

Beam Halo in data: update 2

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The Data Sample

- Run 142130:
 - /store/data/Run2010A/Cosmics/ALCARECO/v4/000/142/130/9693689A-3A9E-DF11-A3DE-0030487CD7C0.root
 - 14,542 events
 - 140,258 tracks
- Run 142130, only events with $1 \leq n\text{Tracks} \leq 4$
 - rfio:/castor/cern.ch/user/p/parenti/ALCARECO/nTrk_1_4/skim_RUN142130.root
 - 5,836 evts
 - 9,166 tracks

“Standard” Track Selection

- Number of selected tracks (no track selection yet):
 - all events, all tracks in the ALCARECO 140,258
 - all events with $1 \leq n_{\text{Tracks}} \leq 4$, all tracks 9,166
 - after TrackRefitterBHM* TrackerTrackHitFilter* ctfWithMaterialTracks* AlignmentTrackSelector* TrackRefitterBHM sequence 2,111
- ... applying the selection cuts in sequence:
 - $n_{\text{Hit}} \geq 8$ 1,931
 - $n_{\text{HitsPerSubDet.inENDCAP}} \geq 1$ 639
 - $p \geq 2.5$ 571
 - $n_{\text{LostHits}} \leq 2$ 567
 - $n_{\text{HitDiffEndcaps}} \leq 2$ 402
 - $\chi^2_n \leq 10$. 402

Track Number Reduction

- The biggest reduction in track number is given by:
 - $1 \leq n\text{Tracks} \leq 4$: factor 15 (from 140,258 to 9,166 tracks)
 - TrackHitFilter, TrackRefitter: factor 4 (from 9,166 to 2,111 tracks)
 - number of hits: factor 3 (from 2,111 to 639 track)
- All the other cuts give a reduction factor of 1.6 (from 639 to 402 tracks)
- Check 1: check the effect of $1 \leq n\text{Tracks} \leq 4$ cut on selected tracks
 - 456 tracks after the “standard” track selection, when no $1 \leq n\text{Tracks} \leq 4$ selection is applied
 - The reduction is only 12% on the selected tracks (it was a factor 15 before selection!)

Check 2

- Check 2: check the effect of TrackHitFilter, TrackRefitter on selected tracks only
- Number of tracks opening the ALCARECO with plain root (*in italic, for comparison: after TrackHitFilter, TrackRefitter*)
 - all events with $1 \leq n_{\text{Tracks}} \leq 4$ 9,166
 - $\&\& n_{\text{Hit}} \geq 8$ 3,026 1931
 - $\&\& p \geq 2.5$ 1,277 994
- Comment:
 - 22% of “good tracks” rejected (it was a factor 4 before the selection!)
 - it was not possible to apply the $n_{\text{HitsPerSubDet.inENDCAP}} \pm$ cut in plain root... the information is not directly available

Check 3

- nHit and nHitsPerSubDet.inENDCAPplus/minus cuts cannot be released
- Check 3: softer pMin cut
 - all events with $1 \leq nTracks \leq 4$ 9,166
 - && nHit ≥ 8 1,931
 - && nHitsPerSubDet.inENDCAPplus/minus ≥ 1 639
 - && p ≥ 0.5 622
 - && p ≥ 1.0 613
 - && p ≥ 1.5 599
 - && p ≥ 2.0 584
 - && p ≥ 2.5 571
- Small effect on the statistics

Conclusion

- The $1 \leq n_{\text{Tracks}} \leq 4$ cut, and TrackHitFilter, TrackRefitter are reducing the number of input tracks by a factor 66... but only 12% and 22% of the “good tracks” are rejected