Universität Hamburg

iRyd

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Universität Hamburg
Seminarraum des
Zentrum für optische Quantentechnologien
Luruper Chaussee 149, Gebäude 69, 22761 Hamburg

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Effects of degenerate energy levels in long-range Rydberg molecules and doubly excited negative ions

Degenerate atomic energy levels, such as those in hydrogen (due to spherical symmetry and the conserved Runge-Lenz vector) and in excited, high angular momentum, states of other atomic species (due to their similarity to hydrogen) create an abundance of rich physics in few-body systems containing these atoms.
In this talk I will describe several areas in our research on Rydberg molecules and atomic negative ions where these (near) degeneracies are present and important. In Rydberg molecules formed out of non-alkali atoms, near degeneracies in different, interacting, Rydberg spectra lead to complex multichannel spectra, and in polyatomic Rydberg molecules the degeneracy of Rydberg states leads to non-additive geometry-dependent effects in their potential energy surfaces. This degeneracy also provides robust pathways to control the Rydberg electron via electric and magnetic field pulses. In atomic negative ions, these degeneracies create strong long-range interactions and electron correlation with major implications for the photodetachment cross sections and resonant behavior of these systems.