

Exploring selections across channels in Dark Matter searches with top quarks at the ATLAS experiment of the LHC

Thursday 3 October 2019 10:36 (3 minutes)

Current estimates put Dark Matter to 26.8% of the energy-matter content of the universe, but very little is known about it other than its gravitational interactions. Efforts to learn more about Dark Matter include searching for it at high energy particle colliders. The lack of information about the nature of Dark Matter makes this a complicated task, and many searches are performed in different channels, and considering different theoretical models. In my master thesis, I explore two such analyses, performed in the ATLAS collaboration using data from the ATLAS detector at the Large Hadron Collider at CERN: the tW +MET final state and the $t\bar{t}$ +MET final state. I have made a generation-level study of the overlap between the signal regions used, and come to the conclusion that there is some. I have also compared the models used in these analyses, the 2HDM+a and the simplified spin-0 pseudoscalar model. Given the simplifications made in my study, however, more sophisticated approaches should be used before anything conclusive can be said.

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Session Classification: Thu morning session 2