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Nucleon-Sigma-Terms from Lattice QCD

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The nucleon-sigma-terms are measures of the light-quark- and strange-quark-content of the nucleon. Especially the strangeness-content is of significant interest for dark-matter searches, as it determines the coupling of several dark matter candidates to hadronic matter. While the sigma-terms can not be measured directly they can be determined via lattice QCD from first principles.

The sigma-terms are related to the light- and strange-quark mass dependence of the nucleon mass by the Feynman-Hellmann-theorem. To measure this dependence we used $N_f = 1 + 1 + 1 + 1$ ensembles generated with tree-level improved Symanzik gauge action and tree-level improved clover Wilson fermions with three levels of HEX smearing at four values of the lattice spacing.

Primary author: Mr VARNHORST, Lukas (Wuppertal University)

Presenter: Mr VARNHORST, Lukas (Wuppertal University)

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