstates derived from fully 3-dimensional self-consistent Poisson-Schroedinger calculations. The effects of coulomb interaction on the quantum dot states and hence tunneling rates will be considered. Additionally, a comparison of these numerical results with experimental estimates of tunneling rates derived from random telegraph signals will be presented.

Richard Ross

Date submitted: 04 Dec 2005 Electronic form version 1.4