MAP-Fis PhD Students Assessment

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The Standard Model (SM) can be considered an effective low-energy expression of a more fundamental theory since there are some observed phenomena not explained by it. The existence of dark matter (DM) is one of them.

Monotop signatures can be a powerful probe of specific DM signals appearing in models involving preferential beyond the Standard Model couplings to the top quark. Such signatures rely on tagging a highly boosted top quark together with significant amounts of missing transverse energy.

DM can also be searched for by targeting another rare signature, where the two scattered LHC protons emit two photons that annihilate to produce a V+X system where X can be a DM particle. The protons, which stay intact after the interaction, are scattered through very small angles and can be detected with the ATLAS Forward Proton tagging detectors (AFP), effectively converting the LHC into a photon-photon collider.

A search for DM with the ATLAS detector using these unconventional signatures is aimed for.