Hadronic Contributions to New Physics Searches



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Extractions of the proton and deuteron charge radii from scattering experiments

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Summary

Over the past half-century, the RMS charge radii of the proton and deuteron have been determined using elastic electron scattering or Lamb shifts in ordinary and muonic hydrogen. The discrepancies between the quoted radii from these three methods suggest that either some of the data are in error, or new physics governs the muonic interaction. My colleagues and I have reexamined previous scattering measurements and find them to be consistent with the muonic Lamb shift results. Nevertheless, the largest theoretical uncertainties in atomic measurements come from the nuclear polarizability terms in hyperfine splittings, which depend on nuclear form factors and structure functions. Hence, precise nuclear and atomic physics experiments remain interdependent.

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Session Classification: Proton charge-radius puzzle