Updating the requirement on number of track measurements in EICRecon
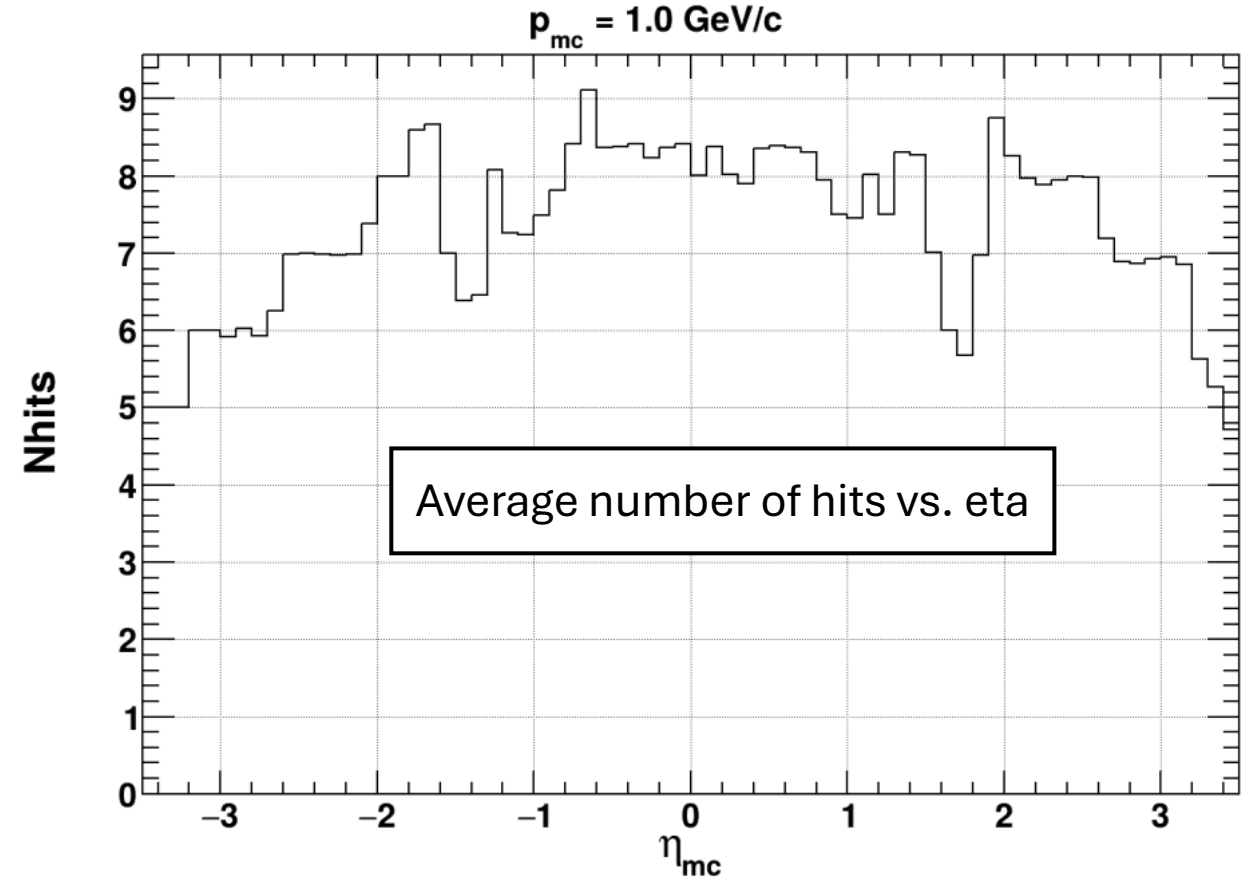
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Impact of cut on number of track measurements

o In our evaluation of the tracking performance for the 18 GeV electron beam setting – with all beam-induced backgrounds included – we found that the application of the simple requirement that the track contained at least 4 fit points (i.e., good measurements) allowed us to suppress background tracks while keeping high efficiency and purity for signal tracks.

o This requirement has been used by the PWGs for their studies with the backgrounds. However, they have had to apply this requirement in their offline analyses.

o One question is whether we should directly apply a $n_{meas.} \geq 4$ requirement when storing the set of tracks produced as output by the CKF algorithm. This would reduce the number of tracks sent to the ambiguity solver factory and downstream factories, such as the primary vertex finder/fitter and the track projection factory.

Impact of cut on number of track measurements

o From the single-particle tracking benchmark, we can see that the number of fit points should be greater of equal to 4 for particles originating from within the first tracking layers.

$p_{mc} = 1.0$ GeV/c

Average number of hits vs. eta

Impact of cut on number of track measurements

o From the single-particle tracking benchmark, we can see that the number of fit points should be greater of equal to 4 for particles originating from within the first tracking layers.

o However, there are a few things we may want to resolve/check first:

  o The plot on the previous page showed the number of hits in the tracking detector left by the generated particle. Right now, for lower-momentum particles especially, the outer tracking layer hits don't always get successfully attached to the track fit. This ~10% effect should be understood.

  o For the high-current 10 GeV electron beam, a more stringent requirement than $n_{meas.} \geq 4$ may be needed.

P = 1 GeV/c

Events with a reconstructed track

Associated Tracker Measurement Hits

Associated Tracker Outlier Hits