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Bounds on a Fourth Generation of Quarks Using Unitarity Constraints

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We perform an exploratory study of the allowed parameter range for the CKM-like mixing of hypothetical quarks of a fourth generation. As experimental constraints we use the tree-level determinations of the 3X3 CKM elements and FCNC processes (K-, D-, B_d-, B_s-mixing and the decay b->s gamma) under the assumption that the 4X4 CKM-matrix is unitary. For the FCNCs we use some simplifying assumptions concerning the QCD corrections. Typically small mixing with the fourth family is favoured, but contrary to expectation we find that also a quite large mixing with the 4th family is not yet excluded. This might change if electro-weak precision observables are also included to the bounds.

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