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Correlating lepton flavour violating b->s and leptonic decay modes in a minimal abelian extension of the Standard Model

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An abelian extension of the Standard Model (SM) based on the introduction of a new abelian gauge group $U(1)'$ is considered, with the corresponding neutral gauge boson Z' having flavour violating couplings to quarks and leptons. The fermion content is the same as in the SM, except for the addition of three right-handed neutrinos. The model, proposed by Aebischer, Buras, Cerdà-Sevilla and De Fazio, describes the couplings of Z' to fermions in terms of three rational parameters $\epsilon_{1,2,3}$ that sum to zero when imposing the cancellation of gauge anomalies. Each ϵ_i is common to all fermions of a given generation, a feature producing correlations among quark and lepton observables.
Within this framework, I investigated $b \to s\ell_1^-\ell_2^+$ transitions, both in the lepton flavour conserving case ($\ell_1 = \ell_2$) and in the lepton flavour violating case ($\ell_1 \neq \ell_2$). In the former, small deviations from SM predictions were found, reflecting a feature of the model in which quark and lepton sectors prevent each other to manifest large discrepancies with respect to SM.
Additionally, I studied the correlations between rare B and B_s decays and the leptonic processes $\tau^- \to \mu^-\mu^+\mu^-$, $\mu^- \to e^-\gamma$, $\mu^- \to e^-e^+e^-$ and $\mu^- \to e^-$ conversion in nuclei. The conducted analysis shows that the current experimental upper bounds on these channels play an increasingly important role in constraining the branching ratios of lepton flavor violating B and B_s decays. In particular, the bound on $\tau^- \to \mu^-\mu^+\mu^-$ does not impose any significant restriction, whereas the other three channels set progressively more stringent limits.

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