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Title: Scattering maps for the CP problem: hydrogen atom in a circularly polarized microwave field

Consider the Rydberg electron in a circularly polarized microwave field, the dynamics of which is described by a 2 d.o.f. Hamiltonian depending on a parameter $K > 0$, which is a perturbation of the standard Kepler problem. The associated Hamiltonian system has two equilibria: L1 (center-saddle for all K) and L2 (center-center for small K and complex-saddle otherwise). Associated with L1 there is a family of Lyapunov periodic orbits that form a normally hyperbolic invariant manifold (NHIM). In this talk, we compute the primary transverse homoclinic orbits to the NHIM (and therefore the associated scattering maps) by combining numerical methods with Poincaré-Melnikov methods. It should be noted that the transversality of these homoclinic orbits is exponentially small in K (by analogy with the L3 libration point of the R3BP). This is a first step in studying the EP (elliptically polarized microwave) problem which has 3 degrees of freedom, where Arnold diffusion can take place.

This is a joint work with Mercè Ollé and Juan R. Pacha (Universitat Politècnica de Catalunya).