Ifr Barrel upgrade information gathering

• Work in response to long list of initial questions from Jeff is archived at

• Addressing the ‘easy’ questions so far:
  – Efficiency studies using BetaPidCalib ntuples
  – Generator level physics plots
  – Bogus level Klong simulation studies
  – Expected lambda for different detector configurations (old/new FWD, with/without layer 19)

• Archive of old studies (need to expand)
What are some of the more difficult questions?

• Ie, where can you help?

• Changing detector geometry:
  – Thanks to FWD upgrade efforts, Ifr geometry is ~completely driven by input files (to the db)
  – Hopefully no new code needed?
  – But some work is needed to actually implement.

  – Need to define and implement new ‘strawman’ barrels
    • I think Luca is working on this already
    • Use 1 db for common studies
Simple model of muon eff/pion fake rate?

• For the FWD upgrade, a simple toy MC was developed and used to understand pion misld.
  – Can we revive (Francesco?)

• I have started on equivalent studies using geant3
Realism of the simulation

• Correctness of solid angle coverage for active detector
  – How accurate is current barrel simulation?
• We should not ignore noise:
  – Roughly 7% drop in high p muon efficiency for current selectors/current geometry. Need to find out effect on pion misId.
  – Is it due to singles rate + beam bkg or something more? (ie, bad electronics)
  – How can we ‘predict’ noise for an upgraded detector?
    • A IfrNoise module exists for simulation of a ‘flat’ background (by default, noise level is very low)

A noise simulation can be validated with existing digimixing data
Muon selectors

• Cut based selectors use a number of variables
  – DeltaLambda, Lambda
  – Track match and track fit chi2s
  – Average strip multiplicity
  – Ifr ‘track’ continuity
  – Kalman based chi2 variable under development
  – NN selector understudy (could be a useful tool if a completely new selector is needed)

• Should we use a simple selector for these studies? Most of mu/pi separation comes from only a few variables.
Analysis level work

• Fake rates:
  – Compare SP4 with PID tables
  – Anyone already set up to evaluate how a lower fake rate in the barrel impacts their analysis?
    • Ds->mu nu
    • Kll

• Work on Klong veto? Any interest to evaluate:
  • Impact of veto on analysis
  • What is a realistic level of vetoing ‘generic’ Klong
  • (it is certainly not 50%....)
New technologies?

• Completely new ideas are still more work…

• How could we use pulse height information in the reconstruction?
  – Improve determination of 1D cluster center position
  – Noise veto?
  – How easy to add this info at the simulation level?

• Non-RPC detectors:
  – Completely new geometry description?
  – Change z pitch or ignore z information?
Conclusions

- Hopefully there are now some names next to my ??
- Can we define some metrics for evaluation of different options.
- Need to use current data sample as a reality check for any studies.