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Machine learning approaches in tracks pattern recognition for the SHiP Spectrometer Tracker

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SHiP is a new proposed fixed-target experiment at the CERN SPS accelerator. The goal of the experiment is to search for hidden particles predicted by models of Hidden Sectors. Track pattern recognition is an early step of data processing at SHiP. It is used to reconstruct tracks of charged particles from the decay of neutral New Physics objects. Several artificial neural networks and boosting decision trees models have been tested for clustering the SHiP Spectrometer Tracker hits into tracks. The models learn correlations between hits within tracks in an event. This allows to form hits into groups where all hits more likely belong to one track. The groups are transformed into tracks by resolving hit confusions between them. The machine learning models reduces hit combinations are needed to be considered during track pattern recognition and increases the pattern recognition speed. The new approaches are compared with conventional track pattern recognition methods used at SHiP on MC data.

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