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Status update: $\pi^0 \rightarrow \gamma^* \gamma^*$ transition form factor on CLS ensembles

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We present the status of the Mainz group's lattice QCD calculation of the transition form factor $\mathcal{F}_{\pi^0 \gamma^* \gamma^*}$, which describes the interaction of an on-shell pion with two off-shell photons. This form factor is the main ingredient in the calculation of the pion-pole contribution to hadronic light-by-light scattering in the muon $g - 2$, $a^{\text{HLbL}; \pi^0}$.

We use the $N_f = 2 + 1$ CLS gauge ensembles, and we update our previous work by including a physical pion mass ensemble (E250). We compute the transition form factor in a moving frame as well as in the pion rest frame in order to have access to a wider range of photon virtualities. In addition to the quark-line connected correlator we also compute the quark-line disconnected diagrams that contribute to the form factor.

At the final stage of the analysis, the result on E250 will be combined with the previous work published in 2019 to extrapolate the form factor to the continuum and to physical quark masses.

Topical area

Structure of Hadrons and Nuclei

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