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Computing Rydberg Electron Transport Rates Using Periodic Orbits SULIMON SATTARI, KEVIN MITCHEL, Univ of California - Merced —
Electron transport rates in chaotic atomic systems are computable from classical periodic orbits. This technique allows for replacing a Monte Carlo simulation launching millions of orbits with a sum over tens or hundreds of properly chosen periodic orbits using a formula called the spectral determiant. A firm grasp of the structure of the periodic orbits is required to obtain accurate transport rates. We apply a technique called homotopic lobe dynamics (HLD) to understand the structure of periodic orbits to compute the ionization rate in a classically chaotic atomic system, namely the hydrogen atom in strong parallel electric and magnetic fields. HLD uses information encoded in the intersections of stable and unstable manifolds of a few orbits to compute relevant periodic orbits in the system. All unstable periodic orbits are computed up to a given period, and the ionization rate computed from periodic orbits converges exponentially to the true value as a function of the period used. Using periodic orbit continuation, the ionization rate is computed over a range of electron energy and magnetic field values. The future goal of this work is to semiclassically compute quantum resonances using periodic orbits.

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