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## Aligning the MATHUSLA test stand detector: Using TensorFlow

MATHUSLA has been proposed as a second detector that sits over 100m from an LHC interaction point, on the surface, to look for ultra long-lived particles. A test stand was constructed with 2 layers of scintillator paddles and 3 layers of RPC's, on loan from the DZERO and Argo-YBJ. Downward and upward going tracks from cosmics and muons from the interaction point have been reconstructed. To align the detector we have used 10K tracks and doing a simultaneous fit to find the location of the detectors. We used TensorFlow to drive the fit and align the detector. All aspects of this work will be discussed, from the technical details of how the alignment equations were converted to matrices for the TensorFlow kernel, the alignment equations expressed in TensorFlow language, and, finally, some high-level comments on the approach.

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