

Machine Learning in Track reconstruction at DarkSHINE Experiment

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The DarkSHINE Experiment is a proposed fixed-target operation using an electron beam to search for dark photons by measuring the missing momentum. The measurement relies on the efficient use of tagging and recoil trackers to measure the electron energy pre- and post-target. We present a comparative analysis of conventional methodologies and contemporary machine-learning techniques for tracking reconstruction. Initial findings suggest that the application of machine learning offers an expedited reconstruction process and a streamlined procedure, thereby significantly enhancing the efficiency of the DarkSHINE experiment. Particularly in scenarios with multiple tracks or high pile-up cases, machine learning techniques have shown great potential to become superior in speed and efficiency and maintain high performances with increasing complexity.

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