IFR Fast Simulation

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IFR geometry for the Super B

- *SuperB IFR configuration is available in PacSim*
- *According to CDR:*
  - *Number of active layers: 8*
  - *More # of Interaction lenghts (6.5-7.5 instead of 5-6 we have now in BaBar)*
- *Cylindrical geometry:*
  - *N-agon will be available in the future*
- *Outside the coil the magnetic field is modelled with a 0-Field*
  - *Tracks in the IFR are straight lines*

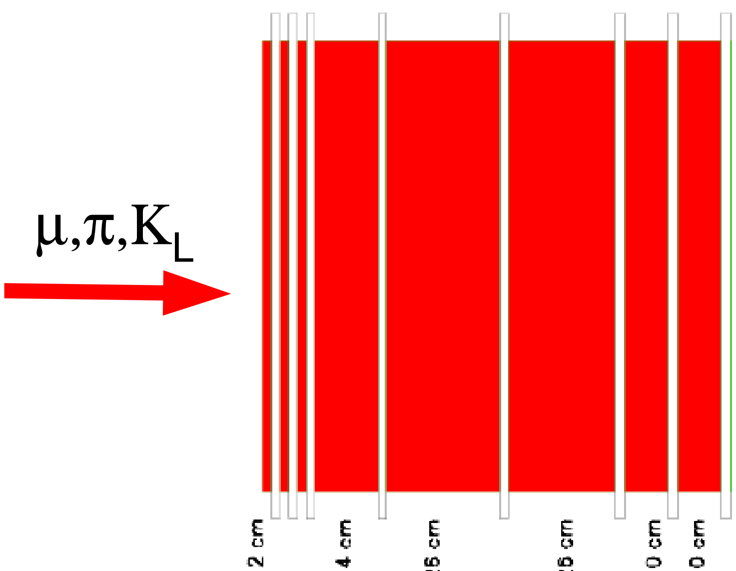
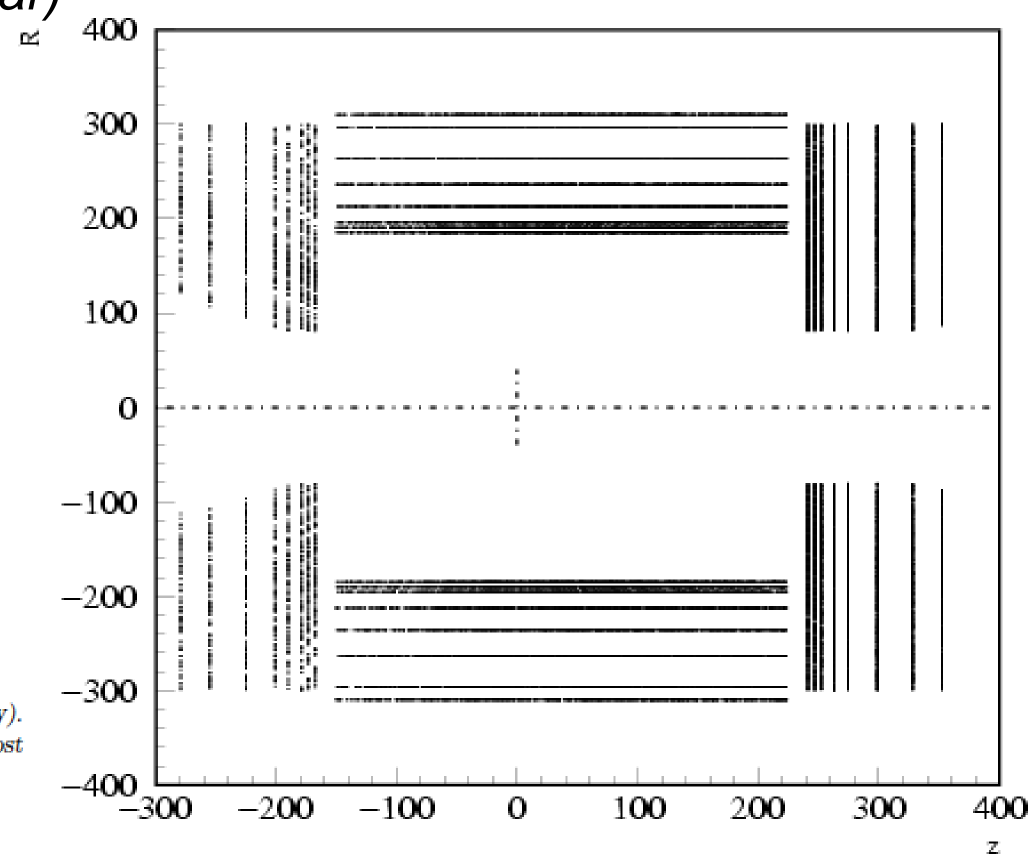
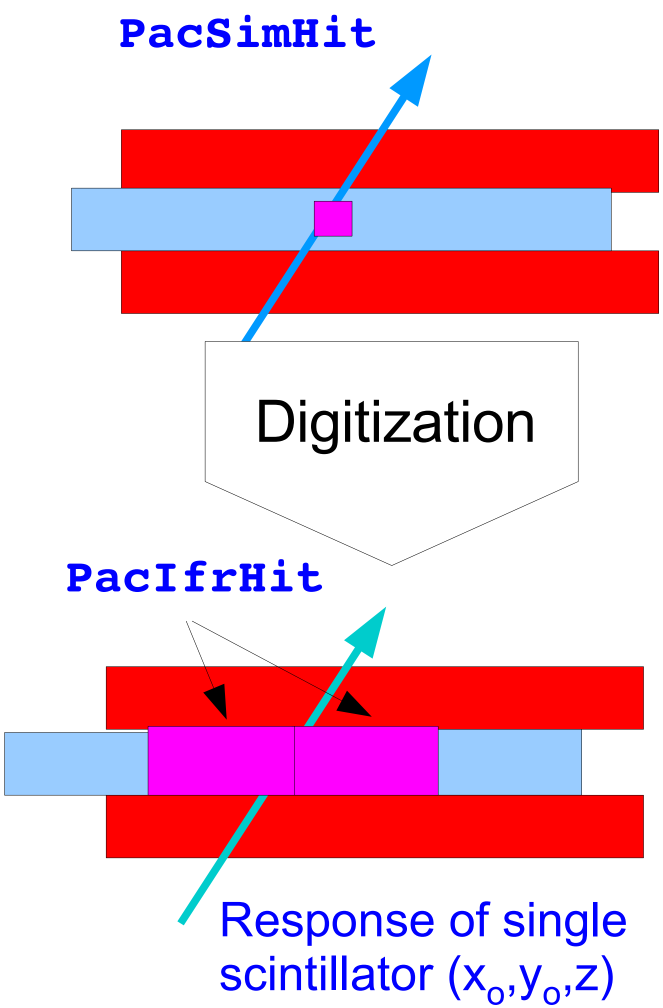


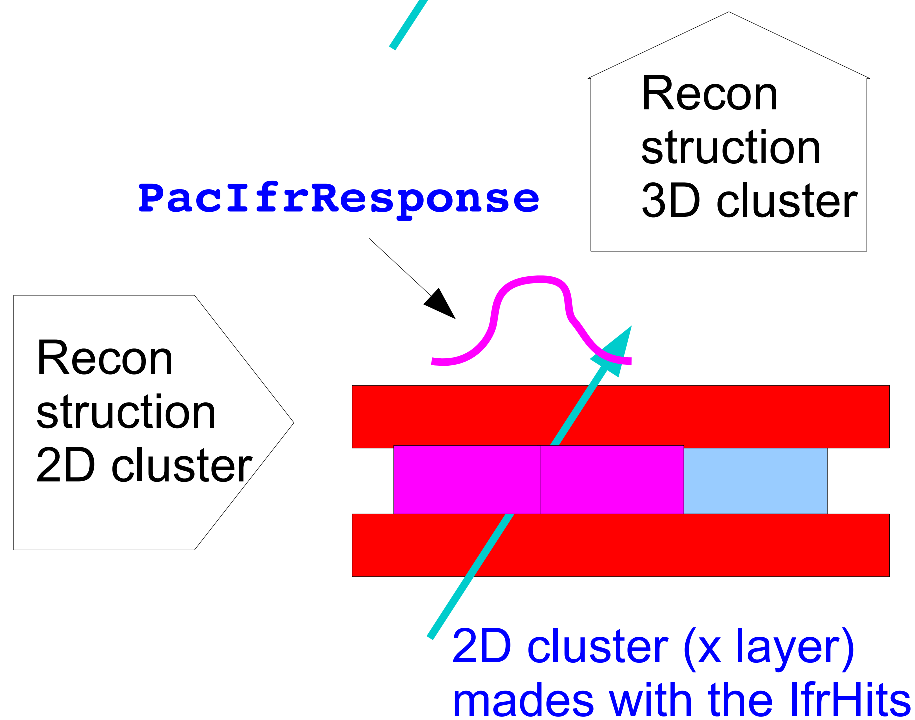
Figure 4-41. *Sketch of the longitudinal segmentation of the iron absorber (gray). Active detector positions are shown in white from the innermost (left) to the outermost (right) layers*

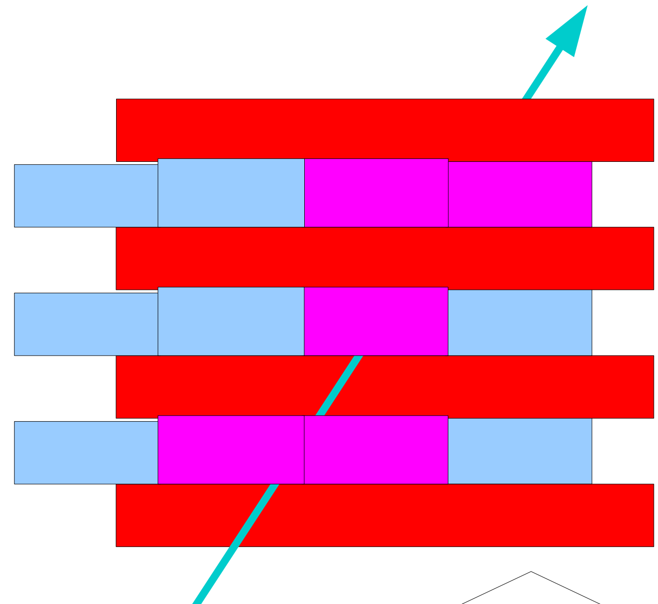


IFR Fast Simulation: design

Simple reconstruction: general design similar to the BaBar one







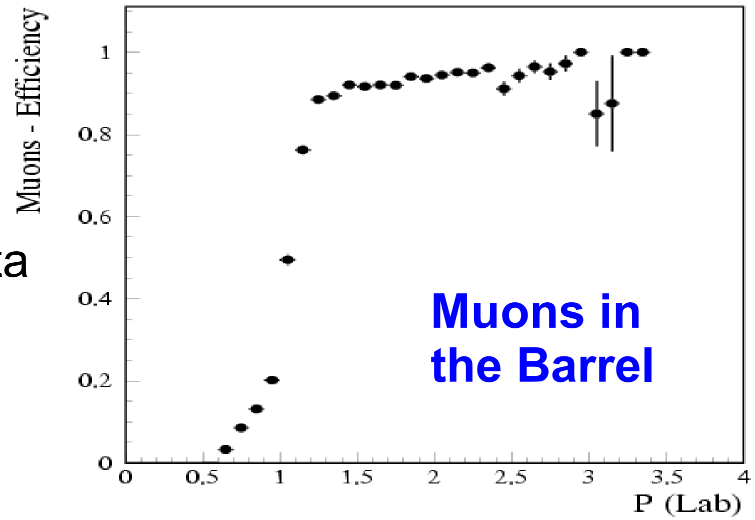
Final reco quantities associated to a track to fill IfrQual object:
- *last layer*
- *layers active*
- *average number of hits per layer*
- *track chi2*

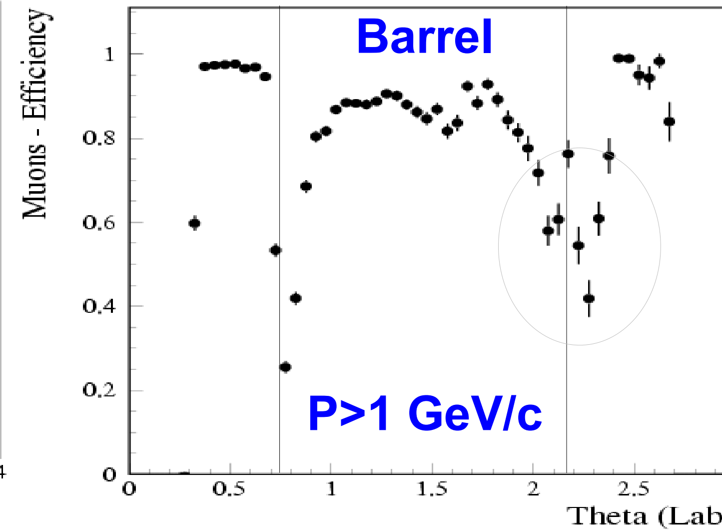
No patter recognition - we kwon the PacIfrHits associated with a track

Performances: muon selector

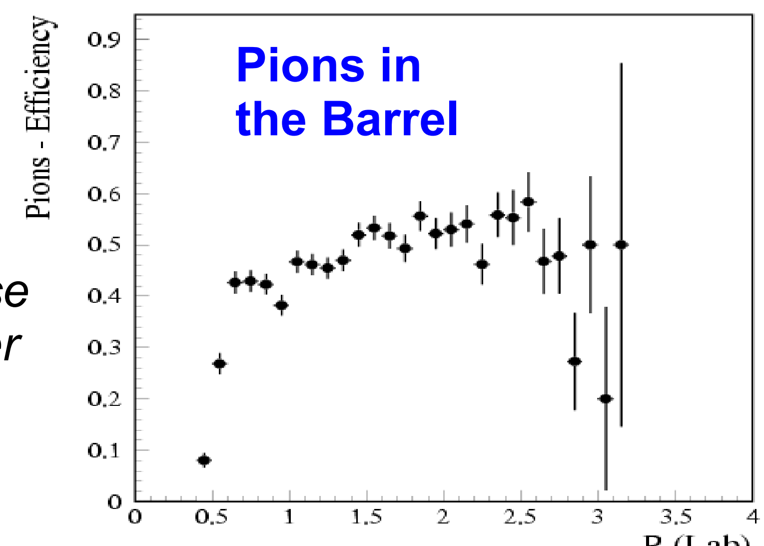
- *mu/pi separation based on the # of traversed layers in the Iron: N>9 Layers*

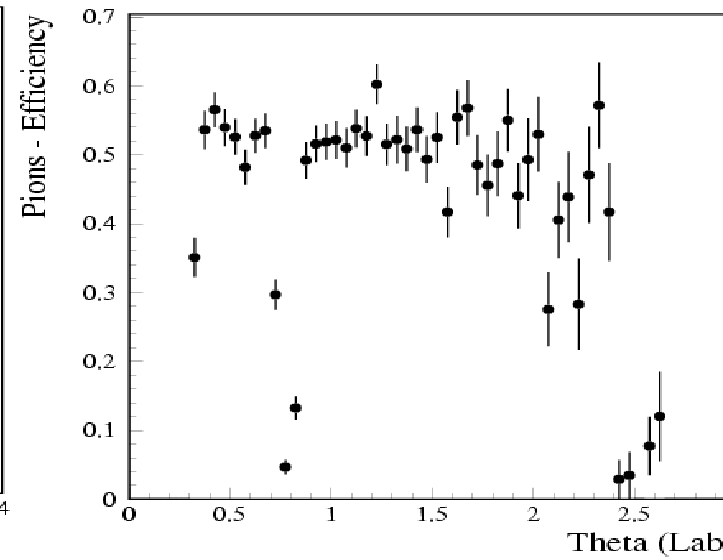
Muon efficiency too optimistic, but the general features (shape of the efficiency versus theta and p) are in reasonable good agreement with the expectation





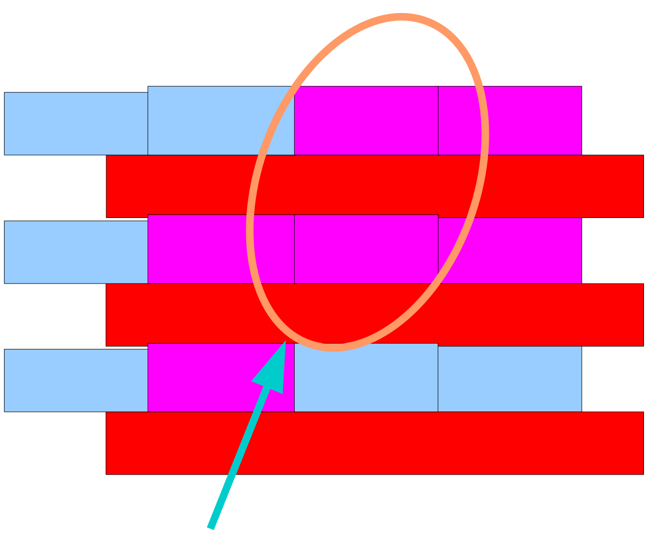
Pions efficiency is too high!
We need to better simulate the IfrResponse when a hadronic shower is produced





Hadronic Showers

- *When a hadron showers, PacSimHits are created within the IFR with some shower informations available:*
  - *Longitudinal development is parameterized (actual range is properly fluctuated)*
  - *For now, we do not take any other action for hadronic showers!*
- *Priority: better simulate the detector response to hadron showers and find the best shower parameters in segmented environment*
  - *A relevant aspect is the lateral development: some measurements (for E>10GeV) are available (Barreiro et al. DESY 89-171, 1989).*
  - *Generate (fluctuate) mutiple PacIfrHit per layer, according to the transverse development*
  - *This will affect*
    - *the average size of the 2D cluster*
    - *the chi2 of the fit to the IFR tracks*
- ***Use the Full Sim. for hadron showers***



Next PacSim (V03) version

- *Perform a fit to the 2D clusters simply with a straight line*
  - *Evaluate the matching between the fitted helix of the track and the track in the IFR at the coil*
  - *Fitter chi2 and the matching are crucial to properly discriminate between muons and pions*
- *Fill the IfrQual object with all the relevant quantity*
  - *Up to now only the number of penetrated layers is filled*
  - *Input to a simple cut based PID selctor (no NN or BDT!):*
    - *#penetrated layers (interaction lenght and expected interaction lenght in the muon hypothesis)*
    - *IFR track chi2*
    - *Matching chi2*
- *IFR response to hadronic showers: parameterize the shower development parameters*
- *Start to look at the* K_L