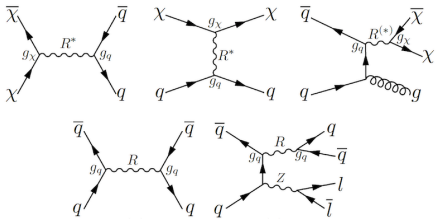

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Probing the real triplet scalar dark matter at colliders (8'+2')

Friday, 5 June 2020 15:10 (10 minutes)

We study discovery prospects of the real triplet model at the LHC and a future 100TeV pp collider. The model provides a dark matter candidate and its smoking-gun signature is the so-called "disappearing charged tracks". We recast current 13TeV LHC searches for disappearing tracks and find that the LHC presently excludes a real triplet scalar lighter than 287GeV with $\mathcal{L} = 36\,\text{fb}^{-1}$. The reach will extend to 608GeV and 761GeV with $\mathcal{L} = 300\,\text{fb}^{-1}$ and $3000\,\text{fb}^{-1}$ respectively. We extrapolate the 13TeV analysis to a prospective 100TeV pp collider and find that a $\sim$ 3TeV triplet scalar could be discoverable with $\mathcal{L} = 30$ ab^{-1} depending on the degree to which pileup effects are under control. We also investigate present and prospective constraints on this model from dark matter direct detection. We find that currently, XENON1T can exclude a real triplet dark matter lighter than $\sim$ 3TeV for a Higgs portal coupling of order one or larger, and the future XENON20T will cover almost the entire dark matter viable parameter space except for vanishingly small portal coupling.

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