

# Electron purity

- Requirements on the scattered electron purity were determined by the inclusive working group during the yellow report. The requirement is given as 99% electron purity over the entire detector. This requirement is quite stringent and can be relaxed in certain regions of kinematic phase space, but there are a few good reasons to initially try to achieve this most stringent requirement:
1. The most challenging place to meet the electron purity requirement is in the barrel region (see next slides). This has to do with the cross section dependence on  $Q^2$ , the momentum distribution of the negative pion background and the fact that, for  $Q^2 > 1 \text{ GeV}^2$  for example, lower momentum electrons only need to be reconstructed for more central pseudo-rapidities.
  2. As demonstrated in all the detector proposals – albeit using parameterized detector responses – the combination of tracking, EmCal, PID, and kinematic cuts can significantly remove the negative pion background. This suggests the more stringent requirement may be achievable. Once an adequate ‘electron finder’ algorithm is in place, electron purity will be a useful benchmark to compare detector configurations.
  3. During the yellow report, many of the physics studies done by groups other than the inclusive group assumed perfect electron purity and reconstruction efficiency. It is not obvious how sensitive these physics measurements are to the scattered electron identification, and so keeping a more stringent requirement would be wise for now.