Dr. Tomas Husek (Valencia U., IFIC)

Radiative corrections and form factors in Dalitz decays of π^0, $\eta^{(\prime)}$ and Σ^0

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Abstract

I summarize current experimental and theoretical results on the two important processes of low-energy hadron physics involving neutral pions: the rare decay $\pi^0\to e^+e^-$ and the Dalitz decay $\pi^0\to e^+e^-\gamma$. The two-hadron-saturation (THS) scenario for the PVV correlator is presented. Related to the neutral-pion Dalitz decay, a new conservative value for the ratio $R=\Gamma(\pi^0\to e^+e^-\gamma(\gamma))/\Gamma(\pi^0\to\gamma\gamma)=11.978(6)\times10^{-3}$, which is by two orders of magnitude more precise than the current PDG average, is provided. Furthermore, I present the radiative corrections for the Dalitz decays $\eta^{(\prime)}\to\ell^+\ell^-\gamma$ beyond the soft-photon approximation, which inevitably depend on the $\eta^{(\prime)}\to\gamma^*\gamma^{(*)}$ transition form factors. Finally, the NLO QED (inclusive) radiative corrections to the Dalitz plot of the $\Sigma^0\to\Lambda e^+e^-$ decay are discussed.