

XVth Quark Confinement and the Hadron Spectrum



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Radiative modes $K^+ \rightarrow \pi^+ \gamma^* \gamma^{(*)}$ and $K^+ \rightarrow \pi^+ \ell^+ \ell^- (\gamma)$ decays

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The rare radiative $K^+ \rightarrow \pi^+ \ell^+ \ell^-$ decays ($\ell = e, \mu$) provide experimental access to the $K^+ \rightarrow \pi^+ \gamma^*$ transition. The relevant form factor is conventionally written in terms of two hadronic parameters, a_+ and b_+ , which are being measured by NA62 in both electron and muon channels. Comparing the two channels allows for a stringent test of lepton-flavor universality. However, appropriate experimental analysis requires adequate theory inputs: Although the $K^+ \rightarrow \pi^+ \gamma^*$ conversion has been studied extensively, radiative corrections involve the $K^+ \rightarrow \pi^+ \gamma^* \gamma^{(*)}$ transitions (with up to two virtual photons), not fully addressed in the literature. At the same time, the $K^+ \rightarrow \pi^+ \gamma^* \gamma^*$ transition is essential for the description of the $K^+ \rightarrow \pi^+ e^+ e^- \ell^+ \ell^-$ decays, which represent a background to new-physics searches.

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