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Towards discrimination and improved modelling of dark-sector showers

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One of the biggest problems in particle physics today, is understanding the nature of dark matter. If dark mesons exist, their evolution and hadronization procedure are currently little constrained. They could decay promptly and result in a very SM QCD like jet structure, even though the original decaying particles are dark sector ones; they could behave as semi-visible jets; or they could behave as completely detector-stable hadrons, in which case the final state is just the missing transverse momentum. In a recent work, we have shown that the dark sector can potentially be probed with jet-substructure observables, however, the modelling of these scenarios is somewhat an unexplored area, owing to the existence of only Pythia Hidden Valley dark shower module. An alternate dark shower model is becoming more necessary, in order to gauge the theory systematics and the extent of model dependence. In this talk, I will cover the proposed idea of having a Herwig hidden valley dark shower and hadronisation module, as well as our published work on jet-substructure studies for semi-visible jets.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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