Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Conductance and Transmittance of waves through a chaotic cavity (or, equivalently, quantum dot) results in regularization of tunneling rates LOUIS PECORA, DONG HO WU, CHRISTOPHER KIM, Naval Research Lab — Tunneling rates in closed, double well quantum or wave systems in two dimensions or higher are radically different between wells with classically regular or chaotic behavior [1]. Wells with regular dynamics have tunneling rates that fluctuate by several orders of magnitude as a function of energy or frequency. Wells with chaotic dynamics have fluctuations smaller than one order of magnitude (a regularization of the fluctuations). We examine a more realistic experimental system, a single well with two channels with tunneling barriers at their junctions with the wells. Former theories for conductance in quantum dots will not apply here. We developed a theory, which uses proper boundary conditions at the barriers and yields the scattering matrix. Results show that the transmission rates fluctuate by orders of magnitude in the regular-shaped well, but are greatly reduced (regularized) for the chaotic-shaped well. We will show experimental results that test these theoretical findings for microwave transmission through a chaotic-shaped cavity, which is made of copper and has two ports with tunneling barriers. [1] Chaos regularization of quantum tunneling rates, L. M. Pecora, H. Lee, D-H. Wu, T. Antonsen, M-J. Lee, and E. Ott, Phys. Rev. E 83, 065201(R) (2011)

Louis Pecora
Naval Research Lab

Date submitted: 04 Nov 2015 Electronic form version 1.4