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Search for Emerging Jets with the ATLAS Detector at the LHC

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A search for a novel experimental collider signature called 'Emerging Jets' is presented using the ATLAS experiment at the Large Hadron Collider. This signature is based on a model of 'Dark-QCD' wherein dark quarks will shower and hadronize analogous to quantum chromodynamics (QCD) in the Standard Model (SM). If produced in particle collisions, these dark particles would form dark-jets: collimated sprays of dark hadrons travelling away from the collision point. These dark hadrons would eventually decay into SM particles, causing displaced tracks and decay vertices which do not originate at the collision points but are seen to emerge into the detectors. This work shows a complete analysis overview, including the use of a Boosted Decision Tree (BDT) to improve the separating power between this unique signal and SM backgrounds, a description of the data-driven background estimation method and initial sensitivity predictions.

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