Displaced vertices and material map in ATLAS

A key observable for new physics at the Large Hadron Collider is the displaced vertex signature. Heavy and hitherto unseen particles can be produced and travel a short distance prior to decaying into Standard Model particles. A search for a such signature associated with a muon and charged particles from the ATLAS collaboration is shown in this poster. The search is based on a data sample of proton-proton collisions at a centre-of-mass energy of 13 TeV, corresponding to an integrated luminosity 136 fb–1 The observed event yields are compatible with those expected from background processes. The results are presented as limits at 95% confidence level on model-independent cross sections for processes beyond the Standard Model, and interpreted as exclusion limits on scenarios with pair-production of long-lived top squarks that decay via a small R-parity-violating coupling to a quark and a muon. A key background to the search arises from interactions of particles from the proton-proton collision with detector and accelerator-related material. The poster also includes details of a study undertaken to estimate and minimise this background.

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