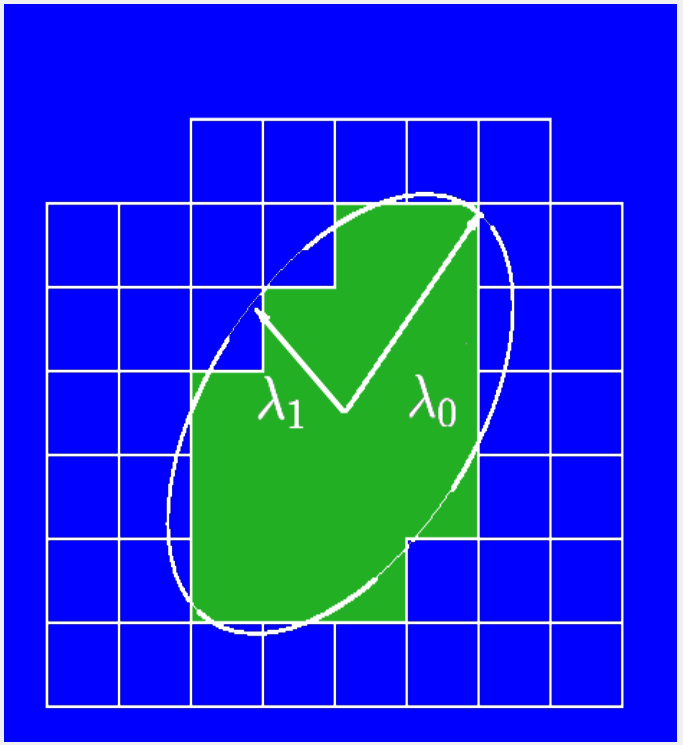
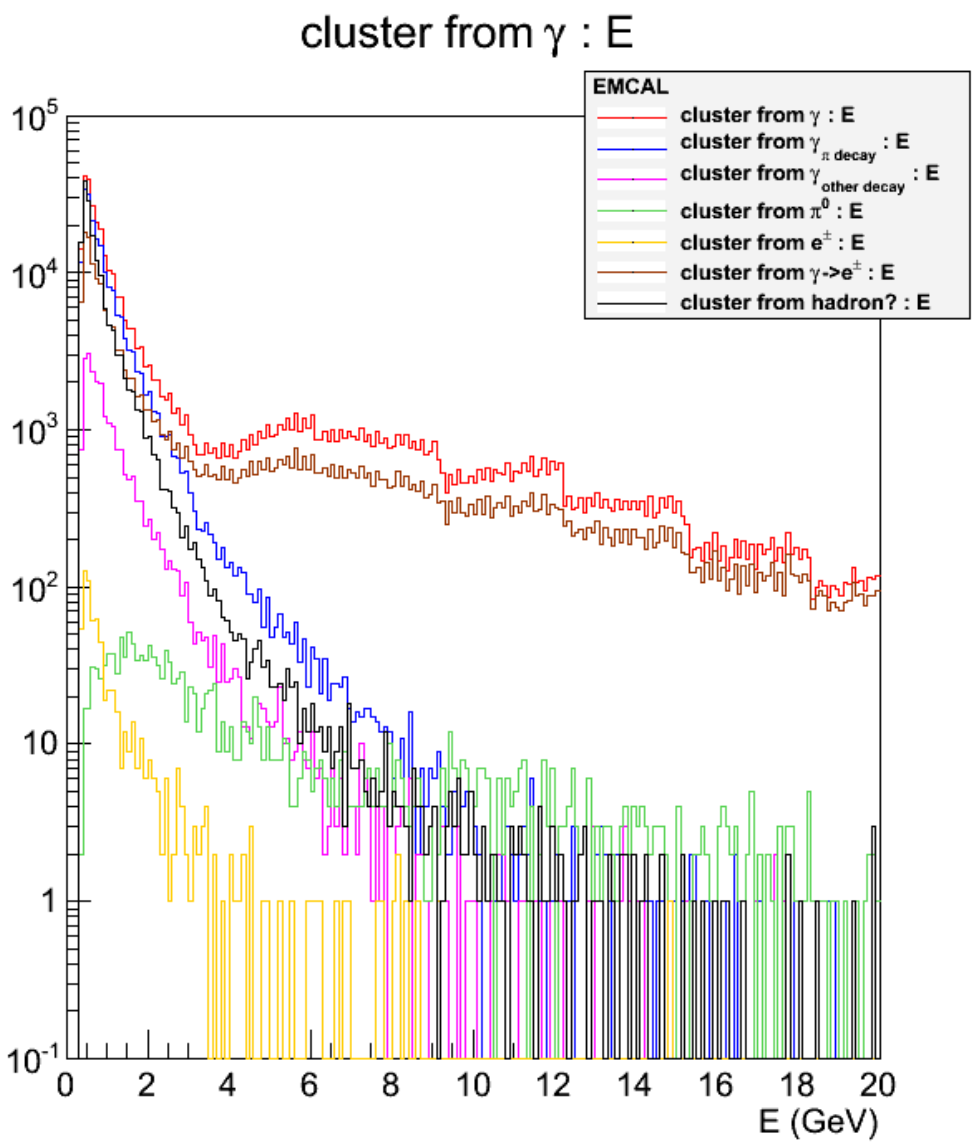
Weekly progress report

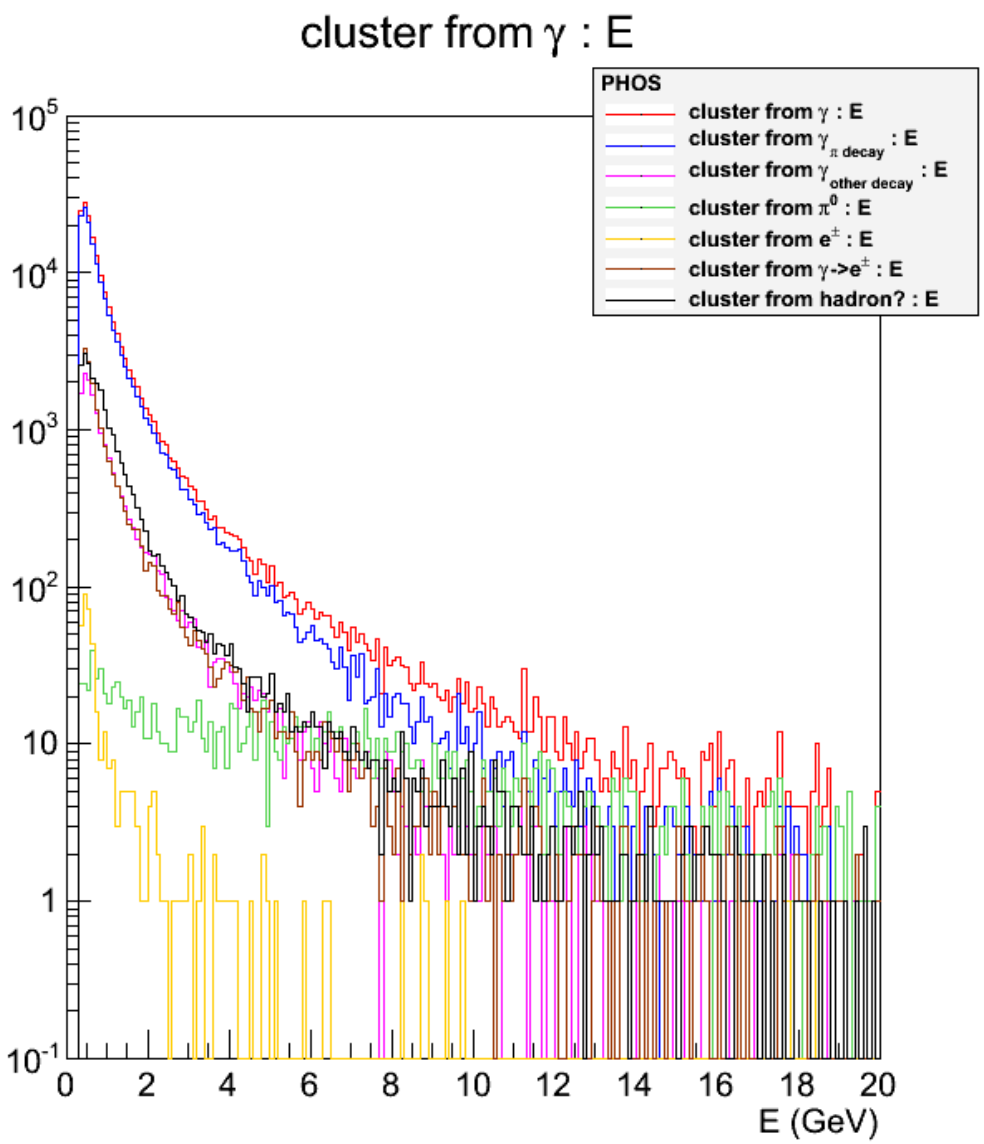
2011-11-08

What was done

- Ran PartCorr framework on 1,5 M Events in PHOS and EMCAL
- Looked for how the variables of interest behave
- Invariant mass analysis (IMA)
- Shower shape analysis (SSA)
- Isolation cut




cluster from γ : E
EMCAL
cluster from γ : E
cluster from γ_π decay : E
cluster from γ_other decay : E
cluster from π⁰ : E
cluster from e± : E
cluster from γ->e± : E
cluster from hadron? : E
10⁵
10⁴
10³
10²
10
1
10⁻¹
0 2 4 6 8 10 12 14 16 18 20
E (GeV)


cluster from γ : E
PHOS
cluster from γ : E
cluster from γ_π decay : E
cluster from γ_other decay : E
cluster from π⁰ : E
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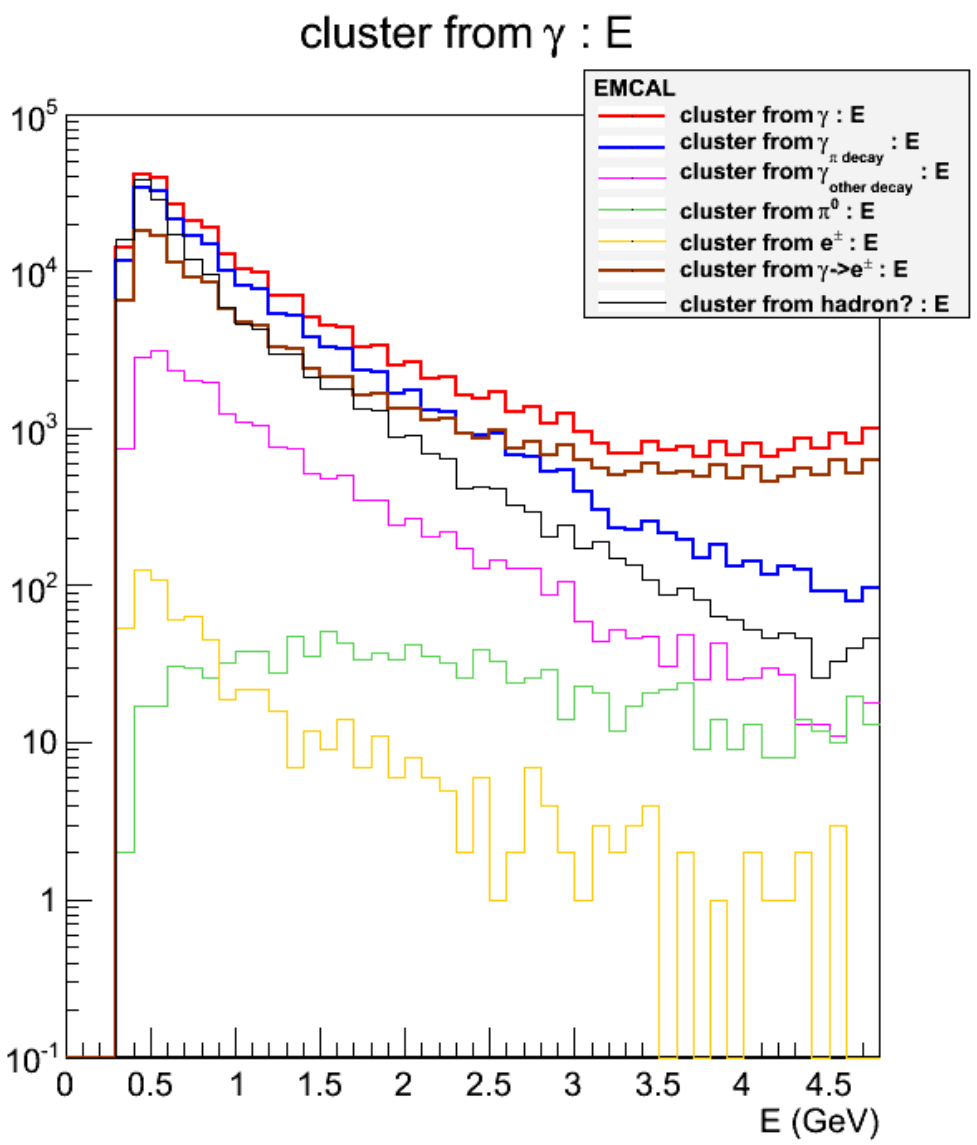
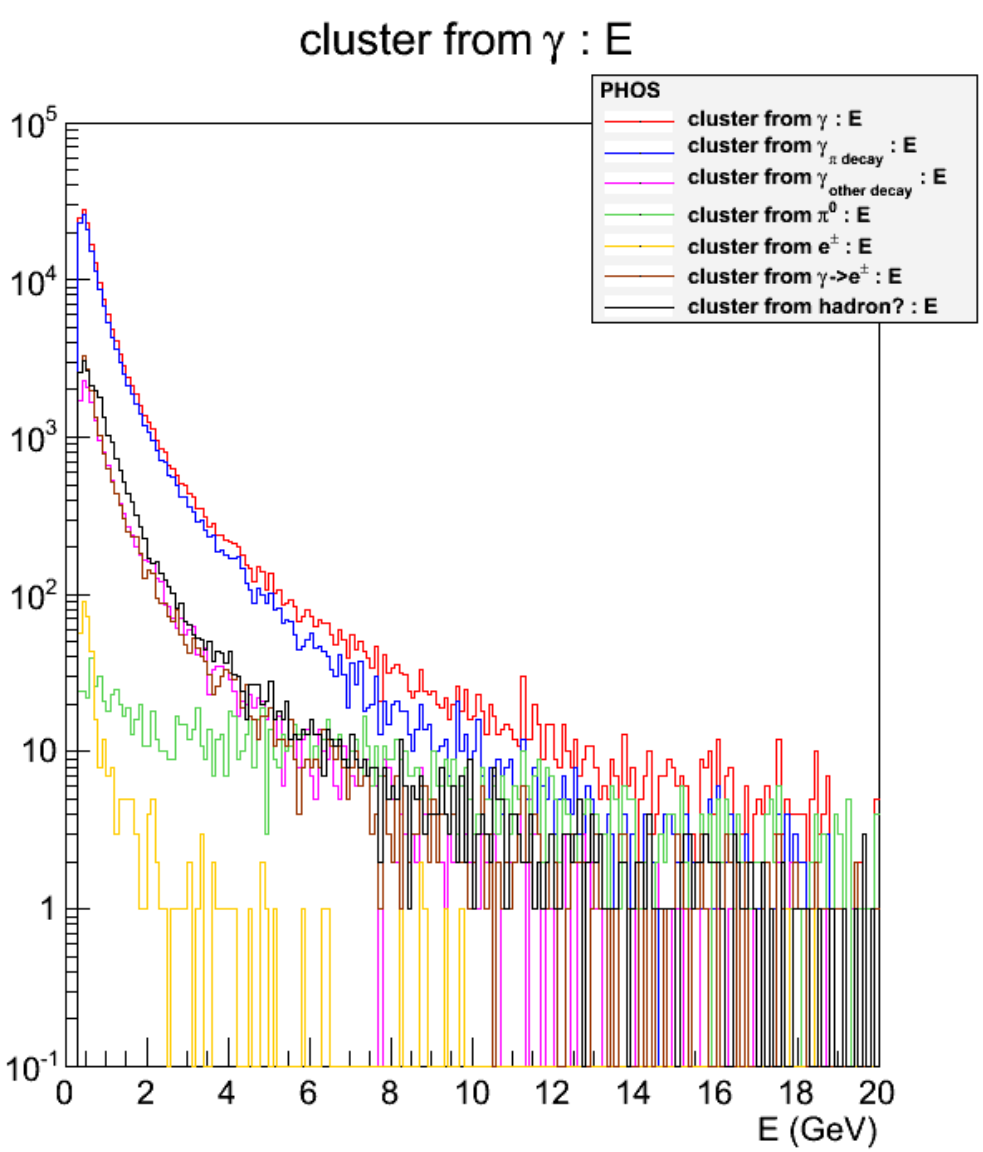
cluster from hadron? : E
10⁵
10⁴
10³
10²
10
1
10⁻¹
0 2 4 6 8 10 12 14 16 18 20
E (GeV)


cluster from γ : E
EMCAL
cluster from γ : E
cluster from γ π decay : E
cluster from γ other decay : E
cluster from π0 : E
cluster from e± : E
cluster from γ->e± : E
cluster from hadron? : E
10^5
10^4
10^3
10^2
10
1
10^-1
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
E (GeV)


cluster from γ : E
PHOS
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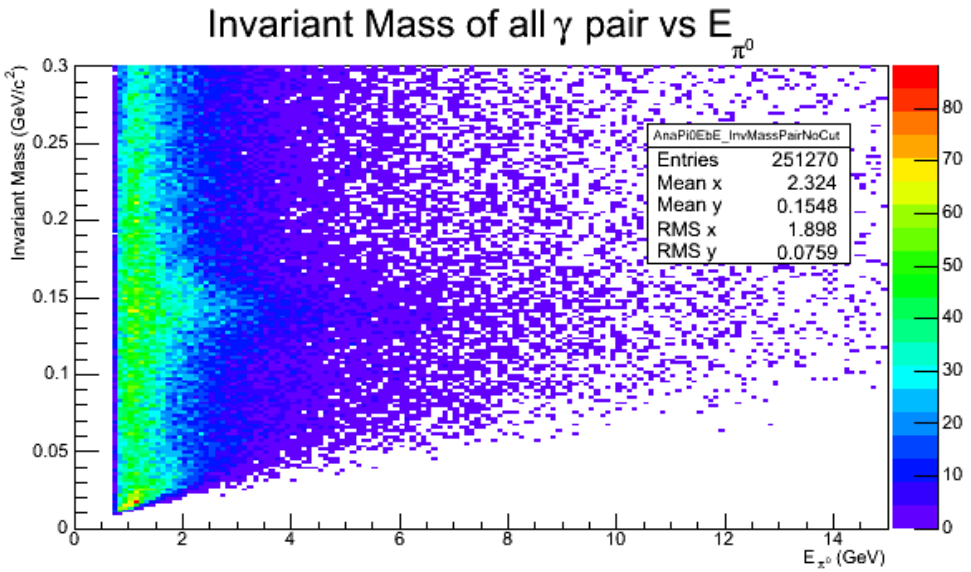
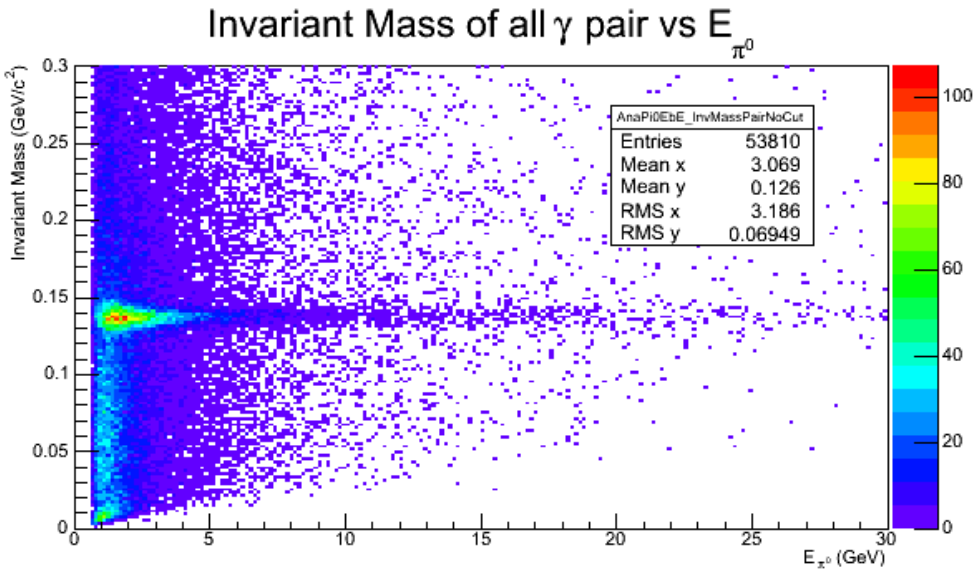
cluster from γ other decay : E
cluster from π0 : E
cluster from e± : E
cluster from γ->e± : E
cluster from hadron? : E
10^5
10^4
10^3
10^2
10
1
10^-1
0
2
4
6
8
10
12
14
16
18
20
E (GeV)

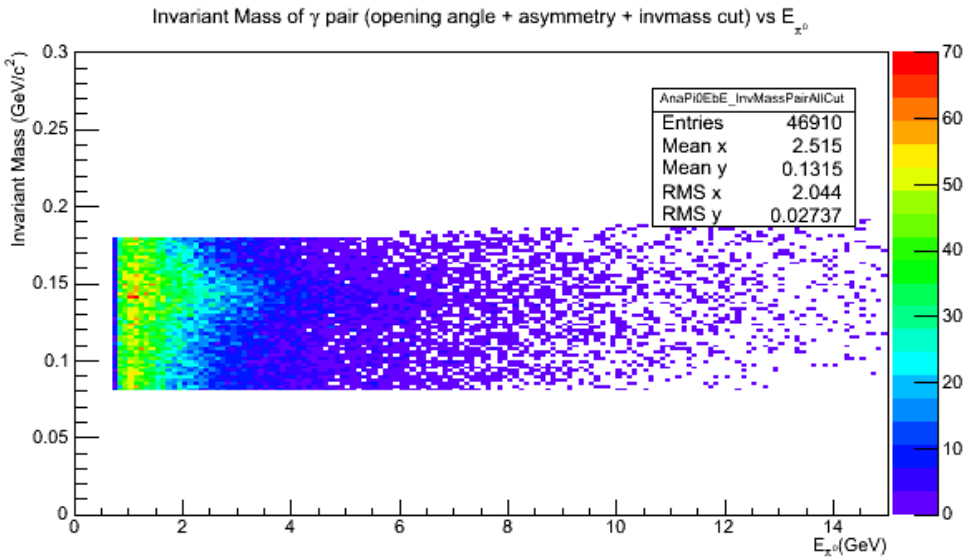
On Pi0 analysis
I will illustrate how the cuts are applied
and what comes out

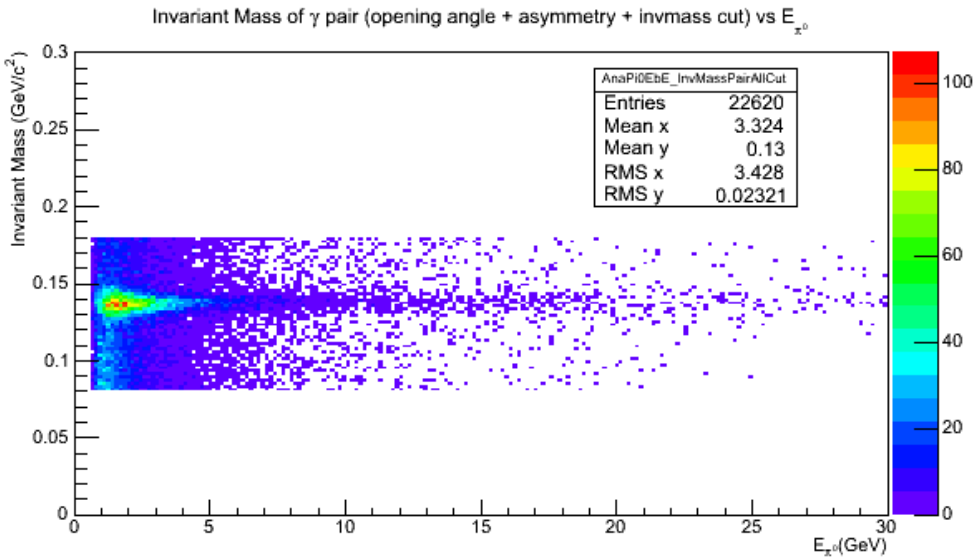
EMCAL

PHOS


Invariant Mass of all γ pair vs E π0
AnaPi0EbE_InvMassPairNoCut
Entries 251270
Mean x 2.324
Mean y 0.1548
RMS x 1.898
RMS y 0.0759
Invariant Mass (GeV/c²)
Eπ0 (GeV)

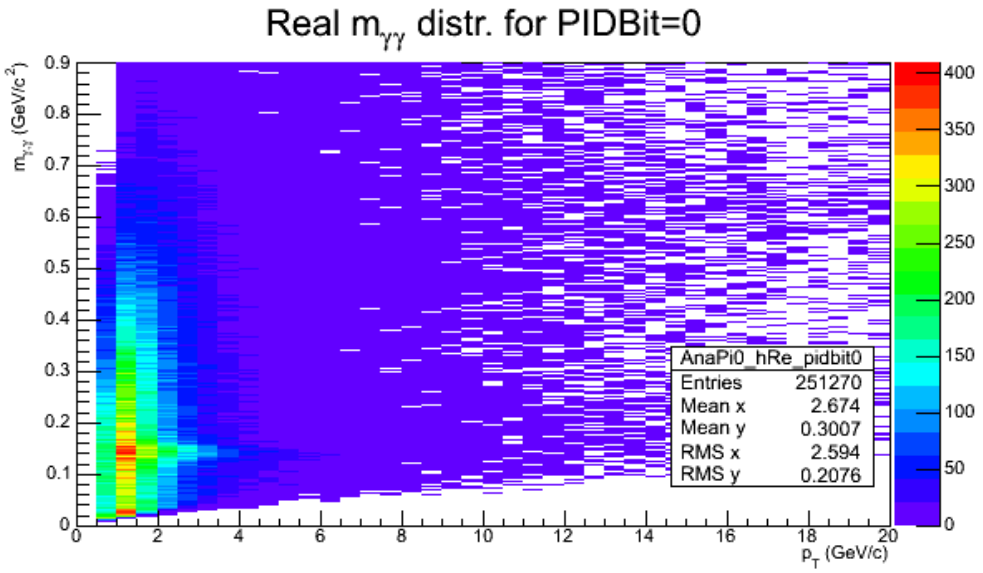

Invariant Mass of all γ pair vs E π0
AnaPi0EbE_InvMassPairNoCut
Entries 53810
Mean x 3.069
Mean y 0.126
RMS x 3.186
RMS y 0.06949
Invariant Mass (GeV/c²)
Eπ0 (GeV)

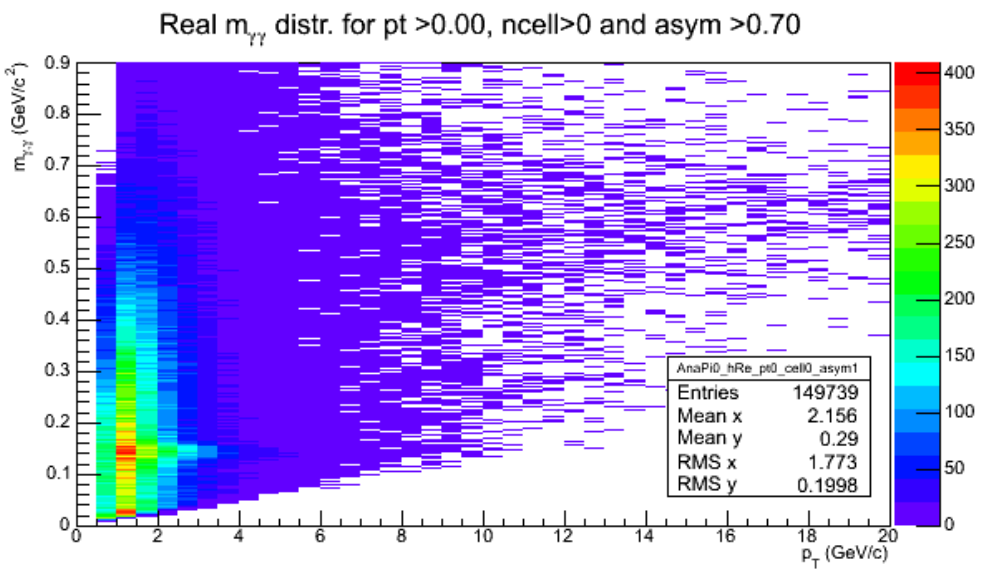

Invariant Mass of γ pair (opening angle + asymmetry + invmass cut) vs Eπ0
AnaPi0EbE_InvMassPairAllCut
Entries 46910
Mean x 2.515
Mean y 0.1315
RMS x 2.044
RMS y 0.02737
Invariant Mass (GeV/c²)
Eπ0(GeV)

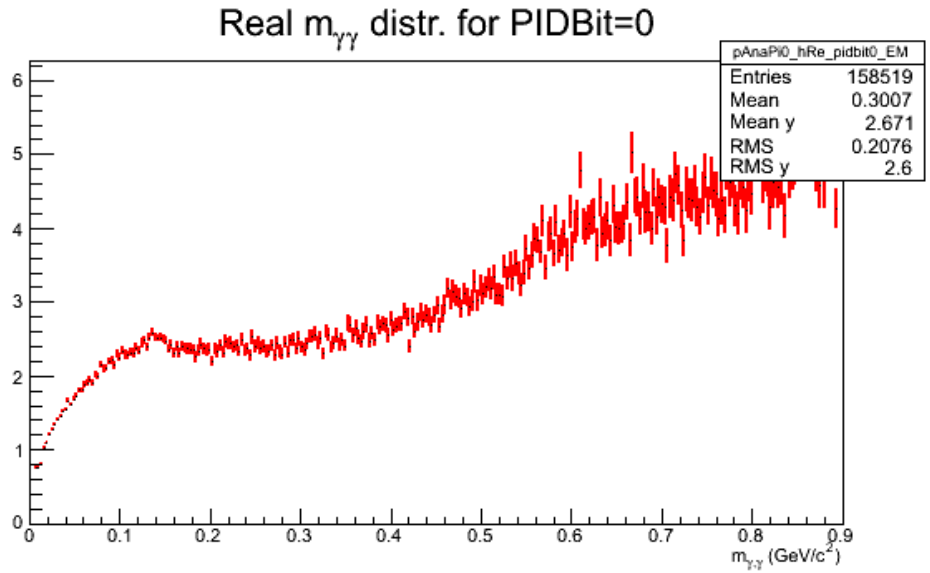

Invariant Mass of γ pair (opening angle + asymmetry + invmass cut) vs Eπ0
AnaPi0EbE_InvMassPairAllCut
Entries 22620
Mean x 3.324
Mean y 0.13
RMS x 3.428
RMS y 0.02321
Invariant Mass (GeV/c²)
Eπ0(GeV)

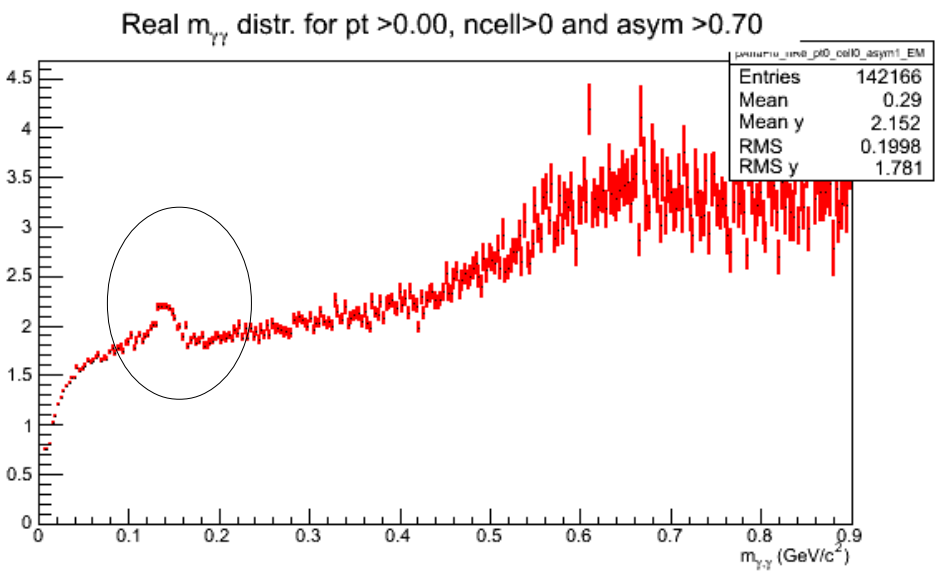
EMCAL

PHOS


Real $m_{\gamma\gamma}$ distr. for PIDBit=0
$m_{\gamma\gamma}$ (GeV/c^2)
p_T (GeV/c)
AnaPi0_hRe_pidbit0
Entries 251270
Mean x 2.674
Mean y 0.3007
RMS x 2.594
RMS y 0.2076

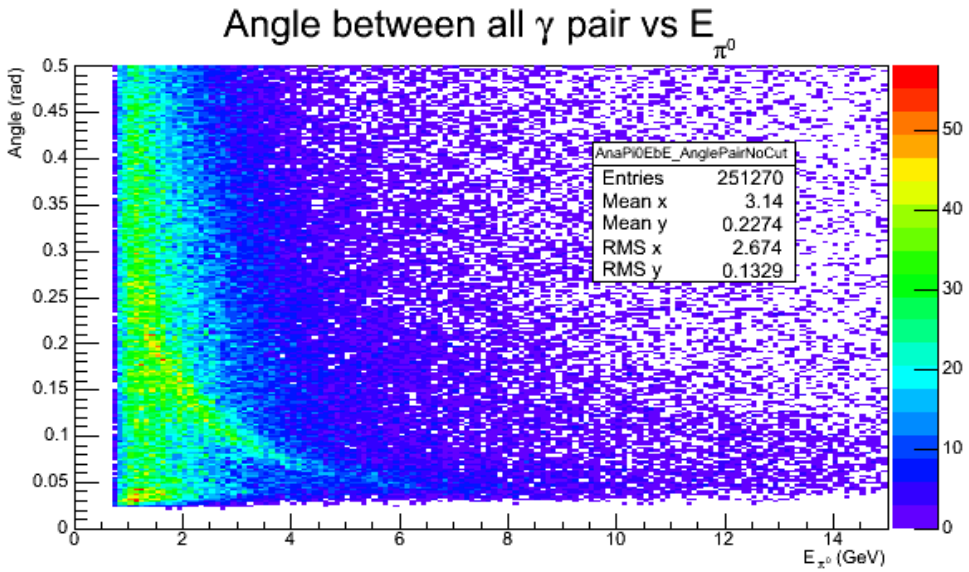

Real $m_{\gamma\gamma}$ distr. for pt >0.00, ncell>0 and asym >0.70
$m_{\gamma\gamma}$ (GeV/c^2)
p_T (GeV/c)
AnaPi0_hRe_pt0_cell0_asym1
Entries 149739
Mean x 2.156
Mean y 0.29
RMS x 1.773
RMS y 0.1998

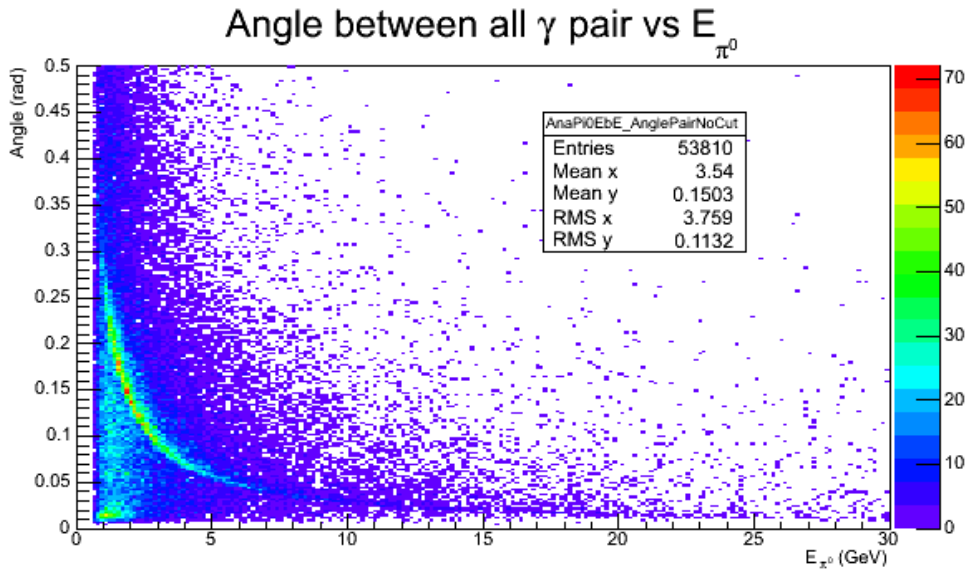

Real $m_{\gamma\gamma}$ distr. for PIDBit=0
$m_{\gamma\gamma}$ (GeV/c^2)
pAnaPi0_hRe_pidbit0_EM
Entries 158519
Mean 0.3007
Mean y 2.671
RMS 0.2076
RMS y 2.6

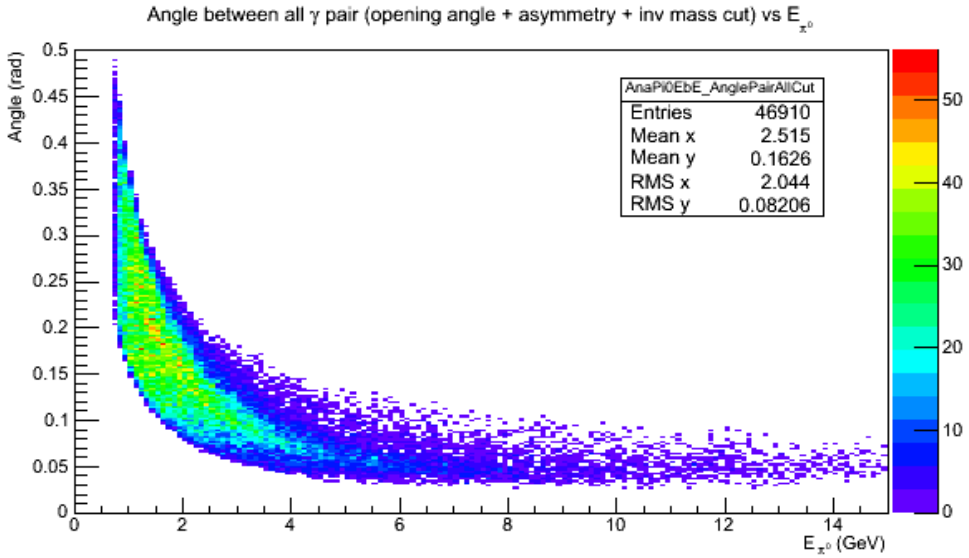

Real $m_{\gamma\gamma}$ distr. for pt >0.00, ncell>0 and asym >0.70
$m_{\gamma\gamma}$ (GeV/c^2)
Entries 142166
Mean 0.29
Mean y 2.152
RMS 0.1998
RMS y 1.781

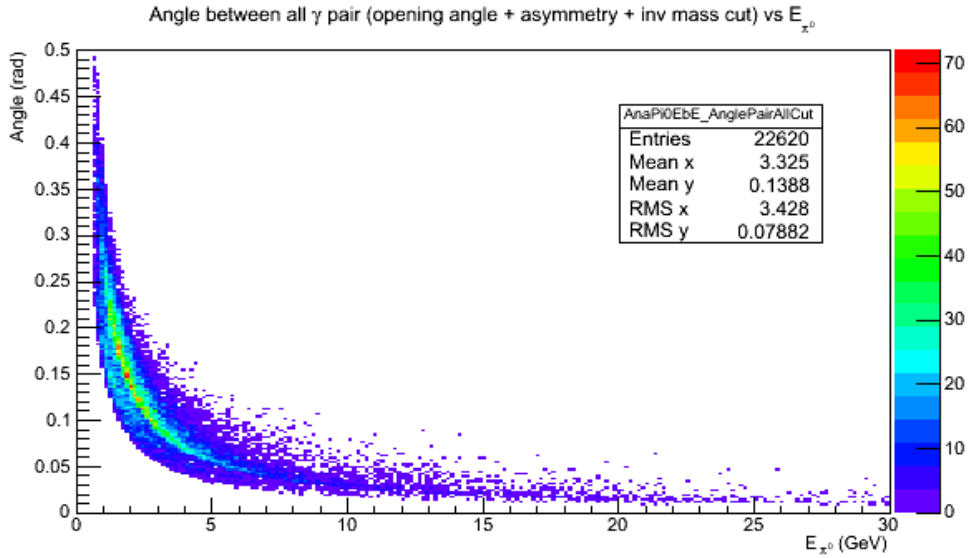
EMCAL

PHOS


Angle between all γ pair vs E π0
Angle (rad)
E π0 (GeV)
AnaPi0EbE_AnglePairNoCut
Entries 251270
Mean x 3.14
Mean y 0.2274
RMS x 2.674
RMS y 0.1329

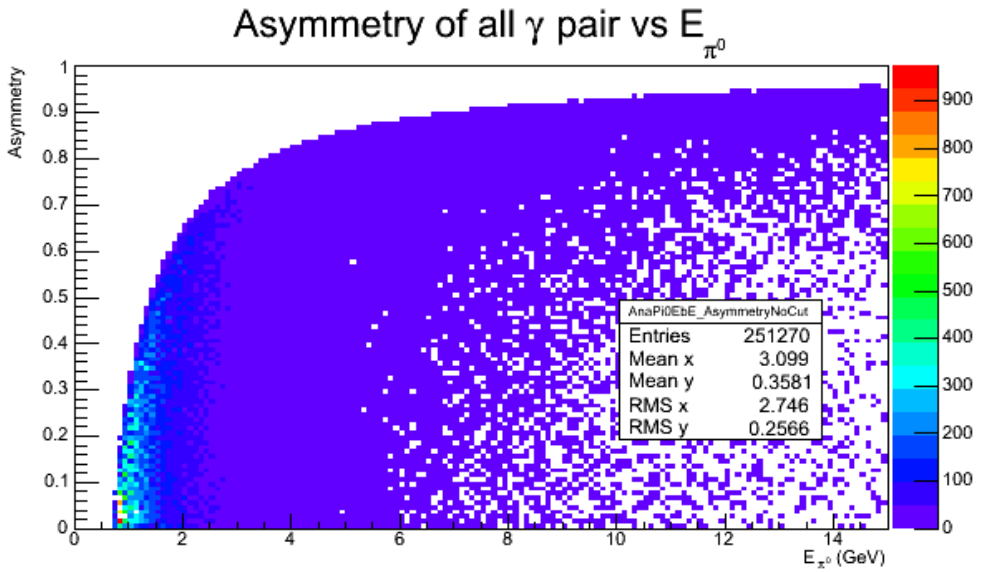

Angle between all γ pair vs E π0
Angle (rad)
E π0 (GeV)
AnaPi0EbE_AnglePairNoCut
Entries 53810
Mean x 3.54
Mean y 0.1503
RMS x 3.759
RMS y 0.1132

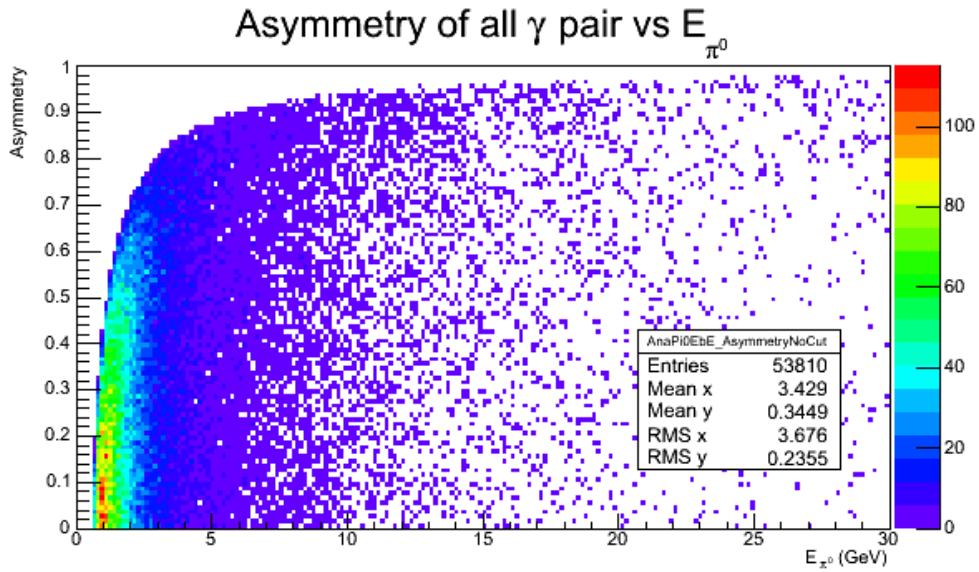

Angle between all γ pair (opening angle + asymmetry + inv mass cut) vs E π0
Angle (rad)
E π0 (GeV)
AnaPi0EbE_AnglePairAllCut
Entries 46910
Mean x 2.515
Mean y 0.1626
RMS x 2.044
RMS y 0.08206

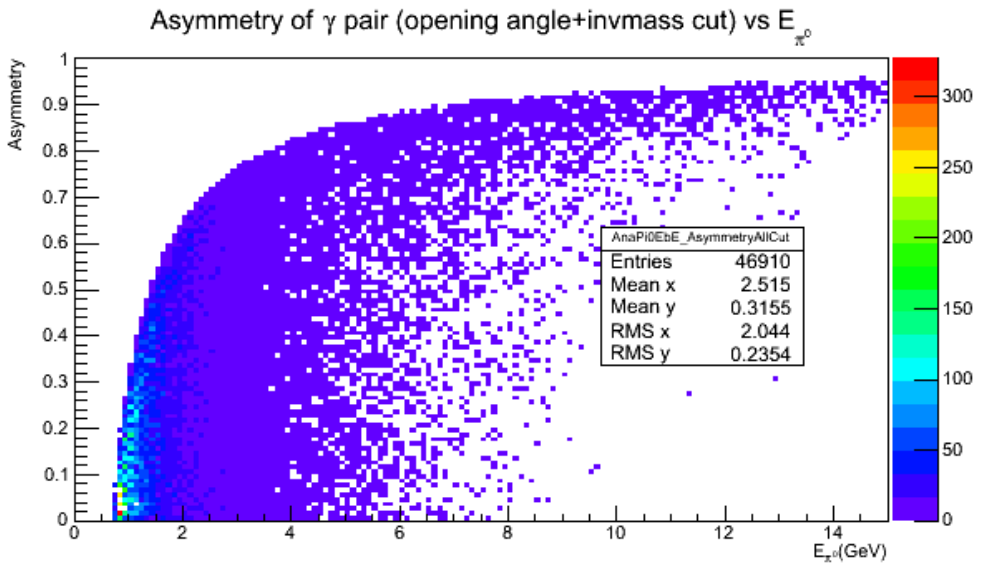

Angle between all γ pair (opening angle + asymmetry + inv mass cut) vs E π0
Angle (rad)
E π0 (GeV)
AnaPi0EbE_AnglePairAllCut
Entries 22620
Mean x 3.325
Mean y 0.1388
RMS x 3.428
RMS y 0.07882

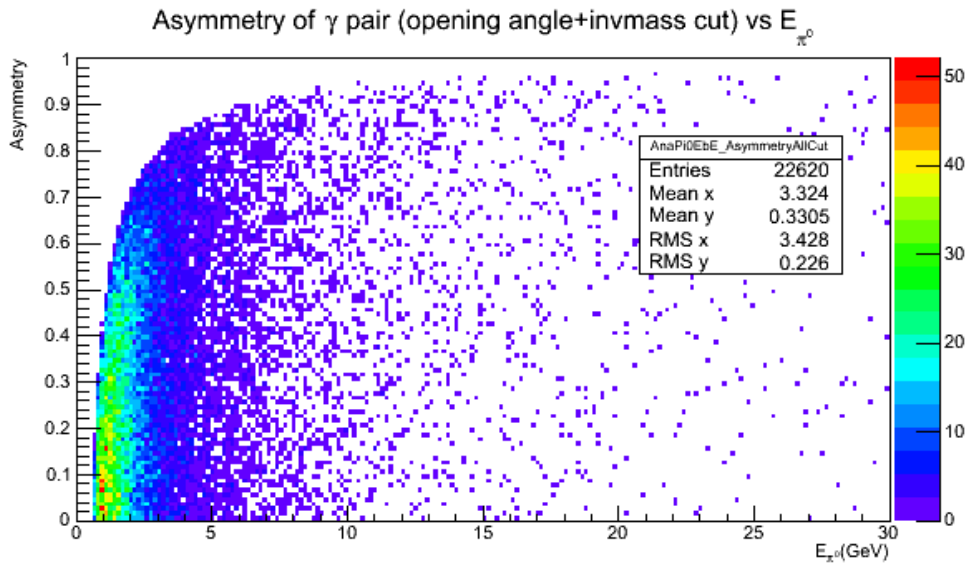
EMCAL

PHOS


Asymmetry of all γ pair vs E π0
Asymmetry
E π0 (GeV)
AnaPi0EbE_AsymmetryNoCut
Entries 251270
Mean x 3.099
Mean y 0.3581
RMS x 2.746
RMS y 0.2566

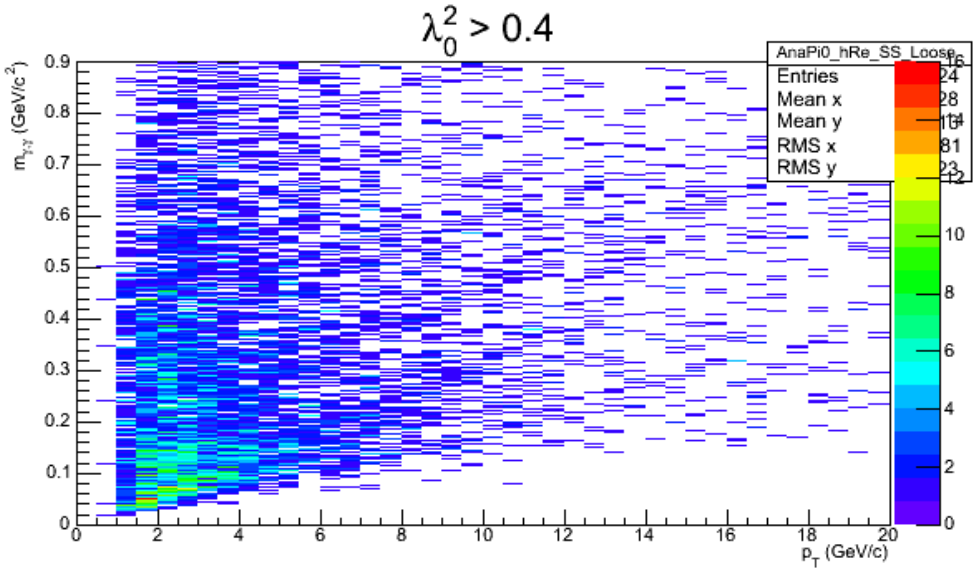

Asymmetry of all γ pair vs E π0
Asymmetry
E π0 (GeV)
AnaPi0EbE_AsymmetryNoCut
Entries 53810
Mean x 3.429
Mean y 0.3449
RMS x 3.676
RMS y 0.2355

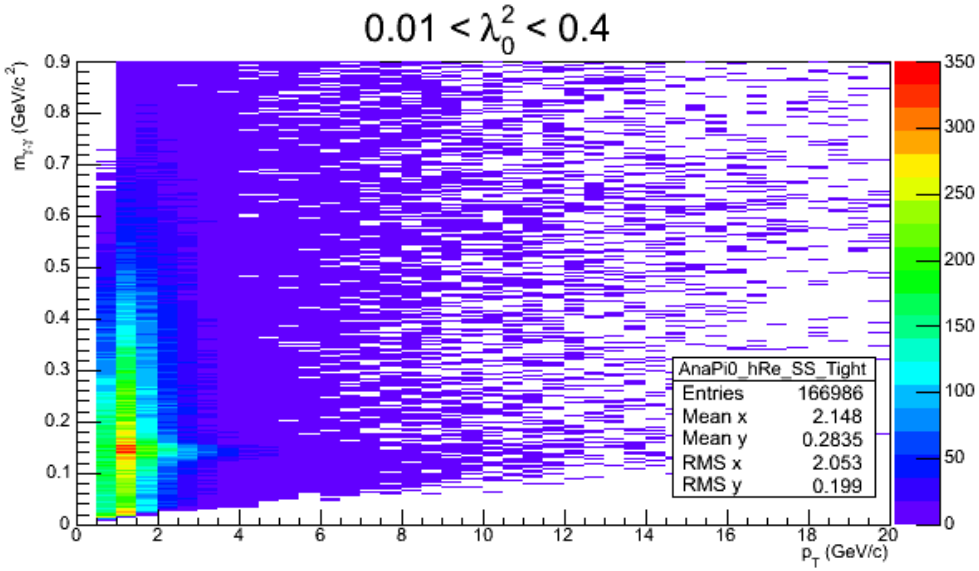

Asymmetry of γ pair (opening angle+invmass cut) vs E π0
Asymmetry
E π0(GeV)
AnaPi0EbE_AsymmetryAllCut
Entries 46910
Mean x 2.515
Mean y 0.3155
RMS x 2.044
RMS y 0.2354

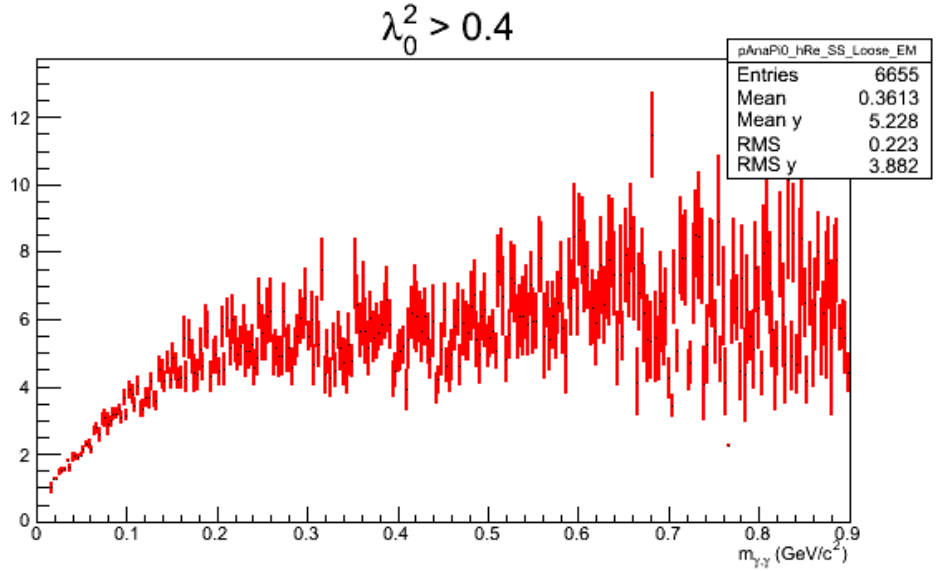

Asymmetry of γ pair (opening angle+invmass cut) vs E π0
Asymmetry
E π0(GeV)
AnaPi0EbE_AsymmetryAllCut
Entries 22620
Mean x 3.324
Mean y 0.3305
RMS x 3.428
RMS y 0.226

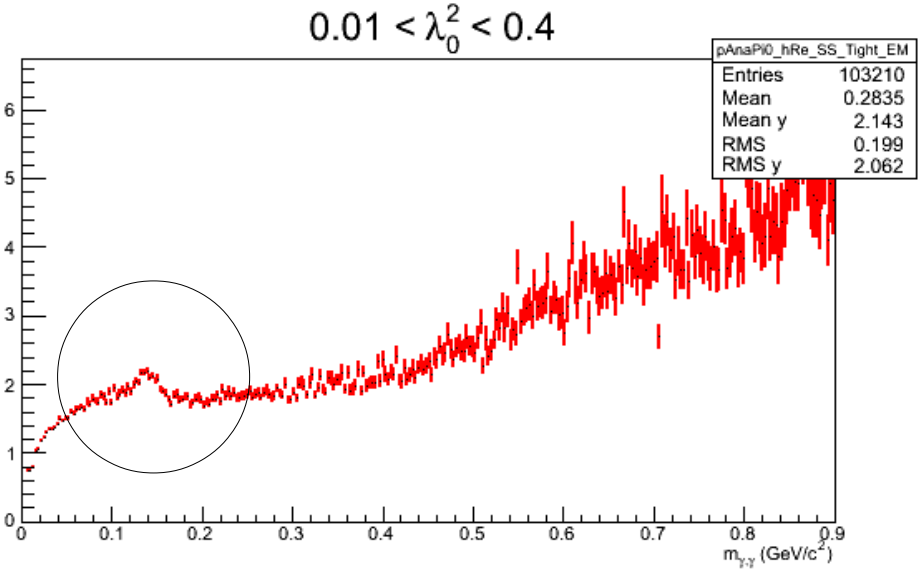
One can look at individual asymmetry parameters:

EMCAL





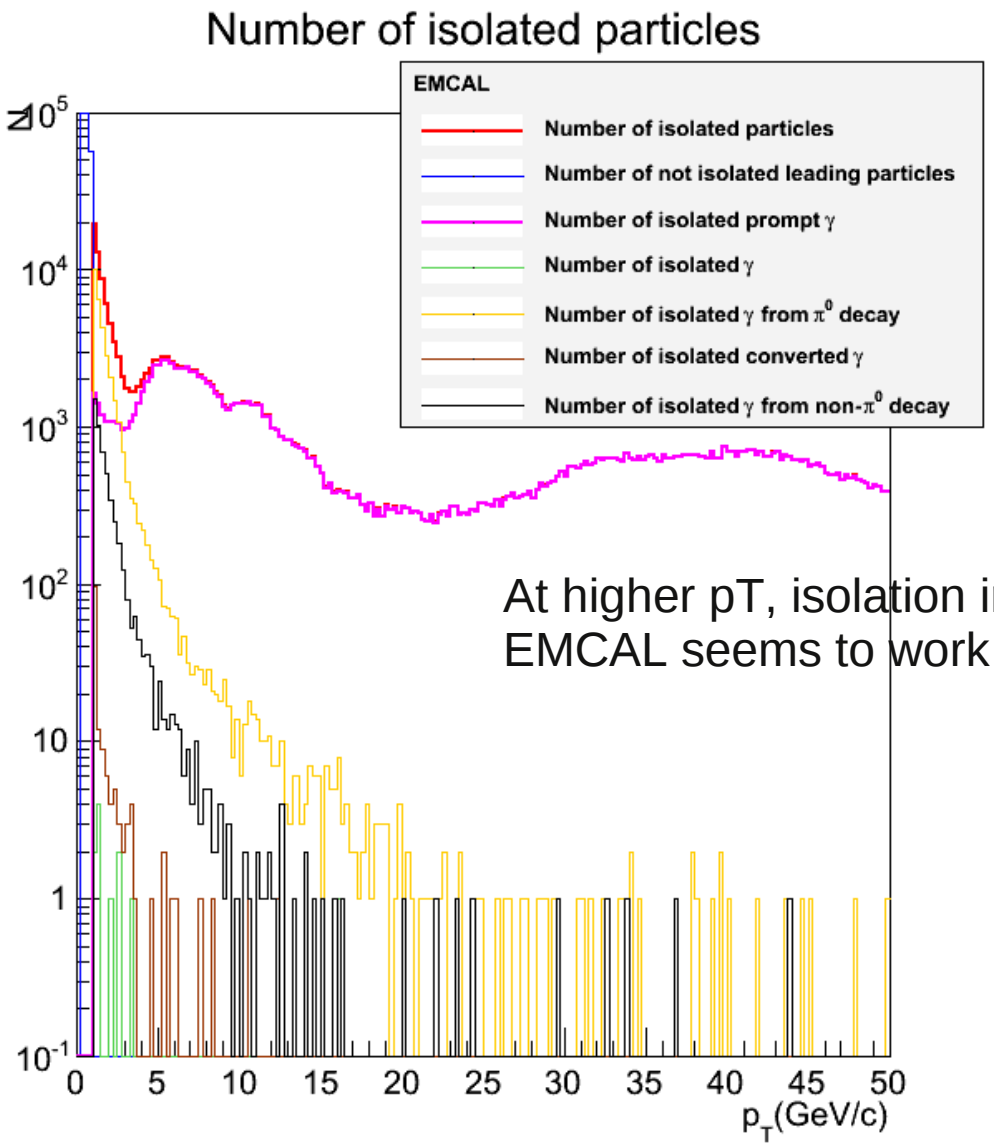




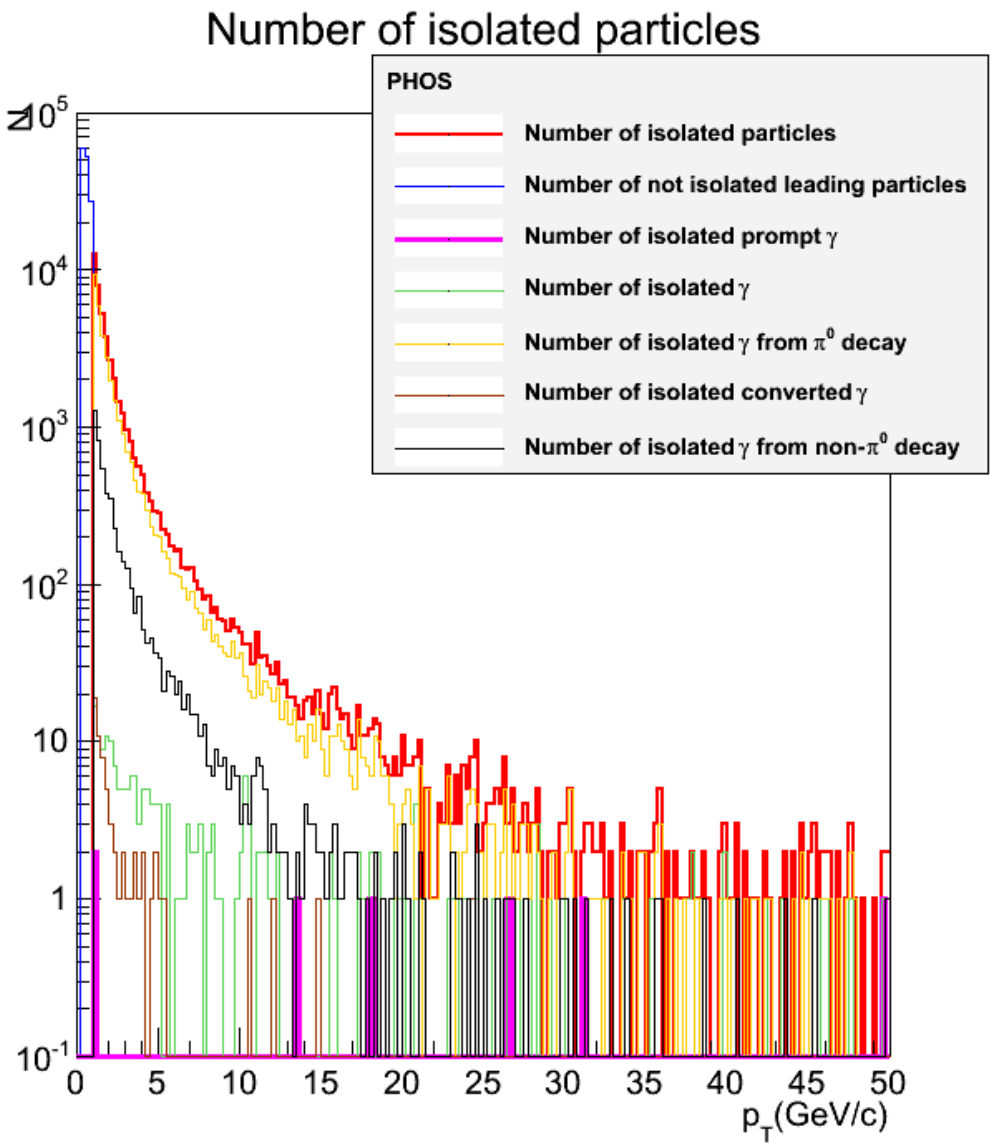
Isolation study

EMCAL

PHOS



At higher pT, isolation in EMCAL seems to work



R = 0.4, pT(thresh) = 0.7, pT(frac) = 0.1

Summary

- PHOS, EMCAL – need different treatment. Cuts need to be tuned individually
- Design a class with a deeper focus on prompt photons aiming towards our analysis
- Time schedule – a 2 weeks behind :(!!!catch up