pXp analysis

Luiz Emediato (Sao Paulo)
Tom McDowell, Cory Rude, Jane Nachtman (Iowa)
Mike Albrow (FNAL)

Overview

1. 4-track code: luianaRP4.cc (github)
   important: **make -f LUMakefile4** to compile the code
   - for now 4 pions per event only
   - 4-track 2015 data

2. Hand notes: luianaRP-scheme.pdf (140MB google drive only)
   - helps to understand the logic
   - not in github, it allows only 25MB/file
   - “pula” is the portuguese for skip or jump
   - if you want to print the code in syntax-oriented colors use emacs:
     C-u M(ESC)-x ps-print-buffer-with-faces
   - for2 loop: tracks per event
   - for3 loop: vertices per event

- main loops:
    - loop over data files
    - loop over events
    - sub loop over tracks
    - sub loop over vertices

3. number of vertices nvtx : now 1 or 2 (originally 1)

5. cuts:

a- fiducialRegion: 4 tracks, each pion eta < etaCut=2.5

b- fiducialRegionPt: 4 tracks, each pion pt > ptCut=0.2GeV/c (changed to 0.1)

definition:

CTpycut = | CMSpy + TOTEMpy | < 0.06 (applied to all cuts)

CTpxcut = | CMSpx + TOTEMpx | < 0.15

RPvertex = | xVtxL – xVtxR | < 3e-5

CTvertex = -0.04 < (xvtx - xvtxT*100) .AND. (xvtx - xvtxT*100) < 0.18

- cut 1: a, b → hm2rec
  a, b, Q=0 → hm2recOS (hm4recOS)
  a, b, Q!=0 → hm2recSS

- cut 2: a, b, Q=0, RPvertex, CTpxcut, CTvertex → hm2rec2OS (hm4rec2OS)
  a, b, Q!=0, RPvertex, CTpxcut, CTvertex → hm2rec2SS
  need to be fixed

- cut 3: a, b, Q=0, RPvertex, CTpxcut → hm2rec3OS (hm4rec3OS)
  a, b, Q!=0, RPvertex, CTpxcut → hm2rec3SS

- cut 4: a, b, Q=0, RPvertex, CTpxcut, CTvertex, |zvtx|<5.0 → hm4rec4OS
  a, b, Q!=0, RPvertex, CTpxcut, CTvertex, |zvtx|<5.0 → hm4rec4SS

- cut 5: a, b, Q=0, Rpvertex, CTvertex → hm4rec5OS
  a, b, Q!=0, RPvertex, CTvertex → hm4rec5SS

- cut 6: a, b, Q=0, RPvertex, CTpxcut, CTvertex, etaCut2
  each pion |eta| < etaCut2=1.5 → hm4rec6OS
  a, b, Q!=0, RPvertex, CTpxcut, CTvertex, etaCut2
  each pion |eta| < etaCut2=1.5 → hm4rec6SS

- cut 7: a, b, Q=0, diag, RPvertex, CTpxcut → hm4recHFvetoOS
  a, b, Q!=0, diag, RPvertex, CTpxcut → hm4recHFvetoOS

events in the 4-track sample

eta distribution: -3.0 < eta < 3.0 ~ 5,300,000 events

sequence of processing:

CMSpy+TOTEMpy histogram ~ 1,000,000 events

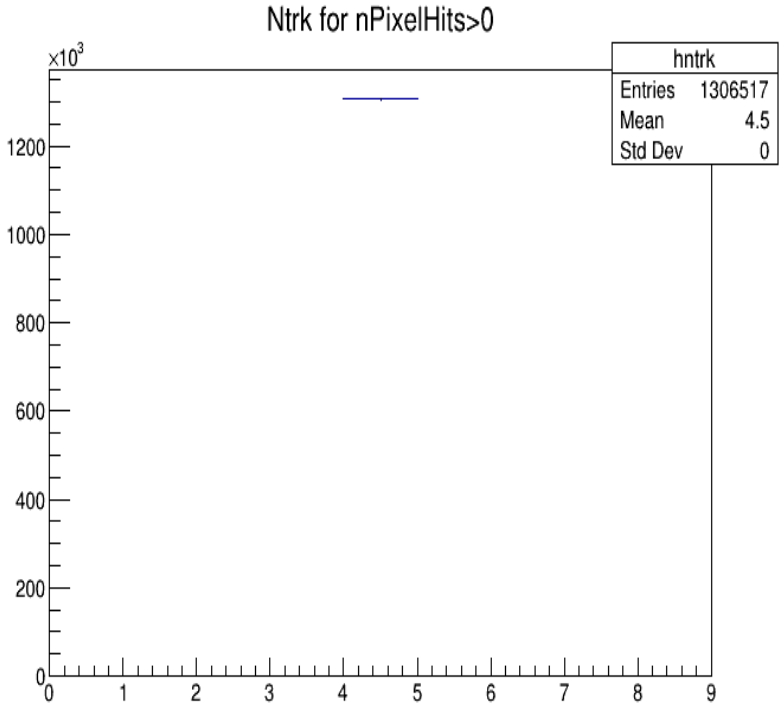
if CTpycut < 0.06 then **(from here we have a big reduction of data)**

CMSpx+TOTEMpx histogram ~ 160,000 events

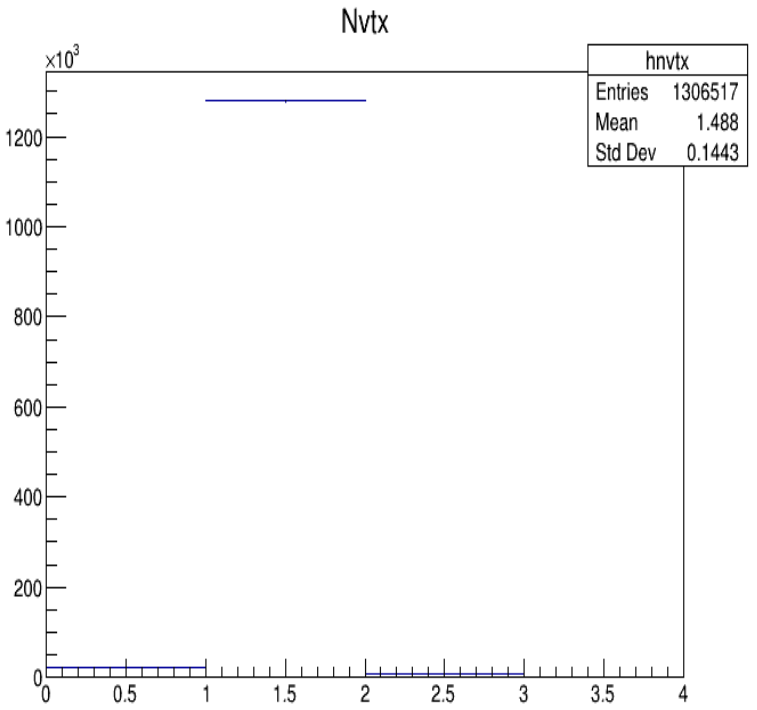
cut 1: fiducialRegion, fiducialRegionPt, Q=0 histograms ~ 140,000 events

4-track sample job#81

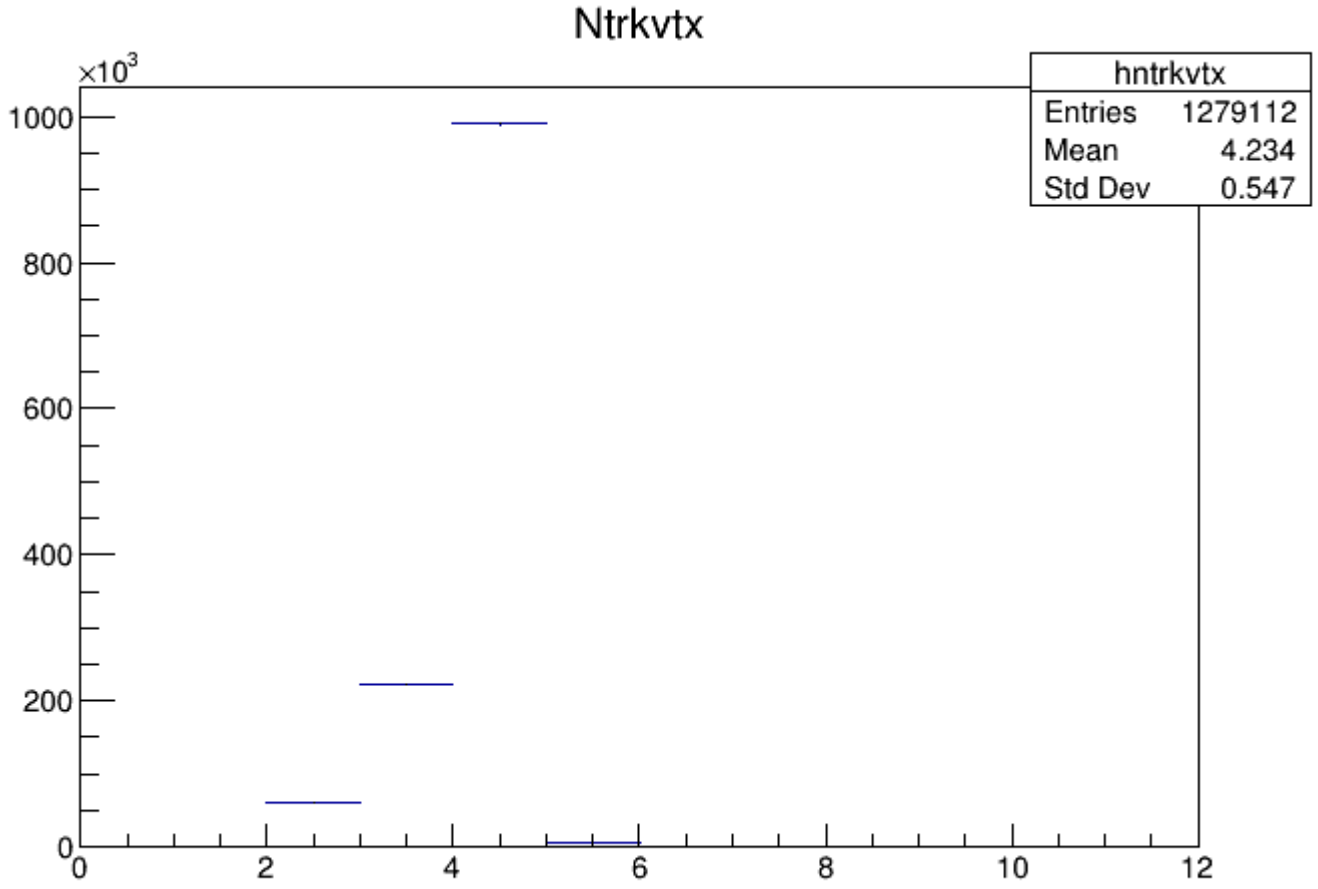
number of good 4-tracks



number of vertices

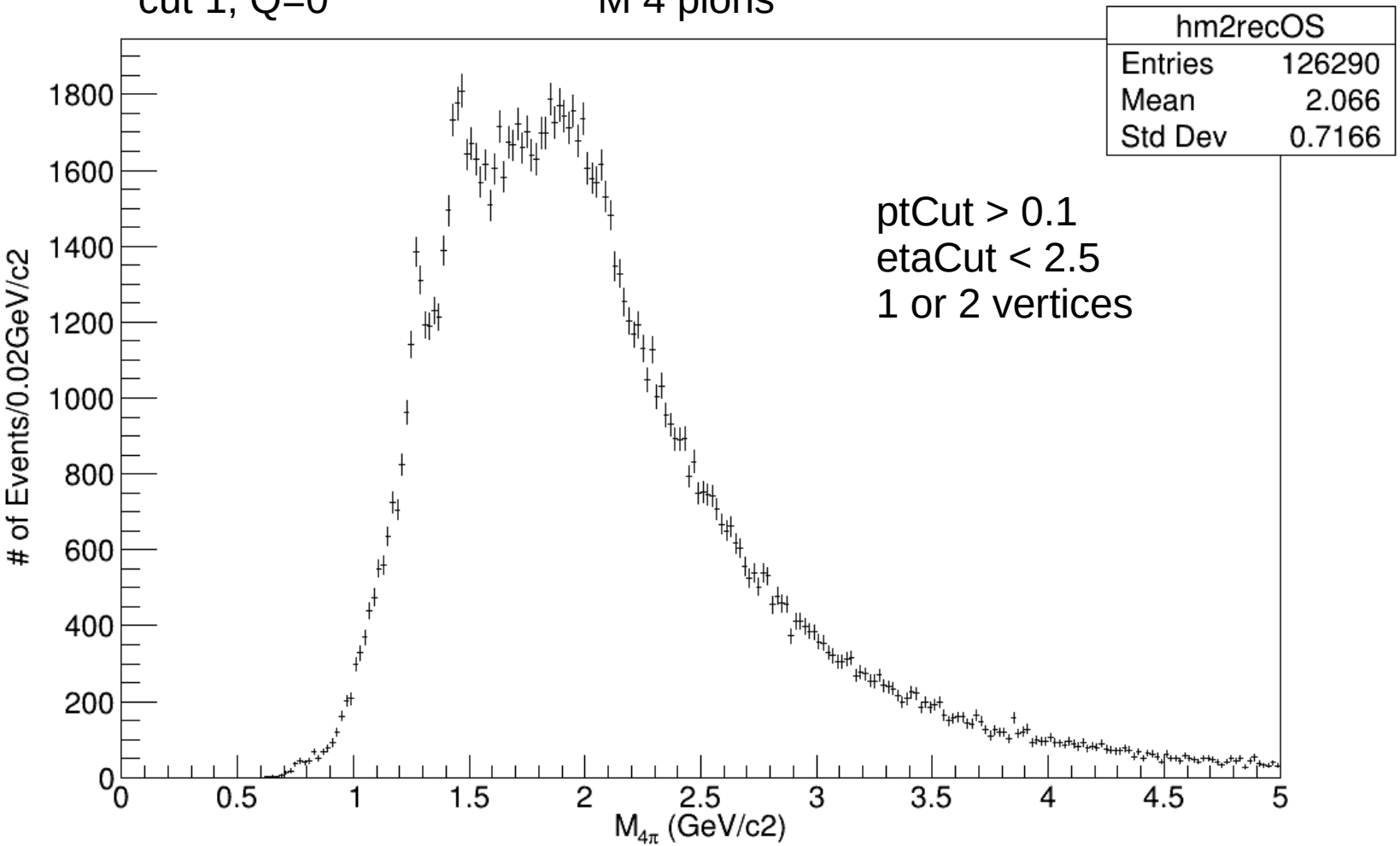


number of tracks with 1 vertex only



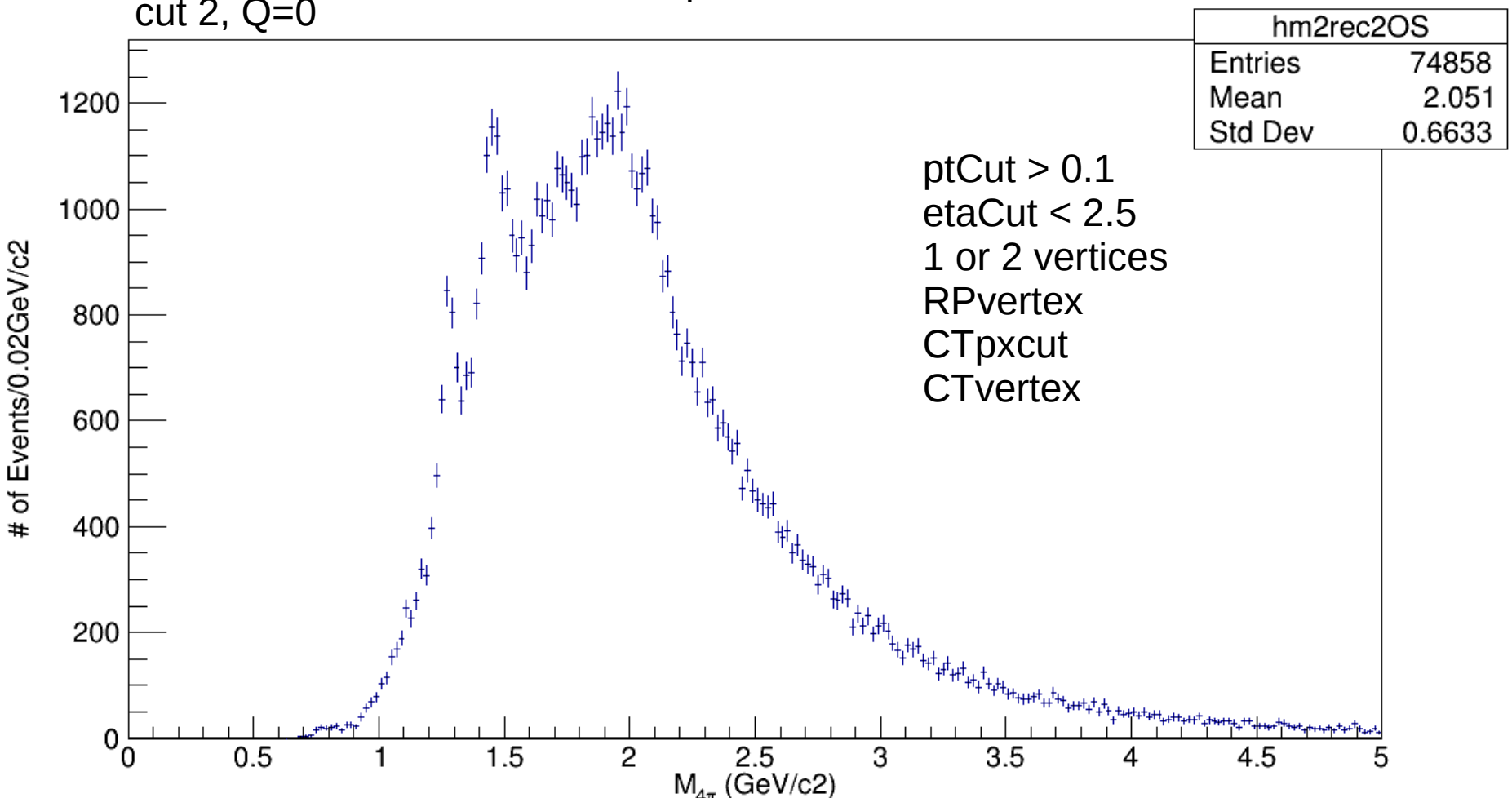
cut 1, Q=0

M 4 pions

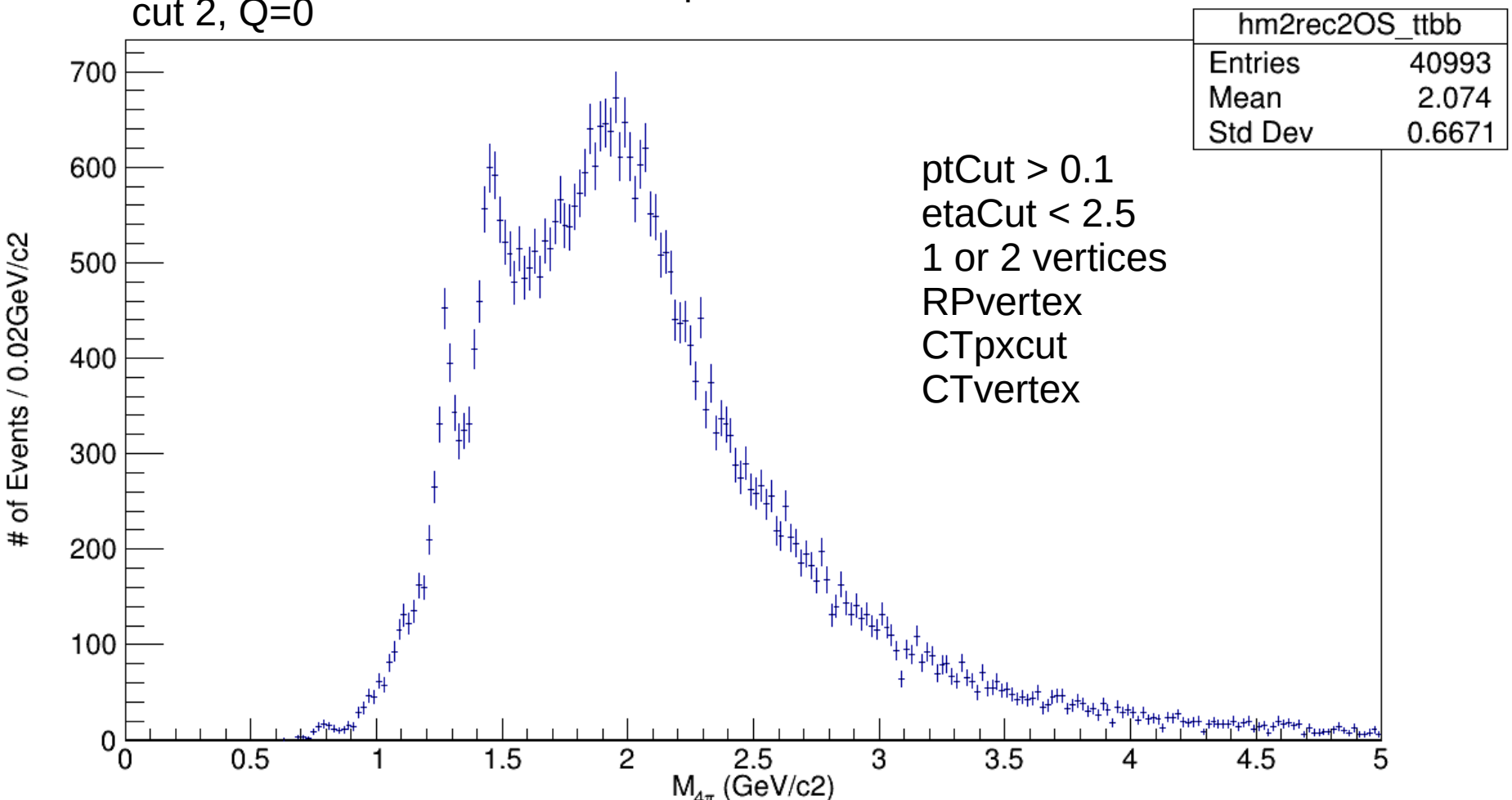


M 4 pions

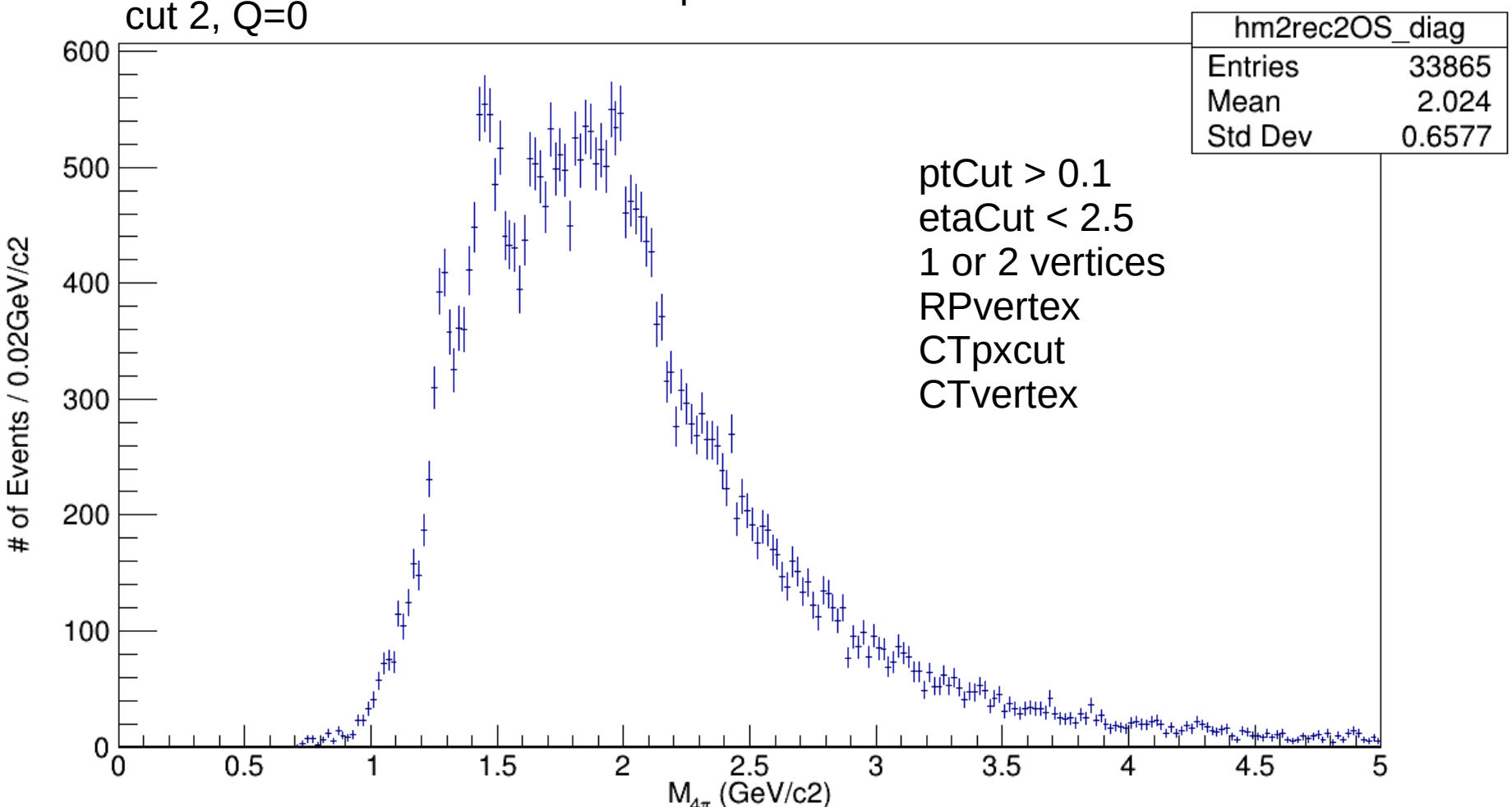
cut 2, Q=0



M 4 pions TTBB



M 4 pions TB/BT



Question: What does Simone mean in the code ?

simulation: **GRANIITTI** is working fine on my Fedora 29

Thanks for your kind help and attention !