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Understanding the "Proton Radius Puzzle": Nuclear Polarizability Correction in μD[1] OSCAR J. HERNANDEZ, TRIUMF, Univ of British Columbia, NIR NEVO DINUR, TRIUMF, CHEN JI, ECT*,INFN, SONIA BACCA, TRIUMF, The Univ of Manitoba, NIR BARNEA, Racah Inst. of Physics — The accuracy of the proton radius was improved ten-fold by new spectroscopic measurements in muonic hydrogen [1] but it differs by 7σ from hydrogen determinations. This discrepancy, has been coined the "proton radius puzzle". The results of new high-precision experiments on muonic deuterium indicate a new deuterium radius puzzle [2]. The accuracy of the nuclear charge radius determination from these measurements is limited by the uncertainty in the nuclear structure effects. We have calculated this correction in Ref. [3] including the first estimate of the nuclear-model dependence. Due to the importance of constraining the uncertainty, we will determine the statistical and systematic uncertainties of the χEFT potentials by determining the co-variance matrices of our predictions. I will also discuss an alternate method that may reduce the theoretical uncertainty.
[1] R. Pohl *et al.*, Nature 466, 213 (2010).
[2] R. Pohl *et al.*, to appear; ECT* workshop, June 20-24 (2016).
[3] O.J. Hernandez, *et al.*, Phys. Lett. B (2014).

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