

The Hebrew University of Jerusalem , Special Nuclear Physics Seminar

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"Nuclear Structure in Light Muonic Atoms"

The most precise determination of the proton charge radius, from a novel muonic hydrogen ($\mu^1\text{H}$) spectroscopy experiment [1], disagrees with previous spectroscopy and scattering experiments done with electrons. The 7σ discrepancy between the muonic and electronic values, known as the “proton radius puzzle”, may be the result of some new physics [2]. In order to investigate this, experiments with other muonic atoms are being conducted [3]. These experiments must rely on accurate theoretical predictions. In particular, their precision is ultimately limited by the nuclear structure terms. We have calculated these terms for several light nuclei using state-of-the-art nuclear potentials, significantly improving previous estimates [4]. Results for the $A=2,3,4$ nuclei will be presented and discussed.

[1] R. Pohl, et al., Nature (London) 466 , 213 (2010).

[2] R. Pohl, R. Gilman, G. A. Miller, and K. Pachucki, Ann. Rev. of Nucl. and Part. Sci. 63, 175 (2013).

[3] A. Antognini et al. Can. J. Phys. 89, 47 (2011).

[4] C. Ji, NND, S. Bacca, and N. Barnea, Phys. Rev. Lett. 111, 143402 (2013).