PHYSIKALISCHES KOLLOQUIUM

AM 13. JULI 2020 UM 17 UHR C.T.

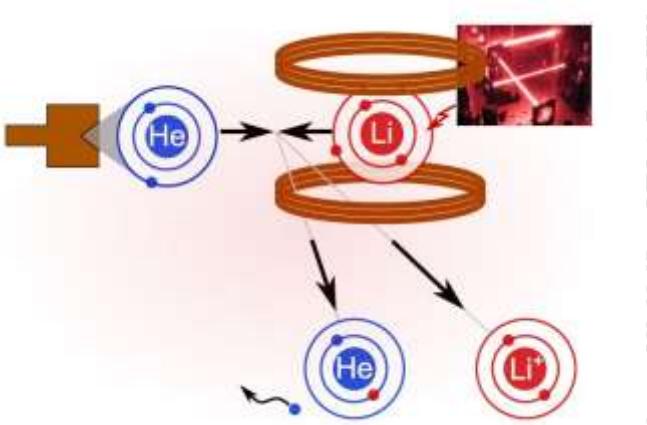
IM GROßEN HÖRSAAL und IM HÖRSAAL I (via Zoom)

(nur registrierte Teilnehmer)

& LIVESCHALTUNG VIA ZOOM

Zoom-Zugang: https://uni-freiburg.zoom.us/j/91820196030

Passwort: Habil1307



NEW AVENUES IN STUDYING AND CONTROLLING CHEMICAL REACTIONS AT THE QUANTUM LIMIT

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Besides the conventional means of chemical reaction control, e.g., through the change of temperature and pressure, the exploitation of quantum effects offers many further possibilities for influencing the outcome of chemical events. We are working on the active and passive control of autoionization processes, in which an atom or molecule is ionized by a species in a long-lived, electronically excited (metastable) state. In order to passively control such processes, we observe the change in product yield upon electronic and magnetic quantum state selection of both collision partners. Our experimental results for metastable He-Li collisions show that autoionization is efficiently suppressed by the conservation of both the total electron spin and Λ, i.e., the projection of the total molecular orbital angular momentum along the internuclear axis. Based on quantum-mechanical interference effects, reaction rates are also predicted to depend on the relative phase between the atomic wavefunctions. In a new experiment, we will realize this active, coherent reaction control protocol for the first time.