To-Do List of D->K/pi in SVX

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What we have got since last year:

400M Pythia events (signal)

vs. 20K EXODUS Central Au+Au events (background)

Reconstruct invariant mass of K/pi combinatory pairs from pisaToDST

Standard PHENIX process (loose cut) : 38728(S), 954(B)

vs. Kalman fitting (so as to generate cutting threshold, such as DCA, chi2, cos(θ)) the strict cut : 18433(S), 13(B)

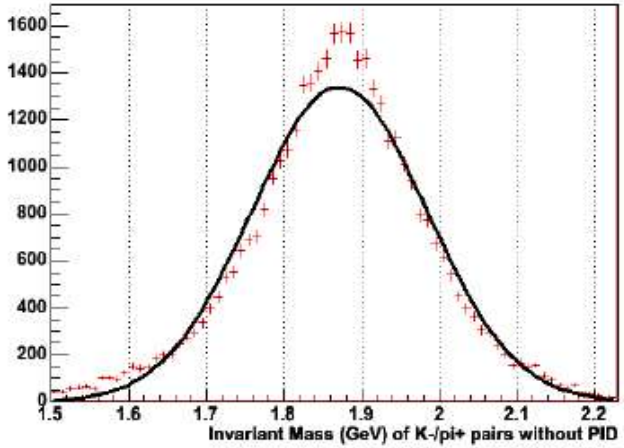
Assuming 1.5E9 Min-Bias events in Run 2009, we got S/sqrt(S+B) as number of significance:

44 vs. 145, respectively

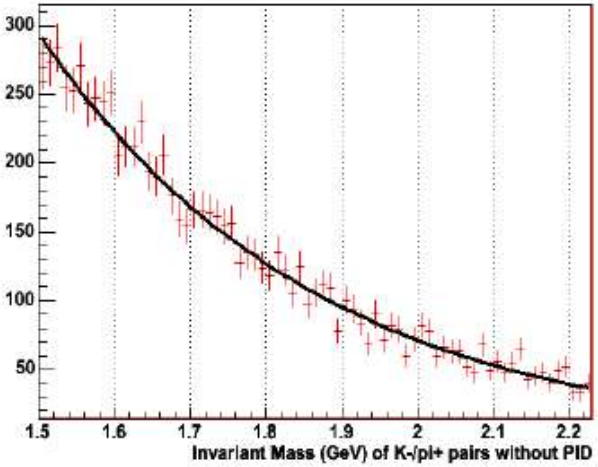
Invariant Mass Spectrum of Unlike-charge Pairs

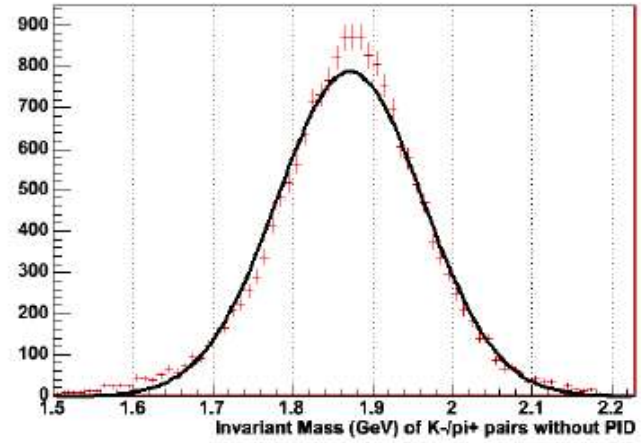
K-/pi+ from D0

EXODUS tracks

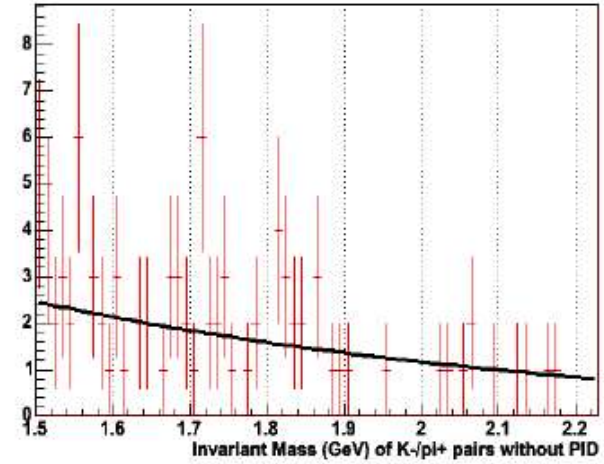


Loose Cut





Strict Cut



Then, is it feasible to do an embedding simulation to see D0 mass peak from Au+Au events?

If we believe the S/sqrt(S+B) in page 2, and we want to see a 5-sigma peak in Min-Bias Au+Au events, it's easy to calculate the number of events necessary:

Loose cut: 20M Au+Au MB events

Strict cut (Kalman Fitting): 1.8M Au+Au MB events

Maybe this is a little too much.

A Fast-Track Simulation ?

However, since we already know Kalman Fitting can evidently increase our S/sqrt(S+B), by reducing background much faster than signal, it may be useful that we do a fast-track simulation:

Instead of pushing all tracks into PISA then pisaToDST, we may use existing simulation result to make a spectrum (distribution of pt, ϕ, etc…) for K/pi tracks, then select from Pythia p+p(charm forced) or EXODUS Au+Au events according to this spectrum, and calculate the invariant mass directly from these tracks.

Therefore, we save the most time-consuming part of our simulation.

But Lot's of Details Need to be Considered

1. Which cut to use to generate the spectrum?

   Currently Kalman Fitting uses 3 cutting-thresholds: DCA, chi2, cos(θ). We may take the former two as single track trigger, and the last cos(θ) as pair trigger. For fast-track simulation, we will use single-track trigger only.

4. What smearing effect are needed to apply?

   In PHENIX, there is know momentum resolution for given centrality and Pt. Since current Kalman Fitting still relies on the central arm to reconstruct tracks, then does SVX association itself, we need to add multi-scattering effect (e.g., smearing of pt, ϕ, or collision vertex?) before actually making any cuts

And what about SVX hits themselves ?

The SVX barrel code in CVS is still primary. We need to add more details inside, both to PISA(simulation) and SvxReco(reconstruction). I am going to learn and work with Vladimir and Joseph (who is doing J/Ψ work using SVX).

Short(?) time object:

4. Add the already-know detector details into PISA
5. Add the reasonable detector effects (resolution, charge-sharing, etc) into SvxReco