VeloRTracking

The first stage is pattern recognition, the idea is to identify clusters from the same straight trajectory in the R-Z plane. The priority is to have high efficiency and low LHCbGhostTrack rate.

The efficiency is defined with respect to "physics" tracks that have at least 3 R and 3 Phi measurements in the VELO, there are other requirements on the information in other detectors depending on track type.

Track finding starts from the R sensor at the highest z value: z increases from the interaction region through the detector toward the muon detector. Given the relatively low angle of acceptance of the detector tracks with hits later in the detector are more likely to be in the acceptance and finding these is prioritized.

The R sensors strips are laid out as shown in attached file. There are 4 non-overlapping sectors of slightly more that 45 deg in each sensor with 512 strips in each. For tracks starting from near the beam axis the same sector is crossed in each sensor. The pattern recognition strategy is as follows:

1. Start with an R sensors, also get the next but one sensor on the same side
2. Loop over the sectors in the sensors
3. Loop over each pair of unused hits from the first and last sensors
4. Extrapolate a line from the two sensors
5. Check the extrapolation matches the expected range of production positions in Z
6. Extrapolate the trajectory to the middle sensor and compare the unused clusters in that sensors to the extrapolated point
7. For combinations with a low chi^2 start a track and mark the three clusters as used.
8. Extrapolate the new track both forward and backwards in z adding clusters close enough to the projection
9. Continue until the extrapolation is outside the sensitive area or 3 stations do not have clusters present.
10. Repeat with the same starting sensor and the next but two sensor on the same side, check both intermediate sensors
11. Finally restart with the next sensor (moving backward in z) until all of the sensors are in the negative z region
12. Then restart from the front of the detector moving forward in z to find backward pointing tracks (not including pileup sensors)

-- DavidHutchcroft - 09 Aug 2005

- PR04_r.ps: PR04 layout of strips (pair of sensors)

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