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A Systematic Study of Quantum Defect Influences on Classical Orbit Probability MATTHEW LEN KEELER, University of MN - Morris — A collection of experimentally obtained spectra as a function of scaled energy can be used to generate a recurrence map, a map of orbit probability with scaled action and scaled energy being the independent variables. One promise of recurrence spectroscopy is to be able to interpret recurrence maps classically, with the recurrence strength being proportional to the classical orbit stability. A simple classical interpretation of such non-hydrogenic maps has thus far been limited because the orbit probability obtained in this manner also contains some quantum mechanical effects. Highly excited Stark spectra for the alkali metals and atoms with fictionalized quantum defects were calculated using standard matrix diagonalization techniques. From these, Stark maps were produced and orbit profiles were obtained. In this systematic numerical study, the effects of quantum defect on classical orbit probability and classical orbit stability are presented with careful consideration of initial launching angle distribution, oscillator strength and interference.

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