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Exploring New Physics Signatures in an Alternative Left-Right Model

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Left-Right (LR) theories are one of the successful beyond Standard Model (SM) frameworks that explain the origin of small neutrino masses and low-energy weak parity violation. However, the conventional LR theory faces a challenge due to the presence of flavor changing neutral currents (FCNCs). To address this, we have studied an Alternative LR model (ALRM), which avoids FCNC constraints. Our study shows that ALRM has distinct new physics signatures compared to conventional LR symmetric models in $0\nu\beta\beta$ decay and leptogenesis. Specifically, we show that the vector-scalar mediated diagrams contribute significantly in $0\nu\beta\beta$ while the small Dirac CP-phase in the right handed neutrino sector can saturate the current BAU bound. Additionally, our model predicts dark matter candidates stabilised by an R-parity, similar to supersymmetry.

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