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Model independent extraction of the proton magnetic radius from electron scattering

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For several years now, we are facing the proton electric radius puzzle, namely, the 5 standard deviation difference between the electric radius as extracted from muonic hydrogen and the electric radius as extracted from regular hydrogen. The origin of the discrepancy is unknown, and could possibly point towards new interactions that do not respect lepton universality.

An equally fundamental property of the proton is its magnetic radius. The magnetic radius of the proton can be extracted from electron-proton scattering data. Surprisingly, different extractions are not consistent either. The particle data book lists three extractions that range from 0.78 fm to 0.88 fm with an uncertainty of 0.02 fm. Are we facing also a proton magnetic radius puzzle?

A major problem in extracting the radius from scattering data is how to avoid model-dependent assumptions about the functional form of the magnetic form factor. In this talk I will describe a model-independent analysis of scattering data aimed at extracting a reliable value of the magnetic radius of the proton.

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