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Model-independent analysis of scenarios with vector-like quarks

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Vector-like quarks are predicted in various scenarios of new physics, and their peculiar signatures from both pair and single production have been already investigated in detail. However no signals of vector-like quarks have been detected so far, pushing limits on their masses above 600-700 GeV, depending on assumptions on their couplings. Experimental searches consider specific final states to pose bounds on the mass of a vector-like quark, usually assuming it is the only particle that contributes to the signal of new physics in that specific final state. However, realistic scenarios predict the existence of multiple vector-like quarks, possibly with similar masses. The reinterpretation of mass bounds from experimental searches is therefore not always straightforward. I will describe a method to perform a combined analysis of experimental searches, considering different final states, to determine the exclusion limit of scenarios where any number of vector-like quarks can contribute to the signal of new physics, as it is usually the case with realistic models of new physics.

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