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Production of Kaluza-Klein States at LHC and Implication for Dark Matter [12+3]

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It has been proposed that, in the large radius compactification (LRC) scenario, the Kaluza-Klein states might be considered as dark matter (DM) candidates. The universal extra dimension (UED) hypothesis, together with the LRC paradigm, holds the prospect of observing KK states at LHC if masses lie in the accessible LHC energy scale. If observed, they might be possible DM candidates, provided LKP is protected by a conservation law not to decay to SM particles. This work is based on axiomatic field theory approach to derive upper bound on production cross sections and bounds on near forward differential cross sections. These bounds are obtained without appealing to perturbation theory, i.e. cross-section bounds are obtained nonperturbatively. The bounds are based on principles of local field theories such as Lorentz invariance, causality and uniqueness of vacuum (respected by all local field theories). We shall depict the growth properties of relevant cross sections as a function of energy. It is speculated that KK states might be observed in cosmic ray experiments.

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