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Production of extra quarks decaying to Dark Matter at the LHC beyond the Narrow Width Approximation

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Studying how ATLAS and CMS searches for supersymmetry in the $t\bar{t} + \text{MET}$ final state constrain scenarios with a fermionic top partner and a dark matter candidate, we show that the efficiencies of the considered searches are quite similar for scalar and fermionic top partners. Therefore, in general, efficiency maps for stop-neutralino simplified models can also be applied to fermionic top-partner models, provided the narrow width approximation holds in the latter.

This motivates the exploration of finite width effects in the production and decay of extra heavy quarks at the LHC, this dynamics being normally ignored in standard experimental searches. For this reason we assess the regions of validity of current approaches and study the impact of the Dark Matter candidate spin on the exclusion.

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