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RK and future b→sℓℓ BSM opportunities

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Flavor changing neutral current |\Delta B|=|\Delta S|=1 processes are sensitive to possible new physics at the electroweak scale and beyond, providing detailed information about flavor, chirality and Lorentz structure. Recently the LHCb collaboration announced a 2.6 \sigma deviation in the measurement of R_K={\cal{B}}(\bar B \to \bar K \mu \mu)/{\cal{B}}(\bar B \to \bar K ee) from the standard model's prediction of lepton universality. We identify dimension six operators which could explain this deviation and study constraints from other measurements. Vector and axial-vector four-fermion operators with flavor structure \bar s b \bar \ell \ell can provide a good description of the data. Tensor operators cannot describe the data. Pseudo-scalar and scalar operators only fit the data with some fine-tuning; they can be further probed with the \bar B \to \bar K ee angular distribution. The data appears to point towards C_9^{\rm NP \mu} = -C_{10}^{\rm NP \mu }<0, an SU(2)_{L} invariant direction in parameter space supported by R_K, the \bar B \to \bar K^* \mu \mu forward-backward asymmetry and the \bar B_s \to \mu \mu branching ratio, which is currently allowed to be smaller than the standard model prediction. We present two leptoquark models which can explain the FCNC data and give predictions for the LHC and rare decays. This work is in recent preprint arXiv:1408.1627 [hep-ph].

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