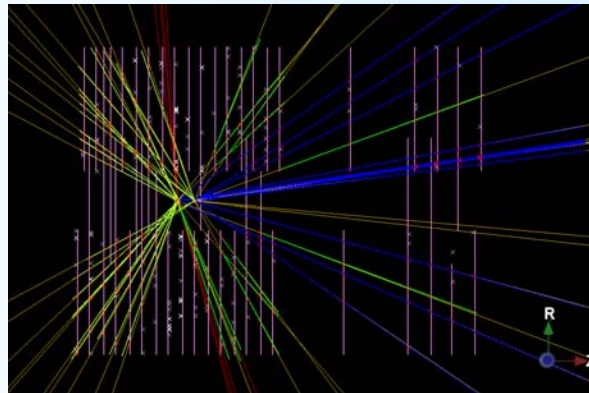


# Clone Tracks Killing

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**What does it do?**

## 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

## *The heart of the logic!*

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

**// Decide whether these tracks are clones**

```
if ( ( nVeloMin > 0 ) &&
    ( nVeloCommon < m_matchingFraction * nVeloMin ) )
    return false; // Not clones !
```

*$nVeloCommon = \# \text{ Velo hits in common}$*

```
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;
```

## 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***
  - *hits = 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)*