Light Cone 2021: Physics of Hadrons on the Light Front



Contribution ID: 90

Type: Contributed talk

Pion to photon transition form factors with basis light-front quantization

Wednesday 1 December 2021 15:10 (20 minutes)

We obtain the distribution amplitude (DA) of the pion from its light-front wave functions in the basis light-front quantization framework. This light-front wave function of the pion is given by the lowest eigenvector of a light-front effective Hamiltonian consisting a three-dimensional confinement potential and the color singlet Nambu–Jona-Lasinion interaction both between the constituent quark and antiquark. The quantum chromodynamics (QCD) evolution of the DA is subsequently given by the perturbative Efremov-Radyushkin-Brodsky-Lepage evolution equation. Based on this DA, we then evaluate the singly and doubly virtual transition form factors in the space-like region for $\pi^0 \rightarrow \gamma^* \gamma$ and $\pi^0 \rightarrow \gamma^* \gamma^*$ processes using the hard-scattering formalism. Our prediction for the pion-photon transition form factor agrees well with data reported by the Belle Collaboration. However, in the large Q^2 region it deviates from the rapid growth reported by the BaBar Collaboration. Meanwhile, our result on the $\pi^0 \rightarrow \gamma^* \gamma^*$ transition form factor is also consistent with other theoretical approaches and agrees with the scaling behavior predicted by perturbative QCD.

Authors: MONDAL, Chandan (Institute of Modern Physics, Chinese Academy of Sciences); NAIR, Sreeraj; JIA, Shaoyang (Argonne National Laboratory); ZHAO, Xingbo; VARY, James

Presenter: MONDAL, Chandan (Institute of Modern Physics, Chinese Academy of Sciences)

Session Classification: Parallel Session