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Minimal and non-minimal Universal Extra Dimension models in the light of LHC data at 13 TeV

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Universal Extra Dimension (UED) is a well-motivated and well-studied scenario. One of the main motivations is the presence of a dark matter (DM) candidate namely, the lightest level-1 Kaluza-Klein (KK) particle (LKP), in the particle spectrum of UED. The minimal version of UED (mUED) scenario is highly predictive with only two parameters namely, the radius of compactification and cut-off scale, to determine the phenomenology. Therefore, stringent constraint results from the WMAP/PLANCK measurement of DM relic density (RD) of the universe. The production and decays of level-1 quarks and gluons in UED scenarios give rise to multijet final states at the Large Hadron Collider (LHC) experiment. We study the ATLAS search for multijet plus missing transverse energy signatures at the LHC with 13 TeV center of mass energy and 139 inverse femtobarn integrated luminosity. In view of the fact that the DM RD allowed part of mUED parameter-space has already been ruled out by the ATLAS multijet search, we move on to a less restricted version of UED namely, the non-minimal UED (nmUED), with non-vanishing boundary-localized terms (BLTs). The presence of BLTs significantly alters the dark matter as well as the collider phenomenology of nmUED. We obtain stringent bounds on the BLT parameters from the ATLAS multijet plus missing transverse energy search.

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