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Axion production in $\eta \to \pi\pi a$ decay

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The axion-like particle (ALP) production from the $\eta \to \pi\pi a$ decay is studied within the SU(3) chiral perturbation theory up to one-loop level. The unitarized decay amplitudes are also constructed to take into account the $\pi\pi$ final-state interactions. Detail analyses between the perturbative amplitudes and the unitarized ones are given in the phenomenological discussions. By taking the values of the chiral low energy constants in literature, we predict the Dalitz distributions, the spectra of the $\pi\pi$ and $a\pi$ systems, and also the branching ratios of the $\eta \to \pi\pi a$ process by varying m_a from zero to $m_\eta - 2m_\pi$.

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