Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Non-uniform position measurements JONATHAN MACKRORY, University of Oregon, KURT JACOBS, University of Massachusetts, Boston, DANIEL STECK, University of Oregon — We present a generalization of the standard treatment of continuous position measurements. In our formulation the measurement strength can vary in space, as would be the case in any physical realization of a continuous position measurement. We start from the Positive Operator Valued Measure that realizes a generalized position measurement, and use that to construct quantum trajectories for an atom's motion. This measurement could be experimentally realized by coupling an atom to an optical field and monitoring the scattered radiation. In particular, we consider the case of a free particle incident on a measurement function. The results of our numerical simulations are presented, with a focus on the case of a step measurement function. In general, the particle can either reflect off the measurement, or be detected and transmit past the step. We find that for large measurement strengths there is a high probability for the particle to reflect coherently off of the measurement, an effect analogous to the quantum Zeno effect.

Daniel Steck
University of Oregon

Date submitted: 22 Jan 2010 Electronic form version 1.4