# Fundamental characteristics of elementary particles and spectroscopy of light exotic atoms

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Precision spectroscopy of light exotic atoms can provide information on the fundamental characteristics of elementary particles that is hard to obtain by other methods. The important examples of antiprotonic helium and muonic hydrogen atoms will be discussed in details. We show [1] that measurements of the wavelength of transitions between appropriately selected levels of the hyperfine structure of antiprotonic helium metastable states with the existing experimental techniques [2] can reduce the uncertainty of the current value of the magnetic moment of the antiproton $\mu_{\bar{p}}$ (presently known to 0.3% [3]) by an order of magnitude. Also discussed is a modification of the triple resonance experimental method [2] which could further reduce the experimental error of $\mu_{\bar{p}}$ by an other order of magnitude.

We also consider the possibility of extracting the value of the Zemach radius of the proton [4] from a measurement of the hyperfine splitting of the energy level of the ground state of the muonic hydrogen atom [5], a matter of significant interest in view of the disagreement between the values extracted by different groups [6, 7, 8] from the hyperfine splitting in the ground state of ordinary hydrogen. An experimental method for this measurement is outlined [9], based on particular characteristics of the diffusion of muonic hydrogen atoms in a mixture of hydrogen and appropriate heavier gases [10, 11, 12].

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