

Dynamical Systems Tools for the study of hydrogen atom in a circularly polarized microwave

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We consider the problem of the hydrogen atom interacting with a circularly polarized microwave field.

A remarkable feature of this system is that the electron can follow an erratic orbit before ionizing, so that the electron makes multiple large distance excursions from the nucleus, with each excursion being followed by a close approach to the nucleus.

The problem can be modeled as a perturbed Kepler problem. We use the standard Dynamical Systems tools that we apply in Celestial Mechanics problems to explain this kind of behavior and other important features of the problem.