

# Probing lepton-flavor-violating processes in $e^+e^-$ colliders

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Scenario with a lepton-flavor-violating (LFV) interaction, either due to LFV coupling of a scalar or a vector boson, is an intriguing BSM phenomenon. This LFV coupling in the presence of muons leads to a rich phenomenology including an extra contribution to muon anomalous magnetic moment. With the low-energy effective coupling  $calL_{\phi e\mu} = \phi\bar{e}(g_{e\mu} + h_{e\mu}\gamma^5)\mu + \text{h.c.}$ , which turns  $e$  into  $\mu$  or vice versa through a scalar  $\phi$ , we first derive  $(h_{e\mu}, M_\phi)$  parameter space that can account for experimental measurements of  $g_\mu - 2$ . We propose to probe such parameter space or that with an even smaller  $h_{e\mu}$  by searching for background-free processes of same-sign, same-flavor final-state lepton pairs  $e^+e^- \rightarrow e^\pm\mu^\mp\phi \rightarrow e^\pm e^\pm\mu^\mp\mu^\mp$  at Belle II. Assuming such final states are detected by Belle II, we propose an effective method to further discriminate between scalar and vector boson mediated LFV interaction scenario.

## Alternate track

1. Quark and Lepton Flavour Physics

## I read the instructions above

Yes

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