Golden Track sample DSTs

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HBD Meeting

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The homework

- Prepare a set of dsts which contain events extracted from real data with tracks of particular interest to HBD software testing
- The goal is to have a set of tracks with some expected response that one can quickly run on and check answers
- Four categories:
  - Backplane conversion pairs
  - Closed Dalitz pairs
  - Open Dalitz pairs
  - “J/psi” or High mass pairs
- One needs to classify based on purely track quantities (ie without using Hbd information

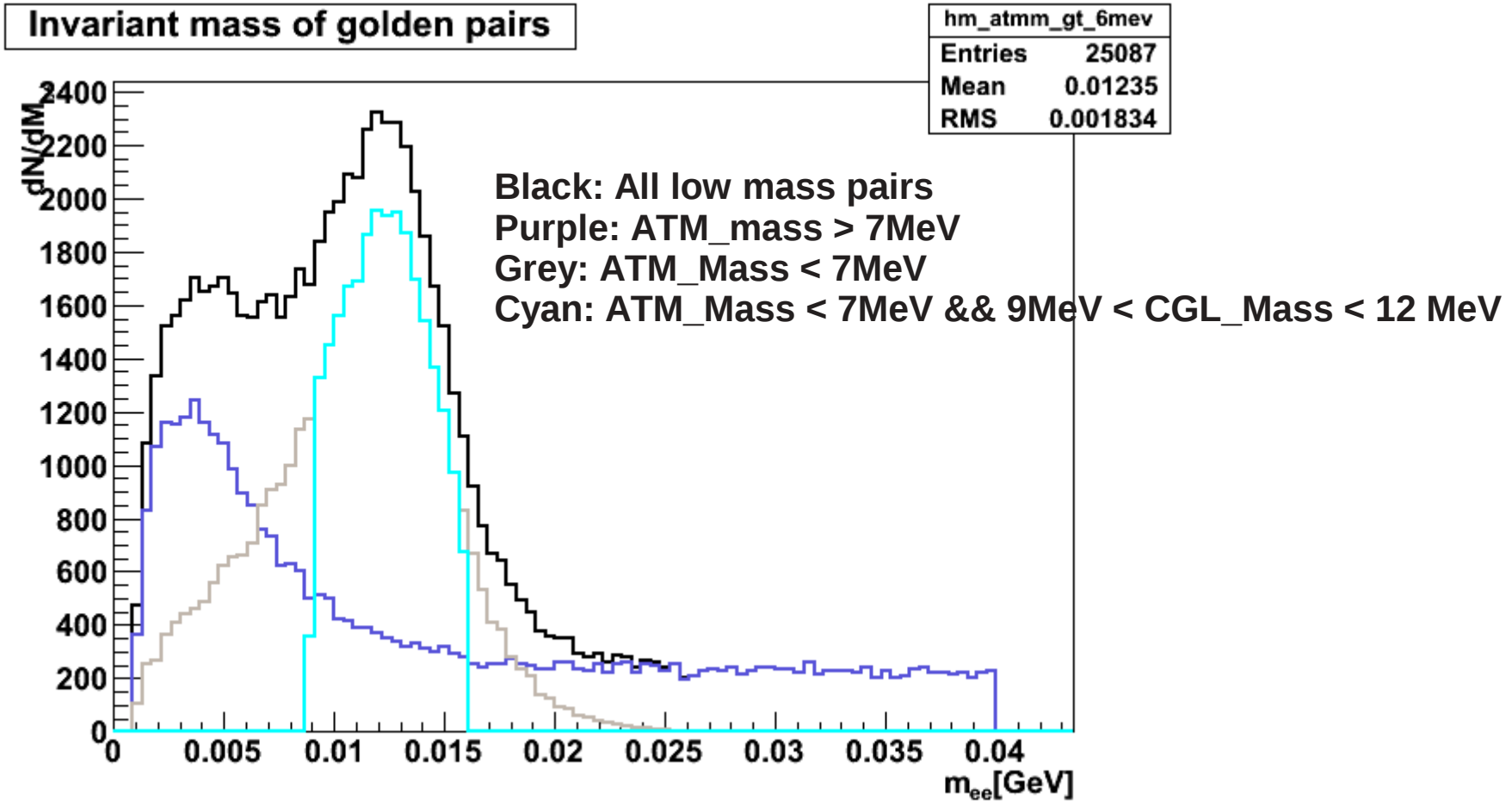
How it was implemented

- For each category
  - Run through all **unlike sign** pairs in the event
  - If at least one pair satisfying the conditions for the category is found, the event is kept, but only the tracks belonging to the pairs that triggered the particular conditions for the category are pushed into the output file
  - The following nodes are saved: EventHeader, Sync, TrigLvl1, PreviousEvent, PHGlobal, HbdMiniCellList, PHGoldenTrack (which is of type PHCentralTrackv24)
- The conditions were based on:
  - CGL reconstructed mass and opening angle
  - Alternate track model (ATM) mass and opening angle
    - ATM is a set of parametrizations developped by Richard Petti (*) to calculate single track pT, the0 and phi0 assuming that it comes from the backplane of the HBD (as opposed to event vertex as is done in CGL track model)
    - If the track actually comes from the backplane, the ATM momentum is more correct than the CGL momentum
    - Invariant mass of backplane pairs which sits at 12MeV (due to CGL assumtion error) is therefore squished to near 0, whereas closed angle Dalitz pairs are pushed out to higher mass
  - The selection strategy uses a combination of cuts on these quantities as explained below

(*) https://www.phenix.bnl.gov/cdsagenda//fullAgenda.php?ida=a10139&fid=12

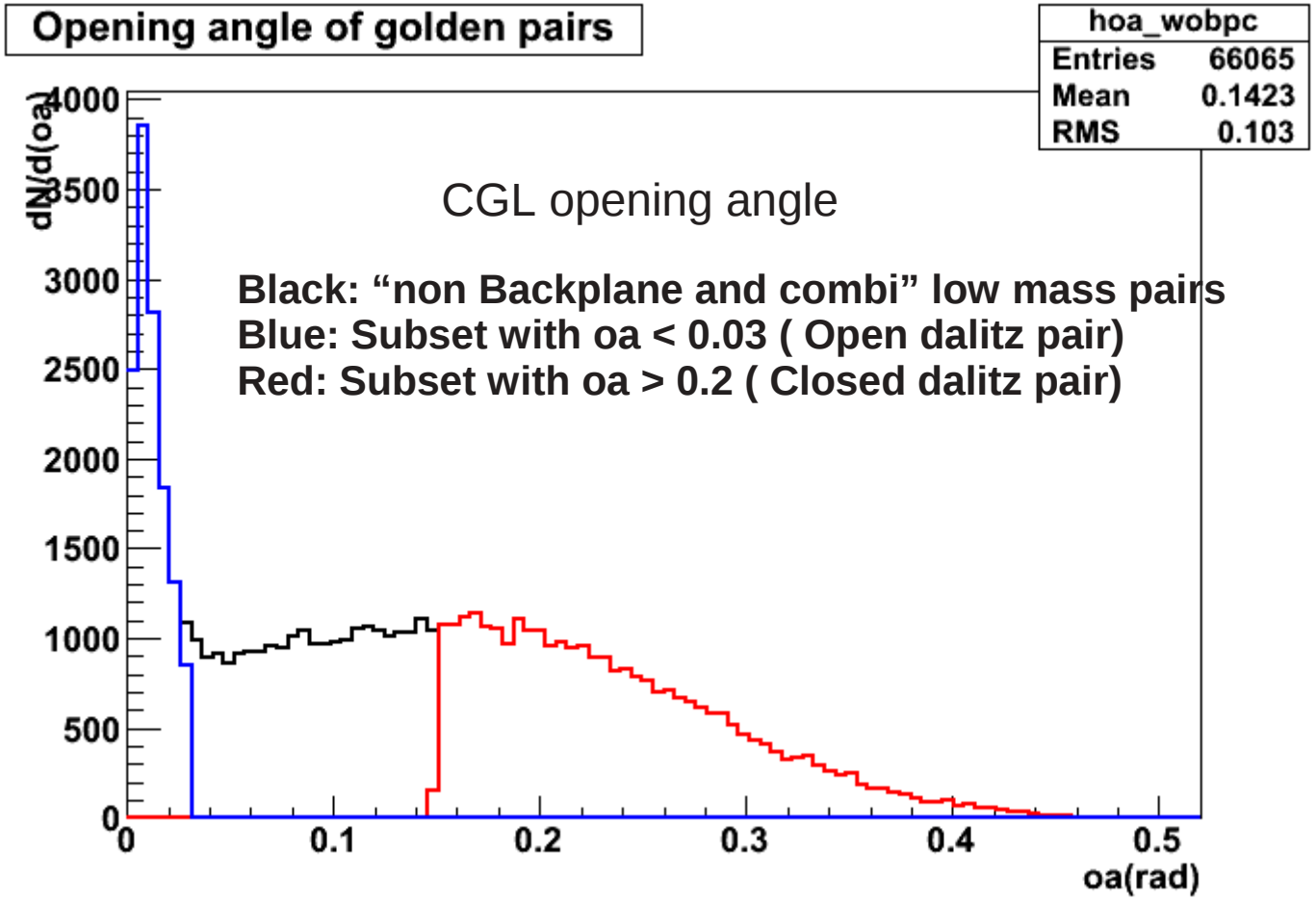
Separating out backplane conversions

- At ATM_mass < 7, the whole backplane conversion peak is suppressed.
- An additional constraint on CGL mass is added to make sure that any contamination from closed Dalitz pairs is minimized
- An additional cut on ATM opening angle < 0.03 rad is applied.

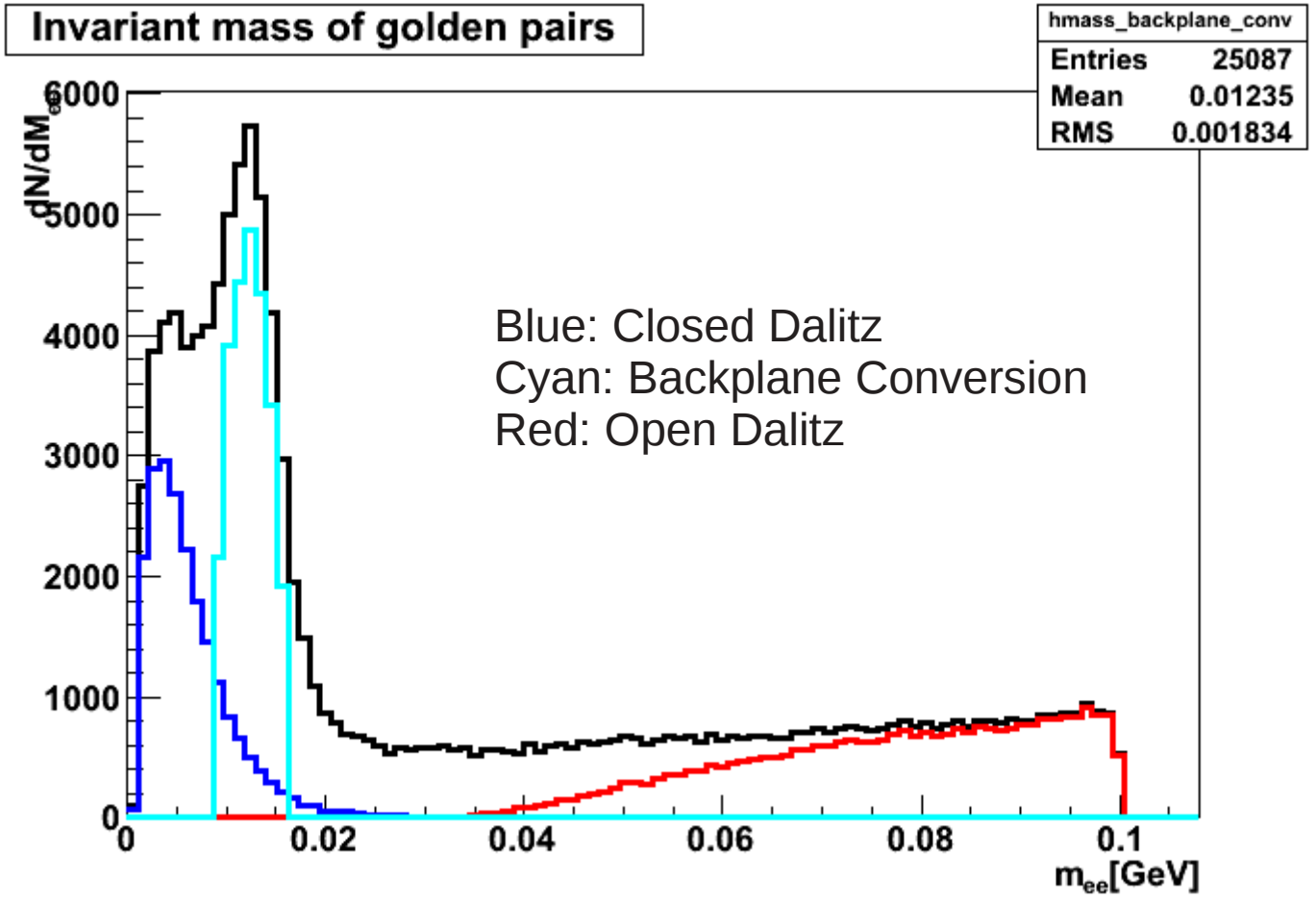


Separating out Dalitzes

- CGL_Mass < 100MeV → suppress combinatorials
- ATM_Mass cut of > 10MeV → suppress Backplane conversions
- The remaining sample is divided into closed and open based on CGL opening angle



Invariant mass of the first three samples



- For high mass pairs, all unlike sign pairs between mass of 2.4GeV and 4.0 GeV are kept.

Locations

- The code was passed on last week's Analysis Taxi
  - https://www.phenix.bnl.gov/viewcvs/offline/AnalysisTrain/HbdGoldenTracks/
  - Macro: AnalysisTrain/pat/macro/Run_HbdGoldenTracks.C
- The outputs from the first pass are located in
  - /phenix/hl/tujuba/diel/golden_tracks/taxi_output
- Files are small so will do the aggregation (Run by run) once all files are processed and send new location on the list
- If there is any suggestion for improvements in the cuts used to categorize these events, it's very easy to re-pass the data
- Please use them and give feedback