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Seeding with Machine Learning in ACTS

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To prepare for the High Luminosity phase of the Large Hadron Collider at CERN (HL-LHC), the ATLAS experiment is replacing its innermost components with a full-silicon tracker (ITk), to improve the spatial resolution of the tracks measurements and increase the data readout rate. However, this upgrade alone will not be sufficient to cope with the tremendous increase of luminosity, and significant improvements have to be incorporated into the existing tracking software to keep the required computing resources at a realistic level.

In this poster, we are focusing on the track seeds reconstruction within the ITk detector, and we explore the possibility to use hashing techniques to improve the seed reconstruction efficiency, limit the combinatorics and eventually reduce the computing time. Metric learning is then used to tune our algorithm for the different regions of the detector, and to increase the robustness against time-dependent detector conditions.

The code developments are done within the ACTS framework, an experiment-independent toolkit for charged particles track reconstruction.

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