

# Radiative corrections for $K^+ \rightarrow \pi^+ \ell^+ \ell^-$ decays revisited

*Saturday 20 July 2024 12:00 (15 minutes)*

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.

## Alternate track

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Yes

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