

Probing charged lepton flavor violation with axion-like particles at Belle II

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We study charged lepton flavor violation associated with a light leptophilic axion-like particle (ALP), X , at the B -factory experiment Belle II.

We focus on production of the ALP in the tau decays $\tau \rightarrow Xl$ with $l = e, \mu$, followed by its decay via $X \rightarrow l^-l^+$.

The ALP can be either promptly decaying or long-lived.

We perform Monte-Carlo simulations, recasting a prompt search at Belle for lepton-flavor-violating τ decays, and propose a displaced-vertex (DV) search. For both types of searches, we derive the Belle II sensitivity reaches in both the product of branching fractions and the ALP coupling constants, as functions of the ALP mass and lifetime.

The results show that the DV search exceeds the sensitivity reach of the prompt search to the relevant branching fractions by up to about a factor of 40 in the long decay length regime.

What is your topic?

Physics beyond the Standard Model

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