Contribution ID: **20**   Type: **not specified**

Nuclear polarizability effects in muonic deuterium

Friday, 16 October 2015 09:45 (45 minutes)

The nuclear charge radius can be
determined from spectroscopic measurements in muonic atoms, provided
the atomic structure is well known and the influence of
nuclear excitation on atomic levels is properly accounted
for. The latter is problematic due to the difficulty in solving quantum chromodynamics in low energy scale.
We perform calculations in perturbative approach by the expansion
in ratio of the nuclear excitation energy over the muon mass. We pay special attention on the nuclear mass
dependence and separation of the so-called pure recoil corrections.
We aimed to
calculate the nuclear effects as accurately as possible, in order to extract
precise nuclear charge radii from the muonic atom
spectroscopy.
Numerical results for muonic deuterium is obtained
by using the AV18 potential with the help of a discrete
variable representation method for solving the
Schroedinger equation.
The obtained result for the 2P-2S transition serves for determination of the nuclear charge radius from the
spectroscopic measurement in muonic deuterium.

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Session Classification: Atomic systems