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PatSeeding

PatSeeding is a standalone reconstruction algorithm for the LHCb main tracker. It is documented in the following places:

- Track reconstruction and K^0_S production at the LHCb experiment [\(thesis, 2011, roughly first half\)](#)
- PatSeeding - A Standalone Track Reconstruction Algorithm [\(an earlier LHCb note on the subject\)](#)

The basic idea of this algorithm is to have a track model that accurately describes the shape of a track in the T stations. Because tracks generally stay within a certain region of the T stations (e.g. in the upper half of the Outer Tracker, or the left boxes of the Inner Tracker), one can first search for tracks per region and only then attempt to find the tracks that migrate between regions to reduce combinatorics.

For the per region search, the algorithm starts out with two x hits, one in the first and one in the last station. Using the track model, it then predicts the position of an x hit in the station in the middle. If it is there, the three hits are used to determine the parameters of the track model more accurately, and all x hits in a window around the hypothesis described by the model parameters are collected to form a track candidate in xz projection. Then, a Hough transform based track search among compatible stereo hits yields the list of hits on the track in the stereo layers.

For the tracks migrating between regions, track model parameters are estimated from unused hits in all four layers of an IT station. Again, the track model is applied to collect compatible hits in other stations and regions.

Tracks found by any of the two track search strategies enter a track competition phase that is designed to kill ghosts and clones before the surviving tracks are passed to the output of the algorithm.

Special Tunings

PatSeeding has several tunings for special applications available:

- running without magnetic field
- running with isolation cuts in a misaligned detector to provide a low ghost sample for alignment purposes
- running on comics data (e.g. taken with Calo trigger, see also TCosmicsTracking)
- running only on hits in a region of interest (e.g. for L0 confirmation in the HLT)
- running without proper alignment (TrackSys() has an "earlyData" option which can be set to make PatSeeding more tolerant to misalignments; this also accepts more ghosts)

-- ManuelSchiller - 13 Aug 2008

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