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Gravitational form factors on the light-front

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We investigate the gravitational form factors of a strongly coupled scalar theory in the light-front Hamiltonian approach. The theory can be used to mimic the interaction between the nucleon and the pion. We renormalize the energy-momentum tensor with a Fock sector-dependent scheme. We futher analyze the hadron matrix elements of the energy-momentum tensor and identify three "good currents"to be used to extract the physical form factors. We show that these currents are free of spurious contributions and are consistent with the covariant perturbation theory in the perturbative limit. We present the gravitational form factors of the nucleon within a Fock space up to three particles (one nucleon plus two pions). The extracted form factors obey known sum rules, including the von Laue condition. Based on the investigation of the scalar theory, we propose a systematic non-perturbative wave function representation of the gravitational form factors, which is then applied to various systems, e.g. the pion and charmonium.

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