Contribution ID: **294**   Type: **Parallel talk**

Twist-four gravitational form factor $\bar{C}_{q,g}$ at NNLO QCD from trace anomaly constraints

Tuesday 28 March 2023 17:50 (20 minutes)

It is known that the trace anomaly in the QCD energy-momentum tensor $T^{\mu\nu}$ can be attributed to the anomalies for each of the gauge-invariant quark part and gluon part of $T^{\mu\nu}$, and their explicit three-loop formulas have been derived in the $\overline{\text{MS}}$ scheme in the dimensional regularization. The matrix elements of this quark/gluon decomposition of the QCD trace anomaly allow us to derive the QCD constraints on the hadron's gravitational form factors, in particular, on the twist-four gravitational form factors, $\bar{C}_{q,g}$. Using the three-loop quark/gluon trace anomaly formulas, we calculate the forward (zero momentum transfer) value of the twist-four gravitational form factors $\bar{C}_{q,g}$ at the NNLO accuracy. We present quantitative results for nucleon as well as for pion, leading to a model-independent determination of the forward value of $\bar{C}_{q,g}$. We find quite different pattern in the obtained results between the nucleon and the pion. In particular, for the nucleon, the present information from experiment and lattice QCD on the nonperturbative matrix elements arising in our NNLO formula allows us to obtain a prediction of the forward value of $\bar{C}_{q,g}$ at the accuracy of a few percent level. This talk is based on arXiv:2209.14367 and a new preprint which will appear in arXiv in a few days.

Submitted on behalf of a Collaboration?

No

Participate in poster competition?

Primary author: TANAKA, Kazuhiro

Presenter: TANAKA, Kazuhiro

Session Classification: WG5

Track Classification: WG5: Spin and 3D Structure