



Counting Electrons One-by-One: Single Gate Ratchet Good and Bad

Neil Zimmerman
NIST, USA

Counting electrons one by one in a single-electron quantum dot is pretty cool. I will start with a discussion of the SI System of Units and the relevance of single electron charge pumps as current standards, discuss the Coulomb blockade physics and single electron charge pumps, and then discuss our empirical results on single-gate and two-gate pumping modes. The appearance of quantized plateaus in the two gate modes but not in the single gate mode leads us to discussing various mechanisms and theoretical models for this result, and finally using the results of those models to suggest ways that we and others can get more robust single gate pumping in the future.

Bio

Neil Zimmerman earned a PhD in physics from Cornell University (New York State, USA) in 1989, worked as a postdoc at Bell Laboratories, and since 1994 has worked at NIST. His research has mostly entailed using single electron devices for both electrical metrology (standards of current) and quantum information.