Clone Tracks Killing

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What does it do?
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**Goal**
- Find tracks that are clones of other tracks

**Basic Definitions**
- Two tracks are clones of each other if they share in both the VELO and SEED stations at least 70% of hits

**Present Usage in our Tracking**
- Clone finder and killer run at the end of the tracking
- Uses by default VeloTT Forward, Match and Seed tracks
- Outputs UNIQUE (= not clone) tracks to “best” container
- Velo “preparation” algorithm + fitting is run afterwards
// Decide whether these tracks are clones
if ( ( nVeloMin > 0 ) &&
    ( nVeloCommon < m_matchingFraction * nVeloMin ) )
return false; // Not clones!

if ( ( nSeedMin > 0 ) &&
    ( nSeedCommon < m_matchingFraction * nSeedMin ) )
return false; // Not clones!

// Not clones if there is no common region (Velo or Seed) with clusters
if ( 0 == nVeloMin && 0 == nSeedMin ) return false;

// Else they are clones!
return true;

e.g. nVeloMin = MIN( nVelo1, nVelo2)
**TrackUtils**

- Contains the `TrackEventCloneKiller` algorithm

- **Loops over all VALID tracks and stores non-clone tracks**
  - fit-failed tracks discarded
  - Calls the `TrackCloneFinder` tool to determine clone tracks

**Options of TrackEventCloneKiller:**

- `TracksInContainers`: path to input tracks
- `TracksOutContainer`: path to output container (default is “best” container)
- `StoreCloneTracks`: flags whether clone tracks are also output (default is “false”)
- `IgnoredTrackTypes`: can be used so that certain tracks are considered for finding clones but are not output to the “TracksOutContainer”
- `CloneFinderTool`:
  - specifies the tool for comparing pairs of tracks and flagging possible clones (default is “TrackCloneFinder”)
  - makes it trivial to test another clone finder tool
TrackTools

- Contains the TrackCloneFinder tool

- Compares the shared hits on pairs of tracks
  - \( \text{hits} = \text{LHCbIDs or Measurements (see below)} \)
  - The one with less hits is flagged as the clone
    - Note: no \( \chi^2 \) cut used for now … to be studied …

Options of TrackCloneFinder:

- MatchingFraction:
  - percentage of matching hits for clone tracks (default is 70%).
  - Note: the matching is done independently for VELO and SEED hits

- CompareAtLHCbIDsLevel: Compare LHCbIDs or Measurements
  (default “true” compares LHCbIDs)