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Dark matter searches through dark photons and heavy top quark partner

A exploratory study of dark photons in a search for dark matter is presented, where a dark photon is a hypothetical dark matter particle. A dark photon may be detected through its kinetic mixing with the general photon, in which it then couples weakly to electrically charged particles and allows a non-gravitational window into the detection of dark matter. We will be considering the hypothetical Maverick top quark decaying to a top quark and dark photon. The dark photon will decay to a lepton pair, and for masses up to hundreds of MeV the decay is completely to a electron and positron pair. We have focused on the hadronic decay of the top quark which gives a final state consisting of a heavy top quark jet. The search is for a large radius jet in the mass range of the top quark and a small radius jet close to the produced electron both with high transverse momenta. The mass of the small radius jet is that of the dark photon. The main backgrounds are expected to be multijet, Standard Model and semileptonic top quark pair production which will be estimated using simulation. The aim of this talk is to discuss the search strategy of this dark photon with the ATLAS detector. Such issues as the signal selection, feasible strategies to reduce and estimate background will be discussed.

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

Yes

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

MSc

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