Contribution ID: **52** Type: **Theory**

Tensor mesons in holographic QCD and their contribution to the muon g-2

Tuesday 11 February 2025 12:15 (20 minutes)

The hadronic light-by-light contribution to the muon $g-2$ contains contributions from intermediate massive spin 2 particles, i.e. tensor mesons.

We use holographic models of QCD (hQCD) to calculate masses, decay constants and transition form factors (TFFs) of tensor mesons and compare them to experimental data. These tensor meson TFFs may be decomposed into 5 Lorentz structures $T_i^{\mu\nu\alpha\beta}$ and structure functions $\mathcal{F}_i$. Compared to previous phenomenological analyses (with the so called quark-model) which only use $\mathcal{F}_1$, a second structure function $\mathcal{F}_3$ appears in hQCD due to 5-dimensional covariance.

In the comparison to the (singly-virtual) helicity data from BELLE of the $f_2(1270)$ the hQCD model fares much better than the quark-model.
The pole contribution to the $g-2$ of 2.40×10^{-11} is of the same magnitude as in the quark-model, but due to the additional structure function $\mathcal{F}_3$ (which only plays a role in doubly virtual observables) *is of the opposite sign.*

This puts into question some proposed error bands for tensor contributions in the literature and calls for more sophisticated phenomenological models including $\mathcal{F}_3$.
We also present full pole+non-pole evaluations in hQCD which go beyond the dispersive formalism and allow for a summation over infinitely many tensor mesons. In this full evaluation additional "trace terms" appear in the tensor-$\gamma\gamma$ vertex which disappear in the dispersive approach since they only contribute off-shell.

Surprisingly the holographic tensor meson tower contributes to the symmetric longitudinal short distance constraint (SDC), but not to the Melnikov-Vainshtein constraint. The total contribution of axials and tensors now comes remarkably close to fulfilling the symmetric SCD exactly, further strenghening hQCD models.

Authors: Prof. REBHAN, Anton; MAGER, Jonas (TU Wien); LEUTGEB, Josef; CAPPIELLO, Luigi

Presenter: MAGER, Jonas (TU Wien)

Session Classification: Talks - Tuesday