

pXp analysis

Luiz Emediato (Sao Paulo)

Tom McDowell, Cory Rude, Jane Nachtman (Iowa)

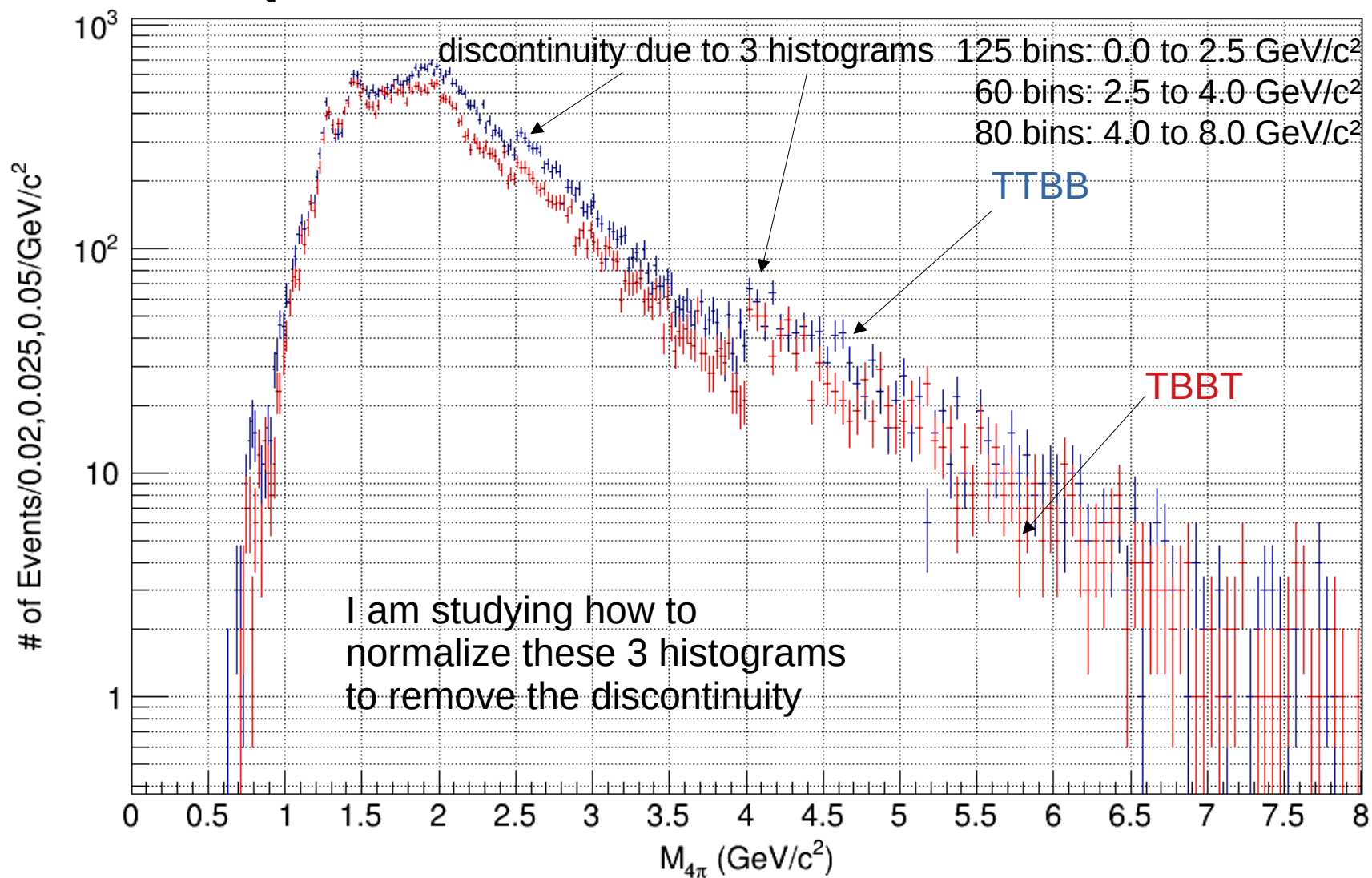
Mike Albrow (FNAL)

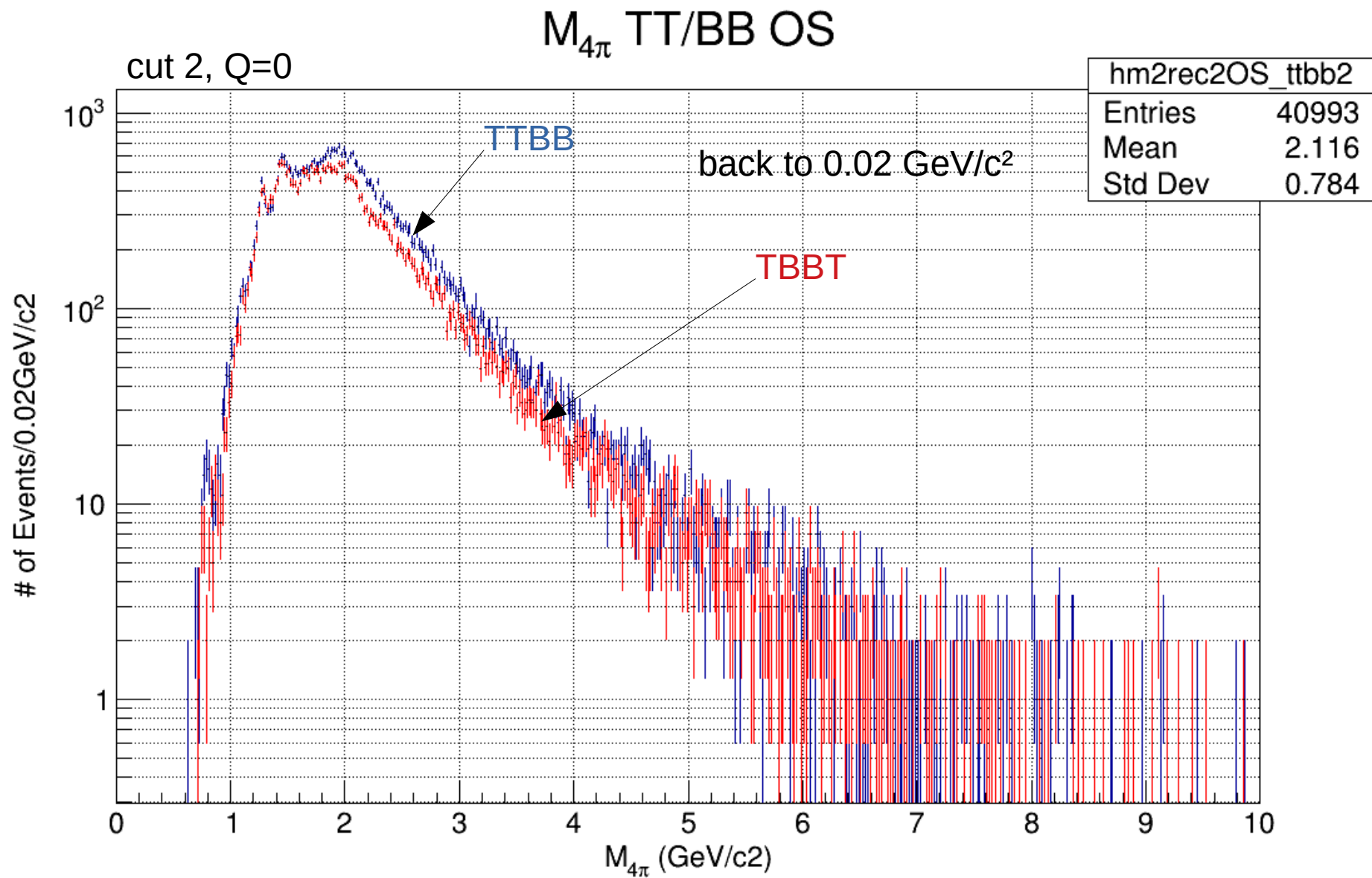
Overview

- 4 pions mass distributions
- 4-track 2015 sample

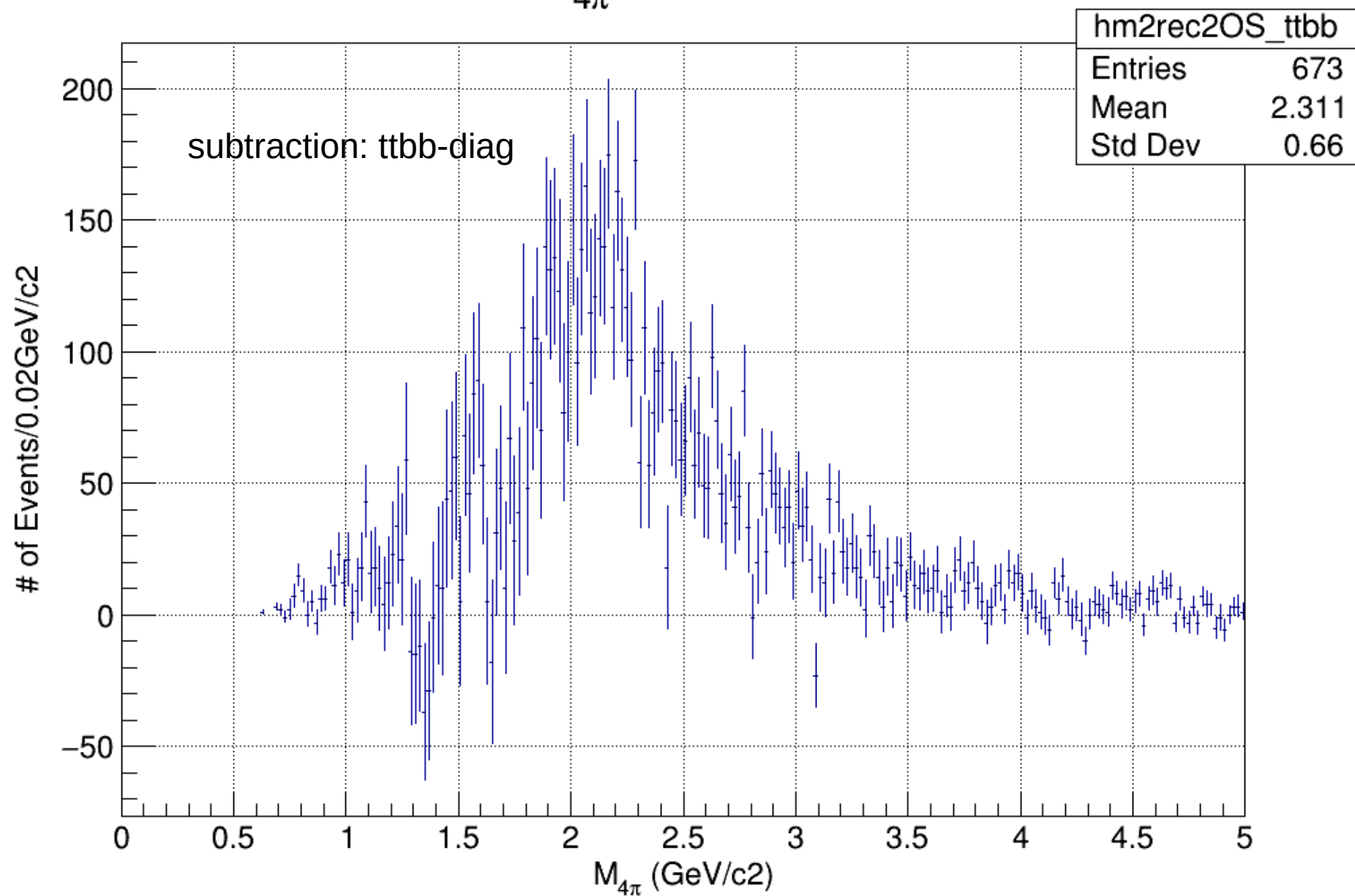
cut 2, Q=0

$M_{4\pi}$ TTBB, TBBT



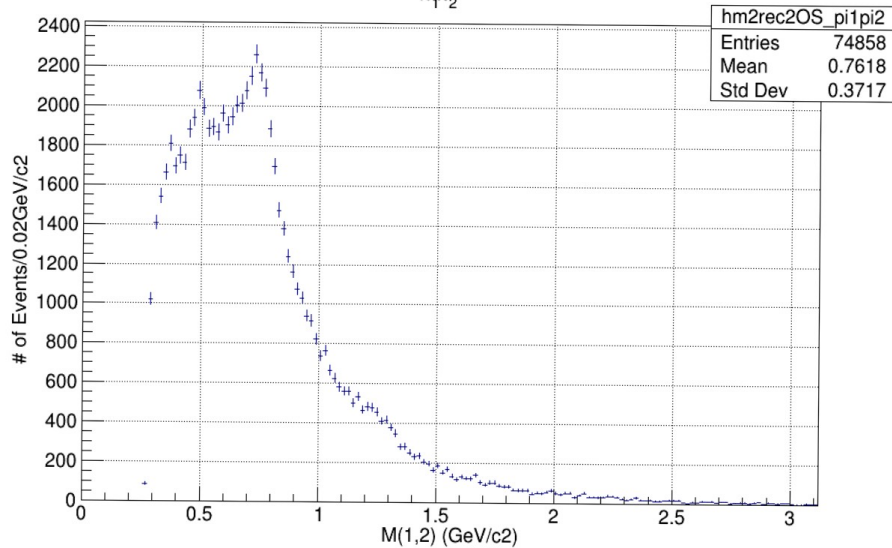


$M_{4\pi}$ TTBB-TBBT OS

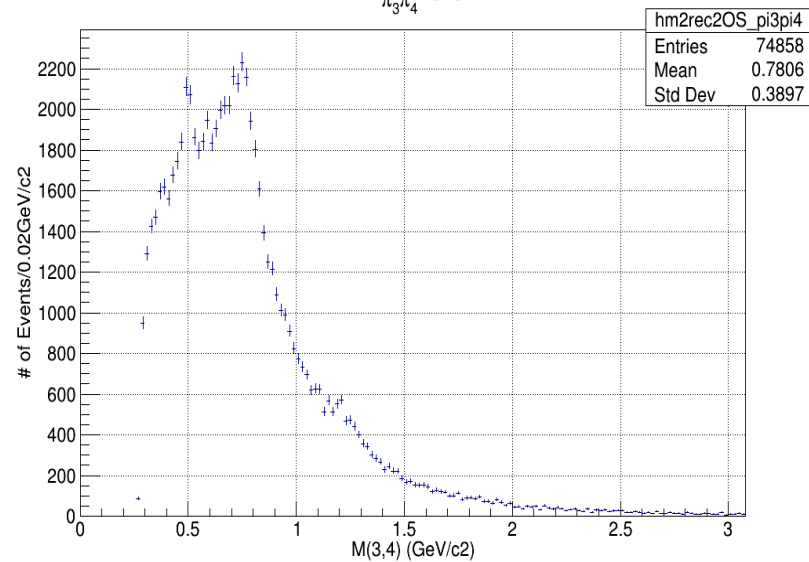


cut 2

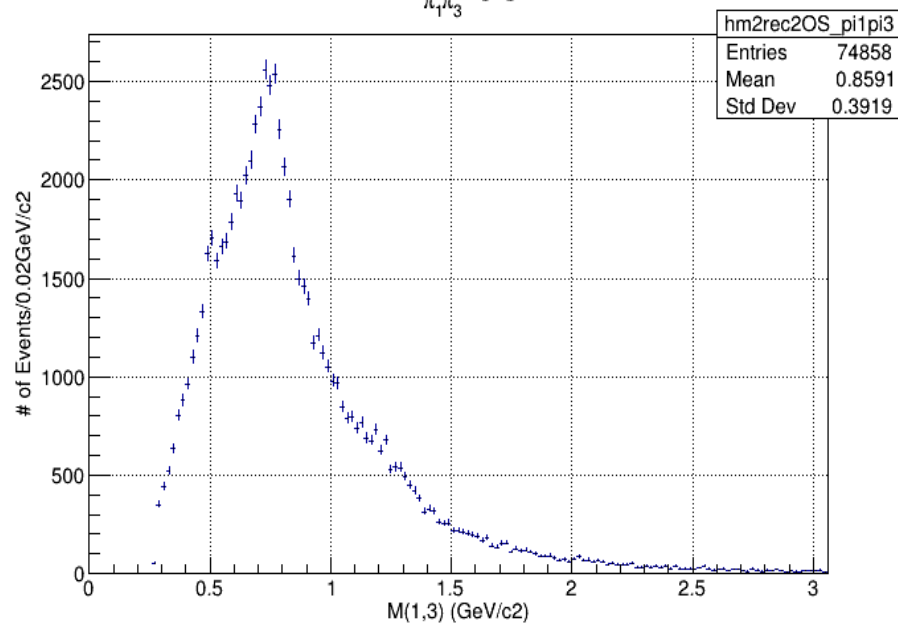
$M_{\pi_1\pi_2}$ OS



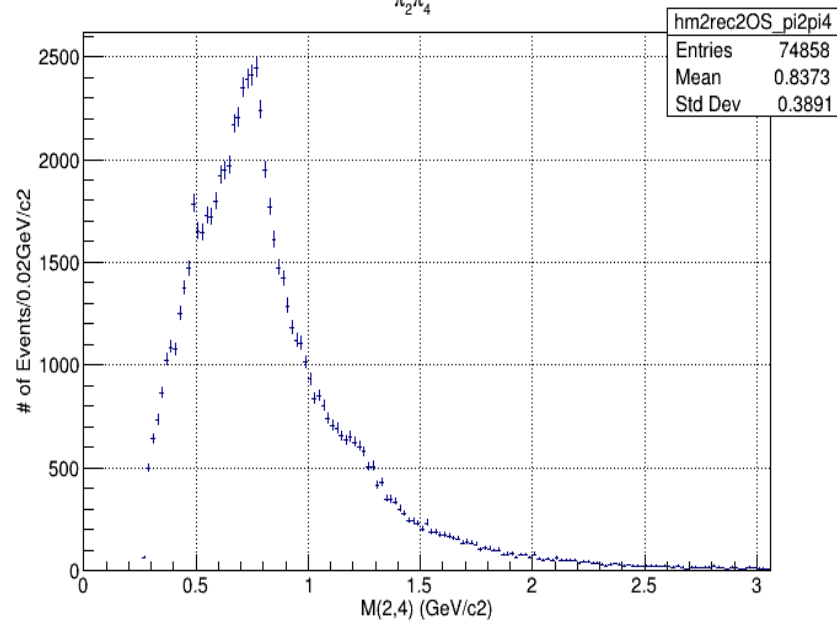
$M_{\pi_3\pi_4}$ OS



$M_{\pi_1\pi_3}$ OS

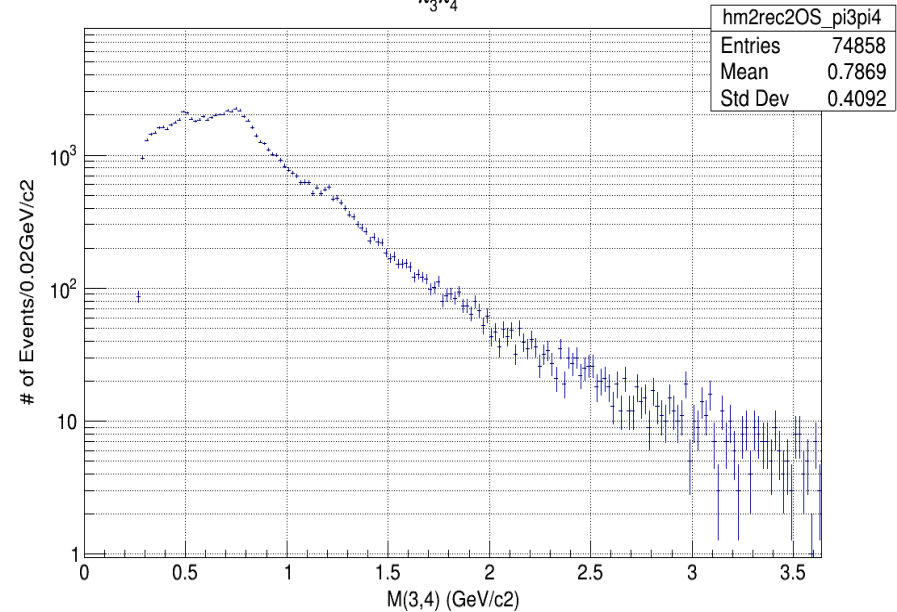
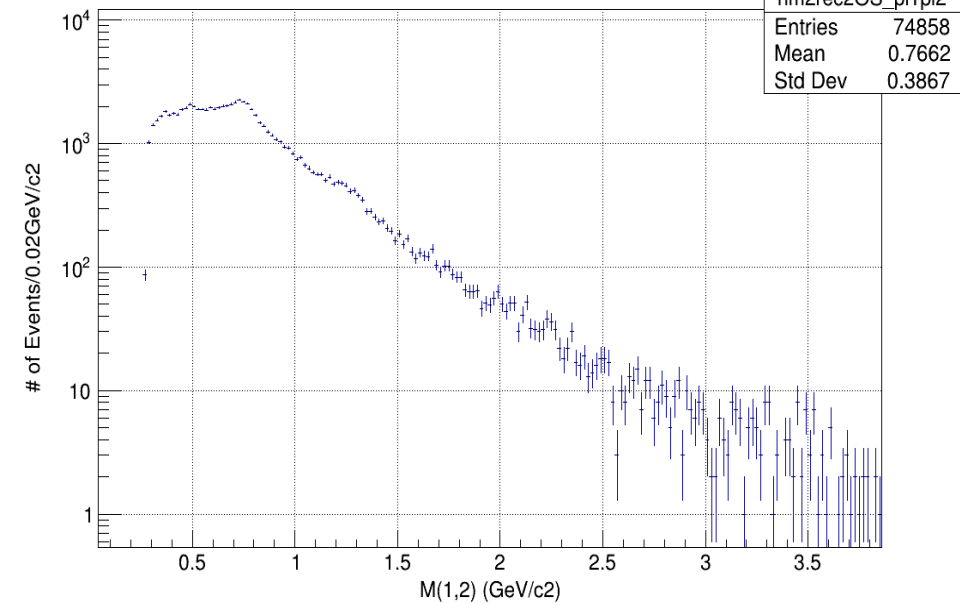
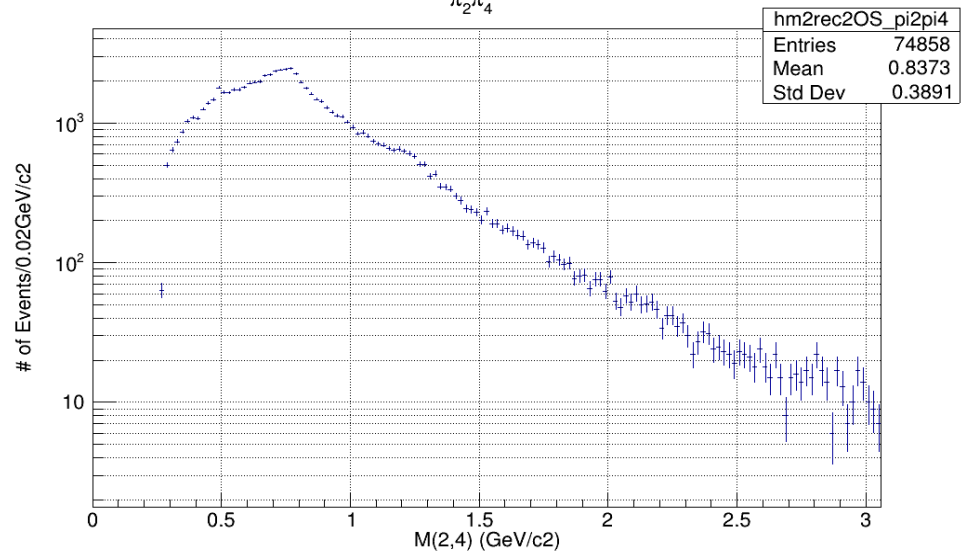
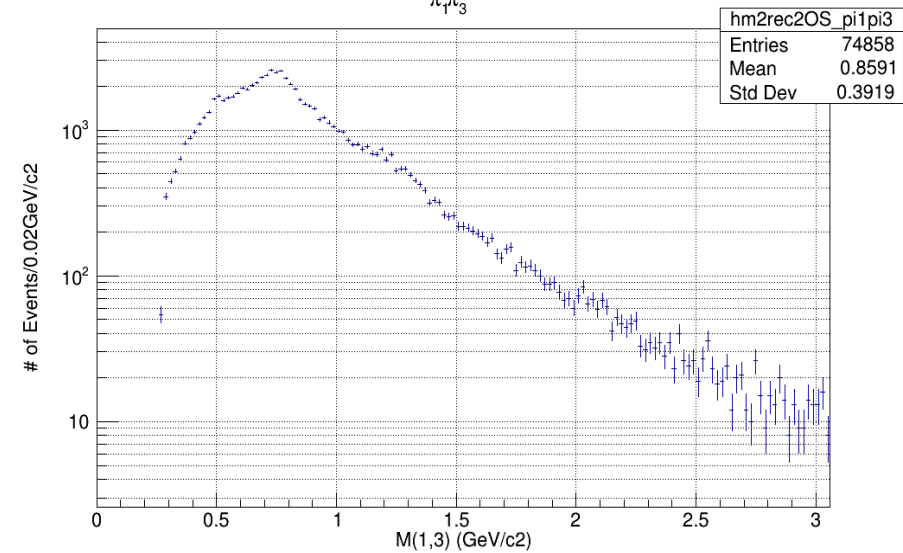


$M_{\pi_2\pi_4}$ OS

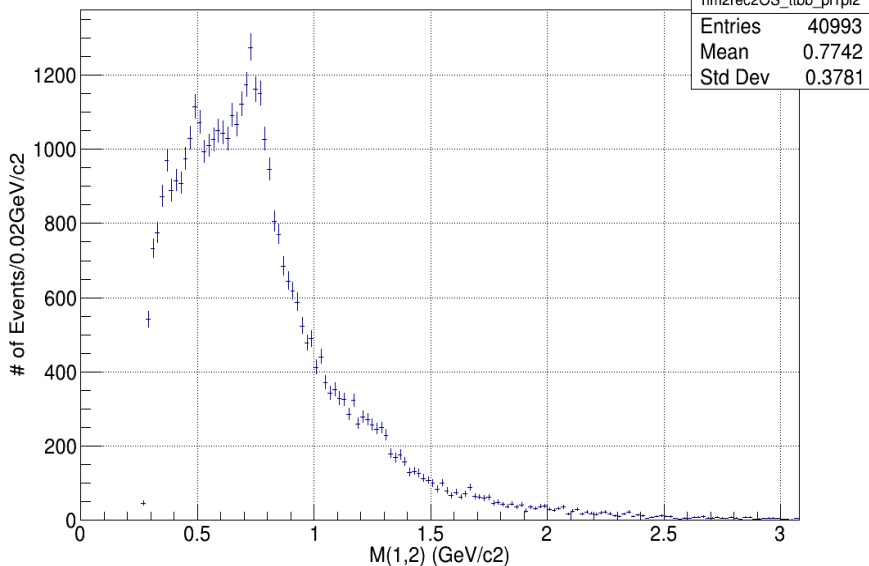
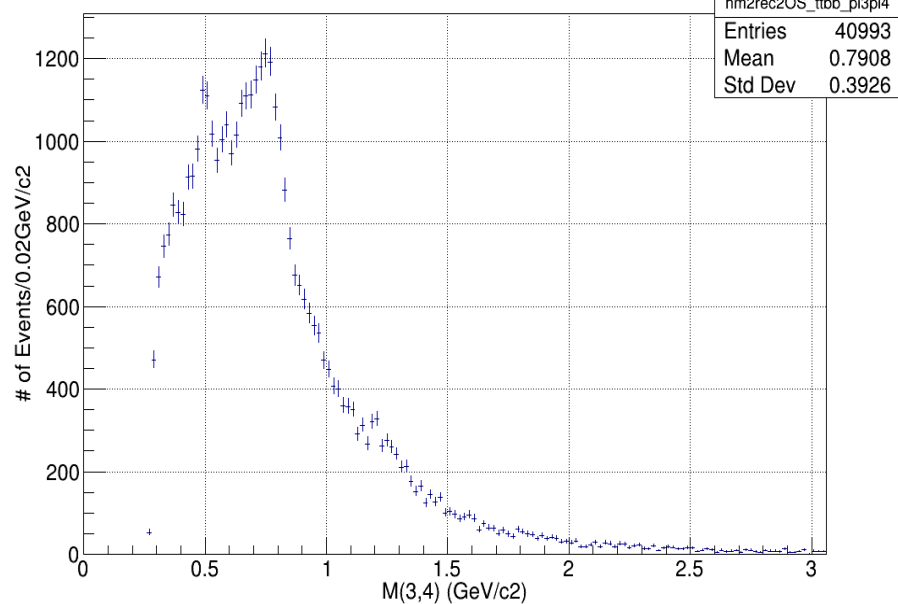
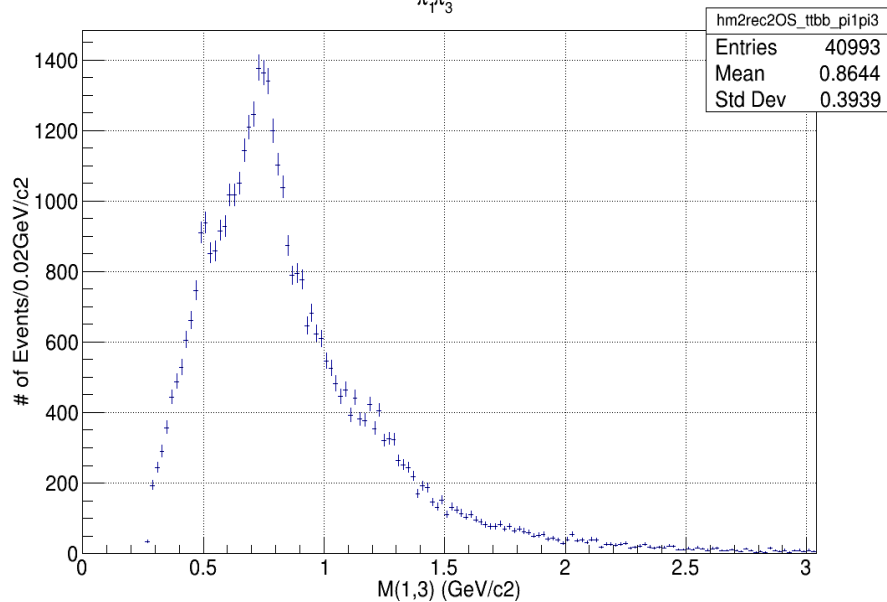
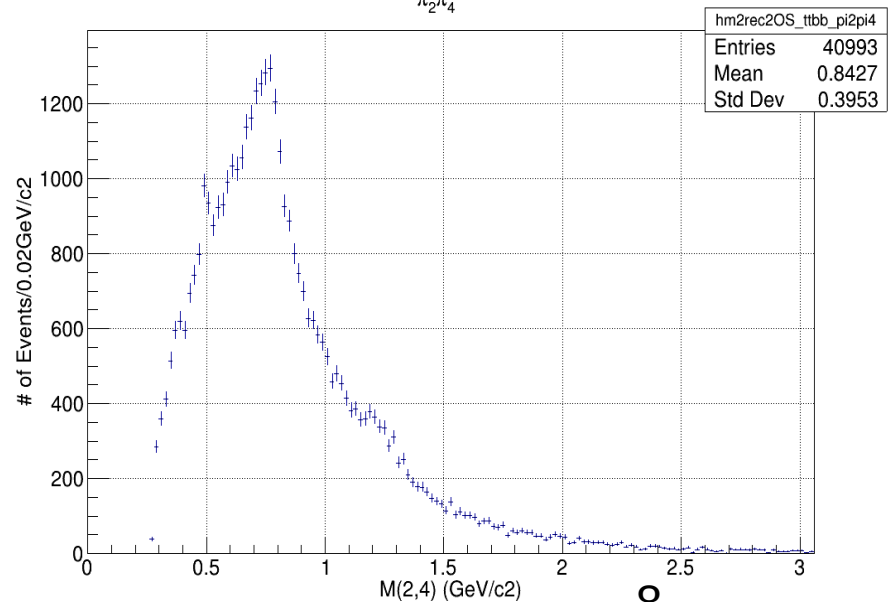


$M_{\pi_1\pi_2}$ OS

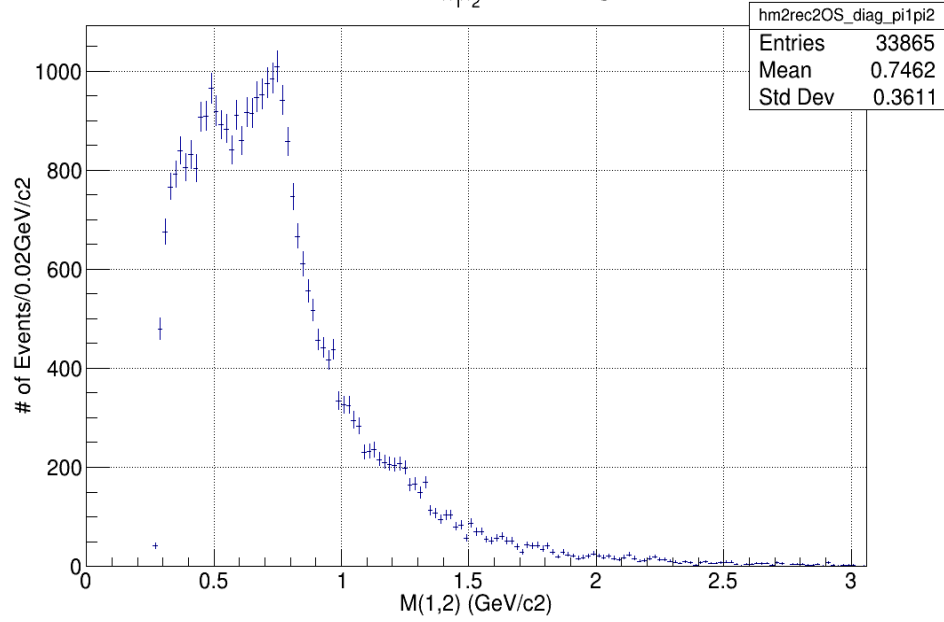
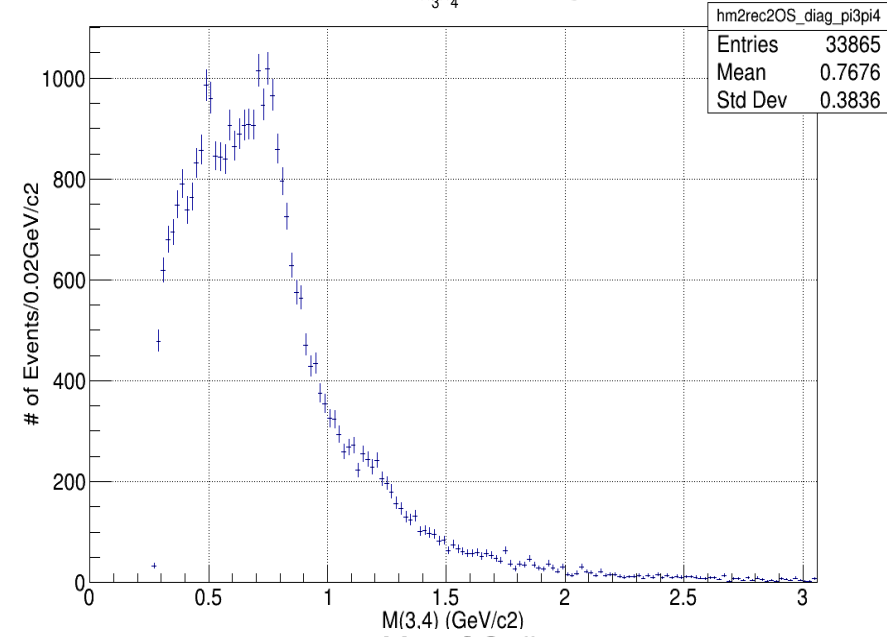
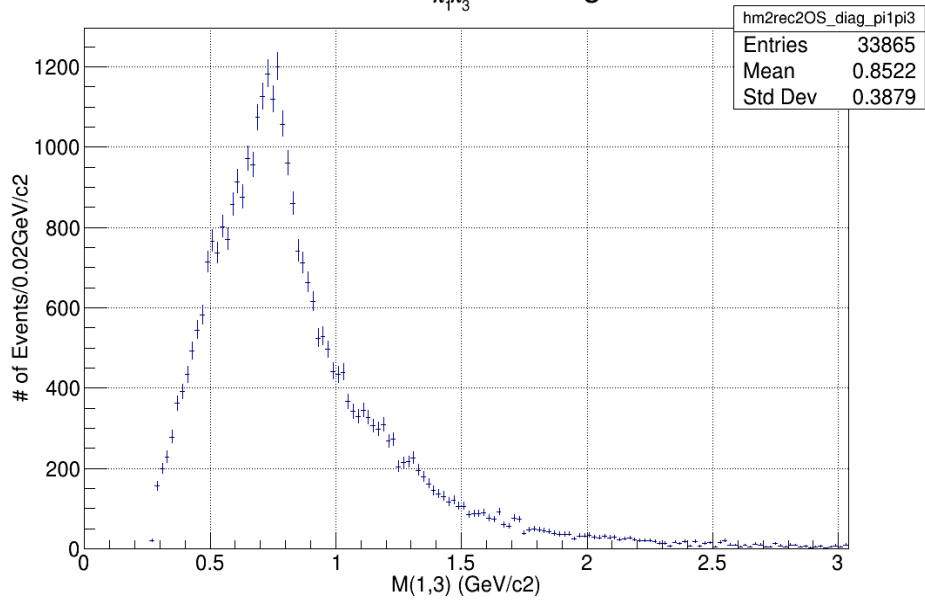
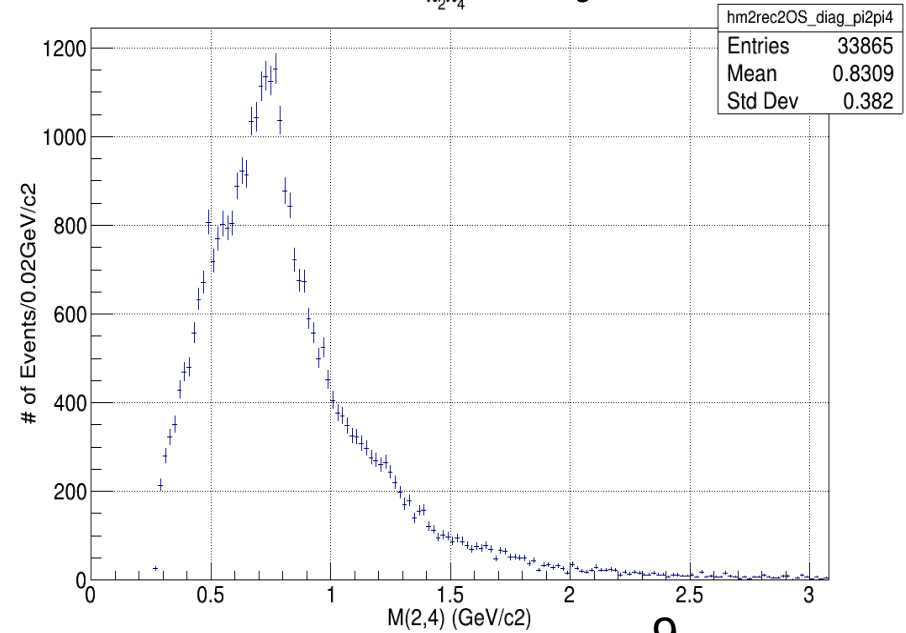
cut 2

 $M_{\pi_3\pi_4}$ OS $M_{\pi_1\pi_3}$ OS $M_{\pi_2\pi_4}$ OS

cut 2

 $M_{\pi_1\pi_2}$ OS TTBB $M_{\pi_3\pi_4}$ OS TTBB $M_{\pi_1\pi_3}$ OS TTBB $M_{\pi_2\pi_4}$ OS TTBB

cut 2

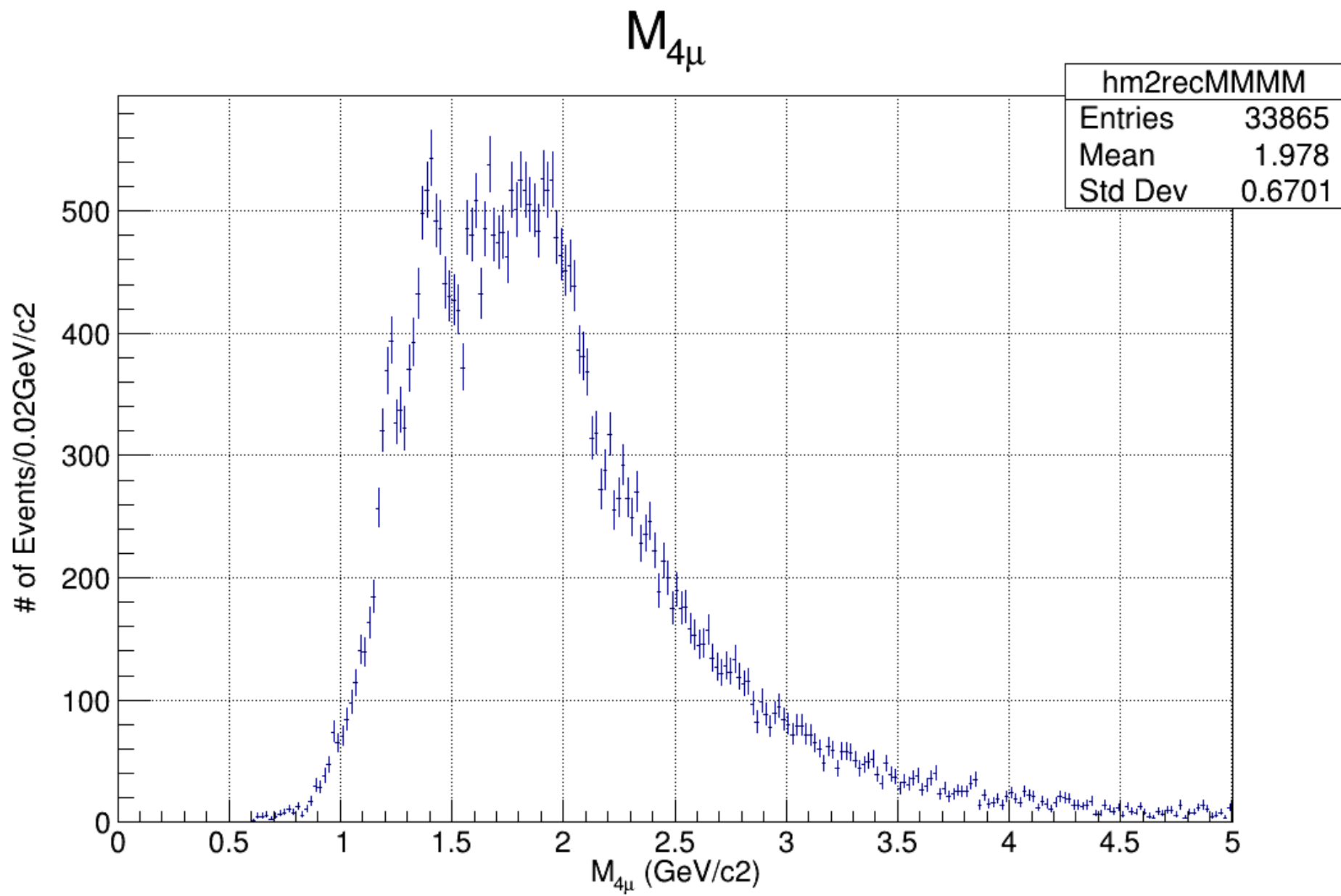
 $M_{\pi_1\pi_2}$ OS diag $M_{\pi_3\pi_4}$ OS diag $M_{\pi_1\pi_3}$ OS diag $M_{\pi_2\pi_4}$ OS diag

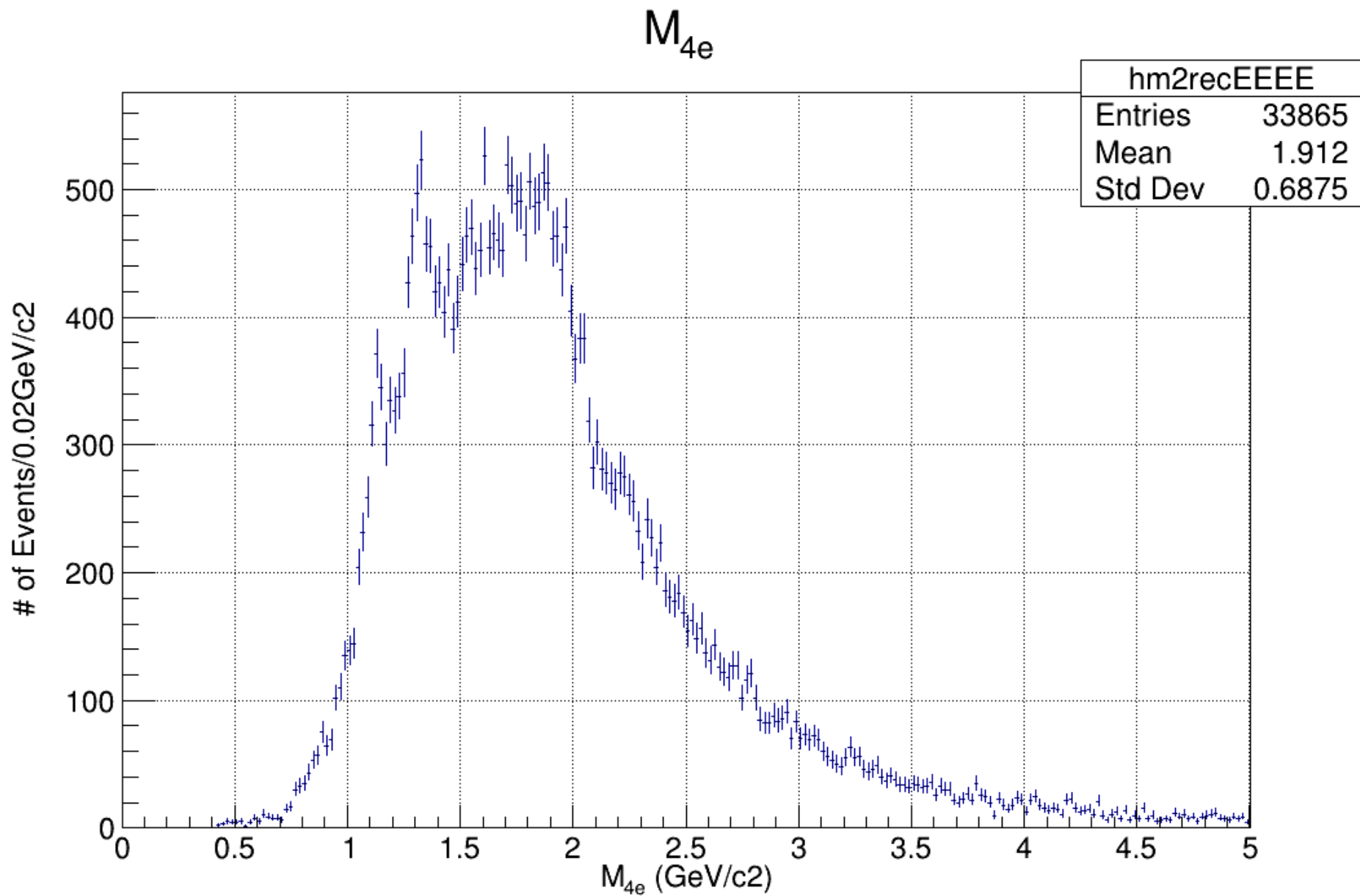
to do:

1. fits
2. t1 and t2
3. slices of delta_phi
4. $pt = \sqrt{px^2 + py^2}$
5. delta pt

questions:

1. Is it enough to assign mass to the 4-tracks? PID ?
2. p pbar ?





from here I will keep Mike's slides

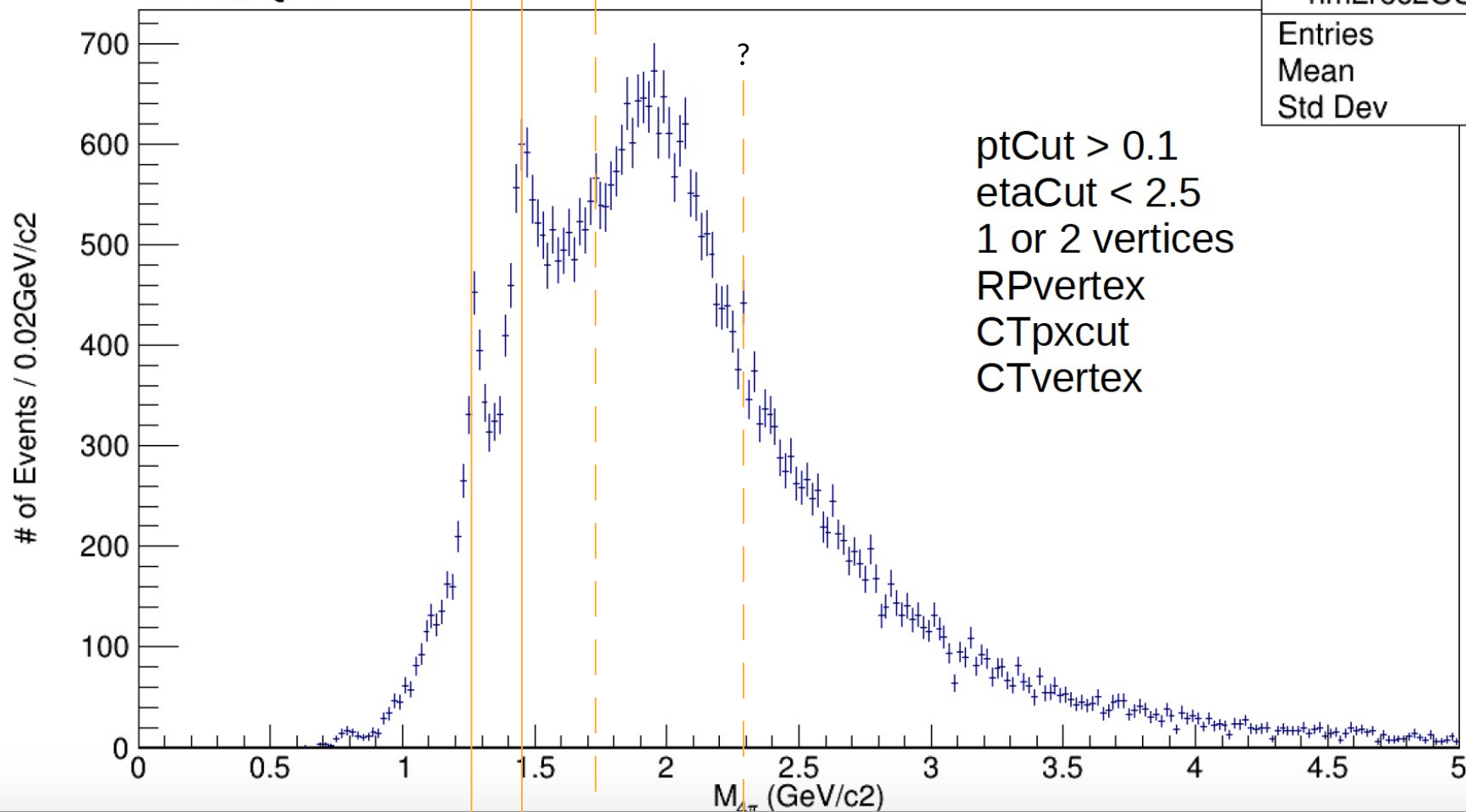
$f_2(1270)$
 $\Gamma = 187 \text{ MeV}$
 $\text{BR} (2.8 \pm 0.4) \%$

$f_0(1500)? \text{ Low!}$
 $\Gamma = 109 \text{ MeV}$
 $4\pi \text{ BR} (49.5 \pm 3.3) \%$

$f_0(1710)?$

M 4 pions TTBB

cut 2, Q=0



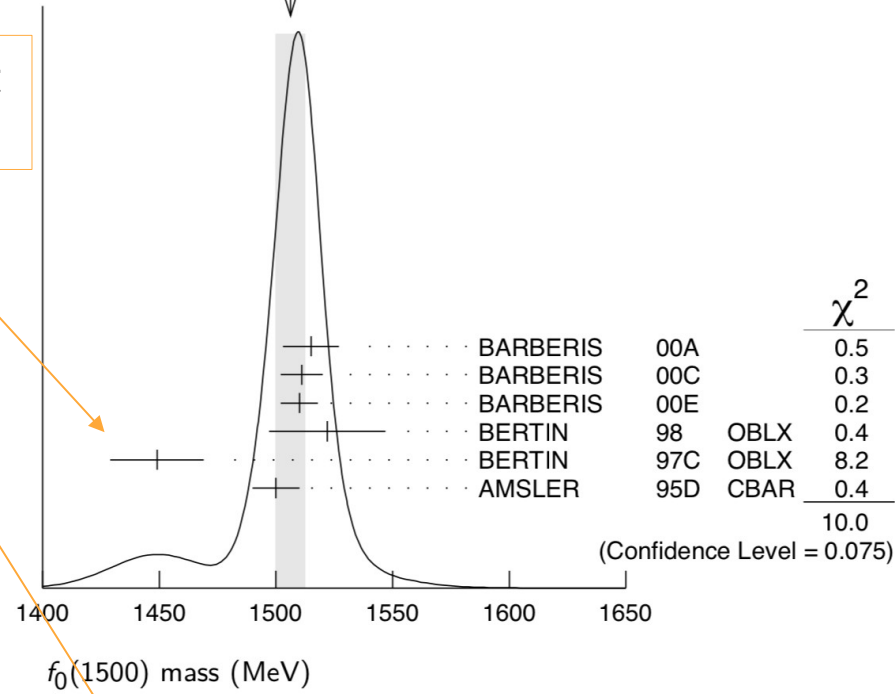
ptCut > 0.1
etaCut < 2.5
1 or 2 vertices
RPvertex
CTpxcut
CTvertex

hm2rec2OS_ttbb	
Entries	40993
Mean	2.074
Std Dev	0.6671

From PDG 2018 big book on $f_0(1500)$

WEIGHTED AVERAGE
1506 \pm 6 (Error scaled by 1.4)

Is this a bad measurement
or a different state?



1505 \pm 15	18 AMSLER	95C CBAR 0.0 $\bar{p}p \rightarrow \eta\eta\pi^0$
1445 \pm 5	19 ANTINORI	95 OMEG 300,450 $pp \rightarrow$ $pp2(\pi^+\pi^-)$
1497 \pm 30	11 ANTINORI	95 OMEG 300,450 $pp \rightarrow pp\pi^+\pi^-$
\sim 1505	BUGG	95 MRK3 $J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$
1446 \pm 5	11 ABATZIS	94 OMEG 450 $pp \rightarrow pp2(\pi^+\pi^-)$

Superseded by Antinori's later paper



A further study of the centrally produced $\pi^+ \pi^-$ and $\pi^+ \pi^- \pi^+ \pi^-$ channels in pp interactions at 300 and 450 GeV/c

WA91 Collaboration, F. Antinori^d, D. Barberis^d, A. Bayes^c, W. Beusch^d, J.N. Carney^c, S. Clewer^c, J.P. Davies^c, D. Di Bari^b, C.J. Dodenhoff^c, D. Evans^c, D. Elia^b, R. Fini^b, B.R. French^d, B. Ghidini^b, A. Jacholkowski^d, J.B. Kinson^c, A. I^d ... M.F. Votruba^c

Abstract

An analysis of the centrally produced $\pi^+ \pi^-$ and $\pi^+ \pi^- \pi^+ \pi^-$ mass spectra from the WA76 and WA91 experiments is presented, which shows that in the $\pi^+ \pi^- \pi^+ \pi^-$ channel there are two new states, the $f_0(1450)$ and $f_2(1900)$. There is another new state in the $\pi^+ \pi^-$ channel with $M = 1497 \pm 30$ MeV and $\Gamma = 199 \pm 30$ MeV, which is compatible with the $f_0(1520)$ observed by the Crystal Barrel experiment. Another interpretation is discussed, where the 1450 and 1497 GeV structures are explained as being due to an interference effect between the $f_0(1365)$ and $f_0(1520)$.

Thanks for your kind help and attention !