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QCD axion EFT under the loop

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The low-energy phenomenology of the QCD axion is usually studied in a model-independent way using an effective Lagrangian. However, one-loop processes that exhibit logarithmic divergencies are sensitive to the high-energy completion of each specific model. This is extremely important for some axion searches, like the ones conducted at Kaon facilities such as NA62 that aim to look for the rare decay $K \to \pi + a$. After showing that the rate predicted by the EFT for this process is not applicable to the popular KSVZ and DFSZ axions, we construct a new QCD axion model that successfully maps to the EFT at one loop. As a consequence, we argue that NA62 has the potential to probe untested QCD axion parameter space in the ~ 0.1 eV region.

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