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Exploring the flavour structure of the high-scale MSSM

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We analyse the sensitivity of quark flavour-changing observables to the MSSM, in a regime of heavy superpartners. We analyse four distinct and motivated frameworks characterising the structure of the soft-breaking terms by means of approximate flavour symmetries. We show that a set of six low-energy observables with realistic chances of improvement in the near future, namely $\Delta M_{s,d}$, $M_{s,d}$, ϵ_K , ϵ'_K , ϵ_K/ϵ'_K , $\mathcal{B}(K \rightarrow \pi\nu\bar{\nu})$, and the phase of $D-\bar{D}$

mixing, could play a very important role in characterising these frameworks for superpartner masses up to $\mathcal{O}(100)\text{O}(100)$ TeV. We show that these observables remain very interesting even in a long-term perspective, i.e. even taking into account the direct mass reach of the most ambitious future high-energy colliders.

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