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Indirect searches for sterile neutrinos at a high-luminosity Z-factory

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A future high-luminosity Z-factory will offer the possibility to study rare Z decays, as those leading to lepton flavour violating final states. Processes such as $Z \longrightarrow l^{\mp}1\ l^{\pm}2$ are potentially complementary to low-energy (high-intensity) observables of lepton flavour violation. We address the impact of new sterile fermions on lepton flavour violating Z decays, focusing on potential searches at FCC-ee (TLEP), and taking into account experimental and observational constraints on the sterile states. We consider a minimal extension of the Standard Model by one sterile fermion state, and one well-motivated framework of neutrino mass generation, the Inverse Seesaw embedded into the Standard Model. The results show that sterile neutrinos can give rise to contributions to BR($Z \longrightarrow l^{\mp}1\ l^{\pm}2$) within reach of the FCC-ee. We also discuss the complementarity between a high-luminosity Z-factory and low-energy charged lepton flavour violation facilities.

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