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Flavour violating bosonic squark decays at LHC

We study quark flavour violation (QFV) in the squark sector of the Minimal Supersymmetric Standard Model (MSSM). We assume mixing between the second and the third squark generations, i.e. $\tilde{c}_{\{L, R\}}\tilde{t}_{\{L, R\}}$ mixing. We focus on QFV effects in bosonic squark decays, in particular in the decay into the lightest Higgs boson h^0 with the mass of ~ 125 GeV, $\tilde{u}_2 \rightarrow \tilde{u}_1 h^0$, where $\tilde{u}_{\{1,2\}}$ are the lightest up-type squarks. We show that the branching ratio of this QFV decay can be quite large (up to $\sim 50\%$) due to large QFV trilinear couplings, and large $\tilde{c}_{\{R\}}\tilde{t}_{\{L, R\}}$ and $\tilde{t}_{\{L\}}\tilde{t}_{\{R\}}$ mixings, despite the strong constraints on QFV from B meson data. This can result in remarkable QFV signatures with significant rates at LHC(14 TeV), such as $pp \rightarrow \text{gluino gluino } X \rightarrow t + h^0 + 3 \text{ jets} + E_T^{\text{miss}} + X$ and $pp \rightarrow \text{gluino gluino } X \rightarrow t\bar{t} \text{ (or } t\bar{b} \text{ or } b\bar{t}) + h^0 + 2 \text{ jets} + E_T^{\text{miss}} + X$. The QFV bosonic squark decays can have an influence on the squark and gluino searches at LHC and can play a role in the determination of the MSSM parameters, in particular of the QFV trilinear couplings. (arXiv:1212.4688 [hep-ph])

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