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# Search for long-lived particles with the ATLAS muon spectrometer

*Monday 7 April 2025 17:00 (15 minutes)*

Many BSM models predict the existence of neutrally-charged long-lived particles (LLPs) with macroscopic lifetimes. When these LLPs decay back into SM particles within the ATLAS fiducial volume, they leave a striking signature in the form of displaced vertices (DVs). Due to its large size and precise tracking capabilities, the ATLAS muon spectrometer (MS) is a powerful tool for LLP searches.
This contribution will discuss the most recent ATLAS search for MS DVs using the full Run 2 dataset. Results are interpreted in terms of scalar portal, axion-like particle, and dark photon models, constituting the most stringent ATLAS limits in the very long lifetime regime. The talk will focus on a dedicated analysis channel targeting Z-associated LLP production. The triggering and selection strategy considers leptonic decay modes of the Z boson and maximises the selection efficiency while practically eliminating backgrounds.

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