Building a Quantum Trajectory Selector for Studying Strong Field Physics

L F DiMauro[1]

[1] *Physics, Ohio State University, Columbus OH, USA*
Contact Email: dimauro@mps.ohio-state.edu

Nearly thirty years ago, a simple and intuitive unified view of intense laser-atom interactions was introduced. The model is based on a semi-classical description where a bound electron is tunnel ionized by the strong optical field, followed by propagation under the influence of the strong field and finally driven back to interact with the core. This simple view has become known as the three-step or rescattering model and is responsible for the production of high energy electron and photons, multiple ionization and the formation of attosecond light pulses. The coherent process is started by the initial step of tunnel ionization which defines the physical observables for steps (2) and (3).

Feynman has taught us that the outcome of a quantum process is dictated by the sum over all the quantum trajectories that contribute to it. Naturally, when analyzing experiments, we often refer to these individual trajectories even though they have not been measured individually. In this talk we will describe a fully functioning Quantum Trajectory Selector (QTS) which allows us to directly measure the outcome of "single" trajectories that summed together make up a quantum process. Our QTS operates in the strong field domain, where the simple semiclassical model described above is ubiquitously used to describe individual quantum trajectories.