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Gravitational Form Factors for Hadrons of Different Spins

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The gravitational form factors (GFFs) of hadrons are the form factors of the energy momentum tensor of QCD, which quantifies how the energy, spin and mechanical properties are distributed within hadrons and how they split between the quark and gluon degrees of freedom. We use the Belifante-Rosenfeld prescription in a Lattice QCD calculation with pion mass $m_\pi = 450$ MeV to measure the symmetric traceless gluon GFFs for hadrons of spin 0, 1/2, 1 and 3/2 (pion, nucleon, rho meson and delta baryon) for Mandelstam t in the spacelike region of $0 \leq -t < 2$ GeV^2. By fitting the normalized GFFs using different functional forms, we extract partial gluonic contributions to the energy, pressure and shear force densities of the hadrons in the 3D and 2D Breit frames as well as in the infinite momentum frame. We also obtain estimates for their partial gluonic mass and mechanical radii.

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