Revisiting proton finite-size corrections in (muonic) hydrogen

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In this talk, I would like to discuss the proton finite-size corrections to the Lamb shift and hyperfine splitting of (muonic) hydrogen. A re-analysis of the $(Z\alpha)^5$ corrections, based on electron-proton scattering data, is presented, discussing limitations of the scattering data and in the finite-size expansion. Furthermore, we point out that the recent lattice-QCD evaluation of the Compton scattering subtraction function [1] needs to include an additional finite-size correction in order to provide a prediction of the total proton two-photon-exchange contribution.

References

[1] Y. Fu, X. Feng, L. C. Jin, C. Liu and S. D. Wen, Phys. Rev. Lett. **134** (2025) no.7, 071903.