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Searching for Compressed Top Partners in the CMS Open Data

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A cluster of *soft* displaced tracks corresponds to the dark matter co-annihilation regime. The long-lived regime is, in particular, motivated by the unexplored top partner physics. The background in this regime is extremely challenging to model using a traditional simulation method. We demonstrate the feasibility of handling the formidable background using the CMS Open Data. We perform this analysis to search for compressed and long-lived top partners in the 8 TeV CMS Open Data events with the integrated luminosity of 11.6 fb^{-1} and obtain new limits. With 15-30 GeV mass splitting between the top partner and the DM candidate, we exclude the top partner mass below 350 GeV, which is more stringent than the ATLAS and CMS results using 8 TeV data with 20 fb^{-1} luminosity. Our study also shows that the CMS Open Data can be a powerful tool to help physicists explore non-conventional new physics and even enable deriving new limits on exotic signals from data directly.

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