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The phenomenological cornucopia of SU(3) exotica

Saturday 30 April 2022 16:30 (15 minutes)

We catalog the gauge-invariant interactions of Standard Model particles and new fields in the six-dimensional (sextet,
$boldsymbol{6}$) representation of the SM color gauge group $\mathrm{SU}(3)_c$. We consider effective operators of mass dimension up to seven, featuring both scalar and fermionic color sextets. We use an iterative tensor-product method to identify the color invariants underpinning such operators, emphasizing structures that have received little attention to date. In order to demonstrate the utility of our approach, we study a simple but novel model of color-sextet fields at the LHC. We compute cross sections for an array of new production channels enabled by our operators, including single-sextet production and sextet production in association with photons or leptons. We also discuss dijet-resonance constraints on a sextet fermion. This example shows that there remains a wide array of fairly minimal but well motivated and unexplored models with extended strong sectors as we await the high-luminosity LHC.

Author: MURPHY, Taylor

Co-authors: CARPENTER, Linda; TAIT, Tim M.P. (University of California, Irvine)

Presenter: MURPHY, Taylor

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