

Nuclear polarizability effects in muonic deuterium

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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 Schrodinger equation. The obtained result for the 2P-2S transition of 1.717(20) meV serves for determination of the nuclear charge radius from the spectroscopic measurement in muonic deuterium.

References

[1] K. Pachucki, A. Wienczek Phys. Rev. A **91**, 040503(R)