Contribution ID: **135** Type: **Poster**

Lamb shift in muonic helium

Tuesday, 12 October 2010 17:00 (2 hours)

for the CREMA collaboration

In order to shed some light on the observed proton radius discrepancy we plan to measure several 2S-2P transitions in muonic helium ions (mu4He+ a nd mu3He+). The aim of this measurement is three-fold: first it will verify the correctness of the muHe+ Lamb shifts prediction (using the nuclear radii from electron scattering). This will serve as validation of muonic bound-state QED theory. Second, if the muHe+ theory is assumed to be correct, the alpha-particle and the helion rms charge radii can be determined. These radii are relevant parameters for the verification of few-nucleon theories and potentials. Third, combined with an ongoing experiment at MPQ aiming to measure the 1S-2S transition frequency in He+, these measurements will open the way to test interesting bound-state QED terms in He+. The B60 term for example could be checked to 5 relative accuracy i.e., five times better than in hydrogen.

The contribution of the finite size effect to the Lamb shift in muHe+ is as high as 20%. Therefore a measurement of the transition frequencies with a precision of 50 ppm (corresponding to 1/20 of the natural linewidth which is 320 GHz) will provide rms nuclear charge radii with ur=3x104 (equivalent to 0.0005 fm). This is limited by the nuclear polarizability contribution

Primary author: ANTOGNINI, Aldo (ETH - Zurich)

Presenter: ANTOGNINI, Aldo (ETH - Zurich)

Session Classification: Poster Session