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New-physics signals of a model with a vector-singlet up-type quark

The VuQ model involves the addition of a vector isosinglet up-type quark to the standard model. In this model the full CKM quark mixing matrix is 4×3 . Using present flavor-physics data, we perform a fit to this full CKM matrix, looking for signals of new physics (NP). We find that the VuQ model is very strongly constrained. There are no hints of NP in the CKM matrix, and any VuQ contributions to loop-level flavor-changing $b \rightarrow s$, $b \rightarrow d$ and $s \rightarrow d$ transitions are very small. There can be significant enhancements of the branching ratios of the flavor-changing decays $t \rightarrow uZ$ and $t \rightarrow cZ$, but these are still below present detection levels.

additional information

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