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Model-Independent Production of a Top-Philic Resonance at the LHC

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We investigate the collider phenomenology of a color-singlet vector resonance, which couples to the heaviest quarks, the top quarks, but very weakly to the rest of the fermions in the Standard Model. We find that the dominant production of such a resonance does not appear at the tree level – it rather occurs at the one-loop level in association with an extra jet. Signatures like t anti- t plus jets readily emerge as a result of the subsequent decay of the resonance into a pair of top quarks. Without the additional jet, the resonance can still be produced off-shell, which gives a sizeable contribution at low masses. The lower top quark multiplicity of the loop induced resonance production facilitates its reconstruction as compared to the tree level production that gives rise to more exotic signatures involving three or even four top quarks in the final state. For all these cases, we discuss the constraints on the resonance production stemming from recent experimental measurements in the top quark sector. We find that the top-philic vector resonance remains largely unconstrained for the majority of the parameter space, although this will be scrutinized closely in the Run 2 phase of the LHC.

Oral or Poster Presentation

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Primary author: KONG, K.C. (University of Kansas)

Presenter: KONG, K.C. (University of Kansas)

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