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Constraining New Physics with Possible DM Signatures from the Study of Low Energy Processes

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We constrain the parameter space of a simplified fermionic dark matter model with a spin-0 mediator from low energy processes. FCNC observables like neutral pseudoscalar meson mixing, rare decays of B_0 , B_s^0 , Kmeson, global fit of all the $b \rightarrow s\ell\ell$ observables, invisible decays of B and K meson are considered along with FCCC observables like $t \rightarrow bW_{\mu}$ anomalous coupling. Other processes like W-mass anomaly given by CDF(2022) and various observables from Z-pole will also contribute to constrain the SM-mediator couplings. All the processes consdided will come in this model via penguin loop diagram. Depending on the mass of the mediator, model is studied for high mass region $M_S \geq 100 GeV$ and low mass region ($M_S \leq 10 GeV$) since different observables give significant bound for different regions. We also studied the DM phenomenology where relic density, direct detection crosssection and indirect bound from DM annihilation rate to SM particles are taken into account. Tight bounds on couplings are obtained which can be used for ither phenomenological studies.

Designation

Student

Reference publication/preprint

Institution

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