Beitrag ID: **39** Typ: **nicht angegeben**

External-field shifts in precision spectroscopy of hydrogen molecular ions

Dienstag, 16. September 2014 17:30 (1 Stunde)

High precision spectroscopy of trapped hydrogen molecular ions and their isotopomers opens room for new, improved-accuracy determination of fundamental constants such as the electron-to-proton and electron-to-deuteron mass ratio, the fine structure constant etc., and of their time variability. In order to understand the likely experimental uncertainties due to residual external magnetic and electric fields, we have evaluated the Zeeman and the static dipole and quadrupole Stark shift and the black-body shift of the transition frequencies between low-lying rovibrational states of the molecular ions HD+ and H2+.
By using a generalized effective Hamiltonian we express the results of the numerical calculations by a few coefficients of the effective Hamiltonian for each ro-vibrational state. This then allows obtaining the systematic shift of the typically large number of individual hyperfine components of a rovibrational transition by angular momentum algebra.
Our calculations allowed the identification of hyperfine components of rovibrational transitions with particularly low sensitivity to external field effects. Moreover, we have generated "composite frequencies", in which the overall Zeeman and Stark shifts are nulled. This permits, in principle, to reduce the experimental inaccuracy by 1-2 orders of magnitude.

Autor: BAKALOV, Dimitar (Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of sciences, Sofia 1784, Bulgaria)

Co-Autoren: SCHILLER, Stephna (Institut fuer Experimentalphysik, Heinrich-Heine-Universitat Duesseldorf, D-40225 Duesseldorf, Germany); KOROBOV, Vladimir I. (Bogolyubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research, Dubna 141980,)

Vortragende(r): BAKALOV, Dimitar (Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of sciences, Sofia 1784, Bulgaria)

Sitzung Einordnung: Poster