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Probing the interplay between TeV scale heavy vector resonances and top partners at the LHC

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Fermionic and vector resonances are a generic prediction of theories where electroweak symmetry breaking is triggered by new strongly interacting dynamics at the TeV scale.

We work in a “discrete” **two site** prescription of the **Composite Higgs model** where the spontaneous breaking of the $SO(5)/SO(4)$ coset gives the Standard Model gauge bosons and six heavy vector resonances. We implement a **partially composite scenario** for the top sector which gives us the $1/3$, $2/3$ and $5/3$ charged top partners. The direct and indirect (electroweak and flavor precision) constraints and requirement of naturalness impose stronger bounds on the heavy vectors than the top partners. This mild hierarchy between the top partners and the heavy vector resonances modifies the search strategy for vector resonances at the LHC. We find that when kinematically allowed, decays of heavy vector resonances to top partners dominate over pure Standard Model final states. We focus on the decay modes where top partner is singly produced. As a part of the “**no loose**” **strategy for heavy vector resonances**, these signatures with strongly boosted tops need to be considered. These **searches for top partners from vector resonances** can aid in hunting top partners and also discover (exclude) vector resonances at the 13 TeV run of the LHC.

Summary

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