Report of the Light and Heavy Vector Meson Working Groups
Nov 12, 1999

1) Back to back Correlations (a way to see medium modification- mass shift) - Xin-hua Li

2) Acceptance and MC requirements for HLVM analysis - R. Seto

3) MDC-3 discussion and assignments

Calculating the acceptance

- Two methods
  - event by event - weighting
    - The event by event method can, in principle, find any wildly varying dN/dmt/dy.
    - Problem of event by event weighting method - single event with low acceptance probablility (large weight) gives large fluctuations (large error bars).
  - finding overall acceptance using the MC (assume some input distribution)
    - The MC method makes the assumption that the dN/dMt/dy is smoothly varying, and that, after iterations, one knows the slopes etc. This leads to the minimization of the fluctuation s and smaller error bars.
- The idea - we will do EVERYTHING (almost?) by the insertion of special MC events into the real data.

Corrections needed from Acceptance

- Issues
  - ID efficiencies (KK,ee,mumu)
  - Tracking and PID efficiencies(multi-track problems)
    - Get by insertion MC track into real events
    - check via by insertion of real tracks into real events
  - Physical processes - Decay, Multiple scattering, hadronic corrections
    - assume Geant gets this right
  - Detector related problems, e.g. dead/hot wires, tof slats, emcal mods
    - First order - just throw into systematic or Estimate correction
    - MC -must use a sample of data from each set of run conditions
  - Bin Sharing problem
    - Do we get the multiple scattering (I.e. angle/position/momentum) distribution correct in the MC? (quantify size of problem)
  - Problem of fakes
    - to first order this will be dealt with since we are doing two particle resonances - and we use mixed event backgrounds
    - Correlated background can be gotten by weighting (B/(S+B))
- Checking
  - Use cross detctor checks
    - e.g. e pid in RICH to check emcal/TEC ; tof in TOF to check tof in EMCAL
    - DO the same in the MC - better get same eff
  - checking the tracking eff
    - take MC/Real K, bury in data, find the eff
      - better be the same
  - Momentum resolution
    - Check using TOF/PID bands (do we get inmass res right?)

MC Needs: to KK - measure dN/dmt/dy vs cent

- Year-1
  - 1 bin in y, 5 bins in mt = 5
  - know ac to 3%->1000 ac/bin
    - acc~.01=.1(geom)*.1(pid,decay,track eff)
  - Start with 500K Phi's (Acc-geom)
    - Tailor dN/dmt between flat and exponential
      - User will weight these appropriately
    - use "fast MC" -Geometry, Bfield
  - Mix 50K into data, 4 centrality classes, reconsruct 200K events (Acc-recon)
  - Acc=Acc-geom*Acc-recon
- Later Years
  - 5 Bins in y, 10 bins in mt = 50
    - 5M to start
    - 500K to bury - use 5 centrality classes reconstruct 2.5.M events
  - Looking at the shape of the mass spectrum (the hot topic) adds another dimension
    - Need perhaps 10 bins in invariant mass, but don't bin in y
- Assume 10 different analysis
  - Event generation+fast mc
    - assume 1 sec/evemt
    - 5M*10 = 50M MC events
    - Assume 1 sec/event -> generate+fastMC
    - 5days*10=25 days
  - Reconstruction
    - 2.5M*10 = 25M events
      - (5 days worth of reconstruction)
      - 0.3B cpu secs or 3000 days

Notes

- "Fast" MC is critial
  - Idea - just use PISA with all material "off"
  - Estimate 10 min = 1 cent event -> 1 sec/track
  - SO < 1 sec/event with everything "off" for generation and propogation of e.g. phi to ee
- Large part of effort will go to reconstructing MC tracks "buried" in real events - e.g. Phenix-J will have to have appropriate Raw data for mixing
  - run conditions are important here
  - - warning - numbers could be 10x larger than these (e.g. just ask for 1% accuracy in acc)

MDC-3 Assignments (Barbara's notes from the meeting)

- 1. We should quantify the time to simulate single track events and compare to the time to simulate central Au+Au HIJING collisions. There are complications to simple scaling with track number from stepping particles in the magnets/inert materials and from event handling overheads.

- 2. We need 10K or more muon arm central collision events and 10K or more muon arm min bias events. These should KEEP the central arm info.
  muon id studies: Ken Read and friends
  e-mu: Hiroki, maybe Atsushi, others
  trigger studies (with the min bias events): Kyle, Xiaochun, Yajun, Jamie(?)

- 3. need at least 10K central Au+Au central arm events and new detector response simulations for the J/psi and phi signal files. Marzia and Sasha will revisit their efficiency studies using new admixed events. (RKS note: Basanta from UCR and Ming from LANL will join this effort - Ming will also begin to look at mu-mu)

- 4. For single electrons, need to make new detector response files for Ziwei Lin's D decay spectra, and admix to some of the 10K events. Jane will do this.

- 5. Conversion electron signal files should be generated to admix to Au+Au collisions. These should be made by throwing relatively high pt photons and forcing them to convert in the materials near the vertex. Someone needs to volunteer to look at the reconstructed mass for these vs. the conversion point.

- 6. We should read out the west arm DC & PC1 and run those events through the reconstruction. Julia says OK!