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Search for Long Lived Particles in the Muon Spectrometer of the ATLAS Experiment at CERN MARCO BARRAGAN, University of Arizona ATLAS Team, ATLAS COLLABORATION — A search for highly displaced vertices resulting from the decay of neutral long-lived particles (LLP) produced by proton-proton collisions and collected by the ATLAS experiment at the CERN Large Hadron Collider is in progress. These particles have a relatively long decay time and decay in the Muon Spectrometer. Such long-lived particles are predicted by several Beyond-the-Standard Model (BSM) theories including those with hidden sectors and those with heavy new neutrinos, which will be discussed. Results from an earlier analysis using 36.1 fb-1 of data will be summarized. Possible improvements in the analysis of 140 fb-1 of data will be discussed. Several variables used in the selection of signal events will be analyzed and presented.

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