Phenomenology 2014 Symposium



Contribution ID: 152

Type: not specified

Distinguishing Flavor Non-universal Color-singlet and Color-octet Vector Resonances at the LHC

Tuesday 6 May 2014 16:45 (15 minutes)

Electrically-neutral massive color-singlet and color-octet vector bosons, common predictions of beyond the standard model physics, have the potential to be discovered as a resonance in a dijet channel at the LHC. A color-singlet resonance that has leptophobic couplings needs further investigation to be distinguished from the color-octet one. In previous work, we introduced a method for discriminating between the two kinds of resonance in the situation where their couplings are flavor-universal, using measurements of the dijet resonance mass, total decay width and production cross-section. Here, we describe an extension of that method to cover a more general and realistic scenario, in which the vector resonances could have flavor non-universal couplings, by incorporating measurements of the heavy-flavor decays of the resonance into the analysis. We present our analysis in a model-independent manner for a dijet resonance with mass 2.5 - 6.0 TeV at the LHC with $\sqrt{s} = 14 \text{ TeV}$ and integrated luminosities 30, 100, 300 and 1000 fb⁻¹, where we found that our method is applicable in most scenarios.

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Session Classification: BSM