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Model Independent Analysis of the Proton Magnetic Radius

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The Proton is a fundamental constituent of matter. In contrast to other fundamental particles like the electron, it is an extended object and has a finite size that can be inferred with some degree of accuracy from several measurements. The electric radius can be extracted from electron-proton scattering experiments,(r_Eˆp=0.871±0.009 fm) and Lamb shift in Muonic Hydrogen (r_Eˆp=0.84184±0.0006 fm). The reason for the discrepancy between these values is still unknown. In the literature there also exist several values of the proton magnetic radius extracted using several model-dependent methods. We use constraints from the analytic behavior of the form factors to determine the proton magnetic radius in a model-independent way. Using existing datasets of electron-proton scattering we find r_Mˆp=0.91(-0.06)ˆ(+0.03)±0.02 fm. *When we include electron-neutron scattering data and pion data, we find r_Mˆp=0.87*(-0.05)ˆ(+0.04)±0.01 fm and r_Mˆp=0.87*(-0.02)ˆ(+0.02) fm respectively. We also extracted the neutron magnetic radius as r_Mˆn=0.89*(-0.03)ˆ(+0.03) fm combining all three datasets.

Oral or Poster Presentation

Oral

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