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Gravitational form factors of the proton

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Hadronic matrix elements of the QCD energy-momentum tensor can be parametrized in terms of gravitational form factors (GFFs) which, through their dependence on momentum transfer and decomposition into quark and glue contributions, encode information about the distributions of energy, angular momentum, pressure, and shear forces within a hadron spatially and amongst its constituents. We report on the progress of an ongoing program to determine the GFFs of the physical proton with full control over uncertainties and including both quark and glue contributions, providing first-principles predictions of the physical energy, spin, pressure, and shear densities. To this end, we present preliminary results of a calculation using Wilson fermions on an ensemble with a close-to-physical pion mass of 170 MeV.

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