$\gamma p \rightarrow \omega(\pi^+\pi^-\pi^o)p$ from CLAS (g12 run)

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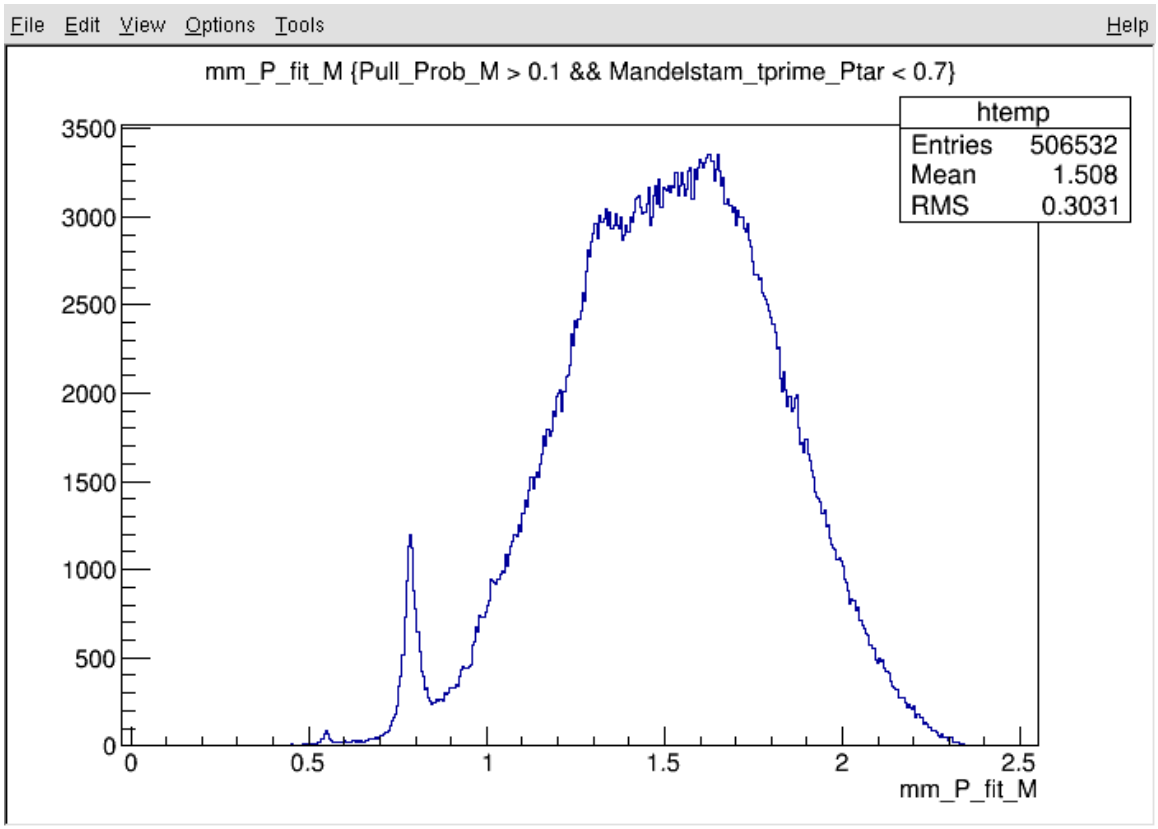
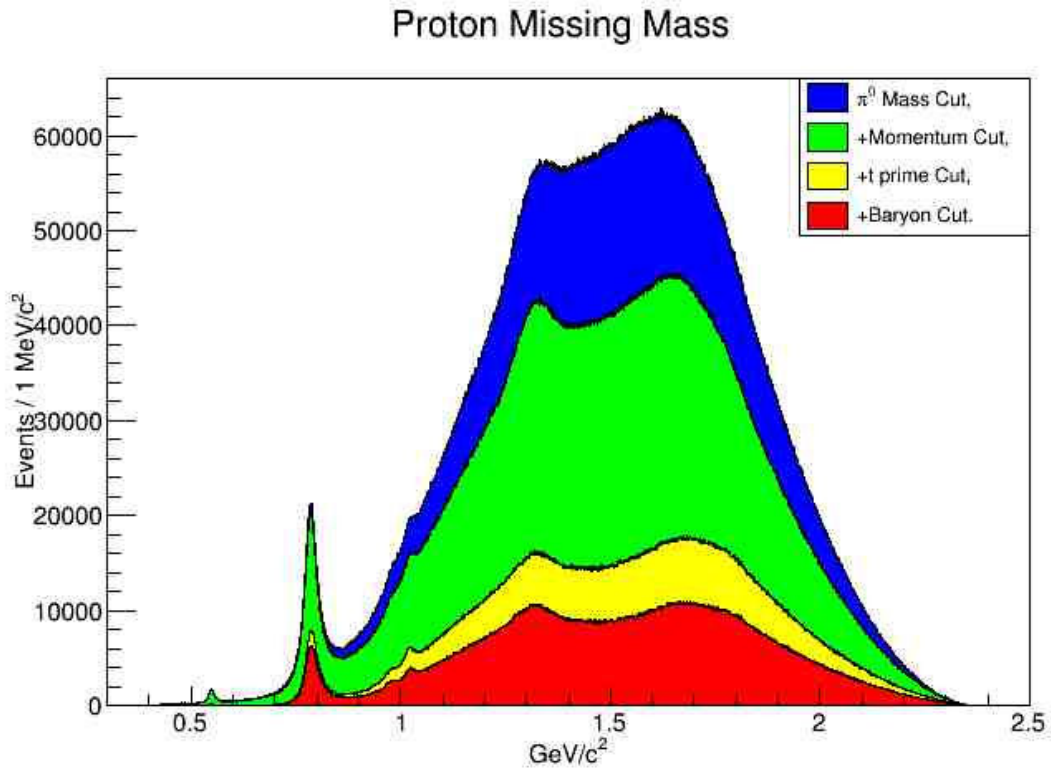
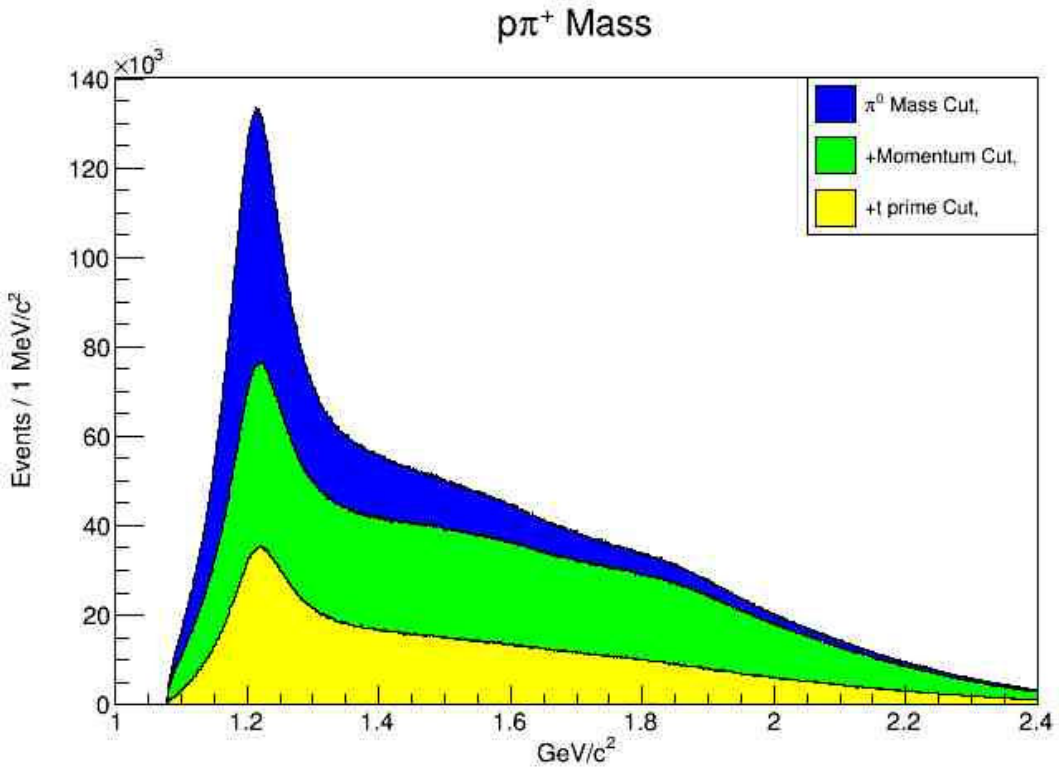
Status – 2/7/2014

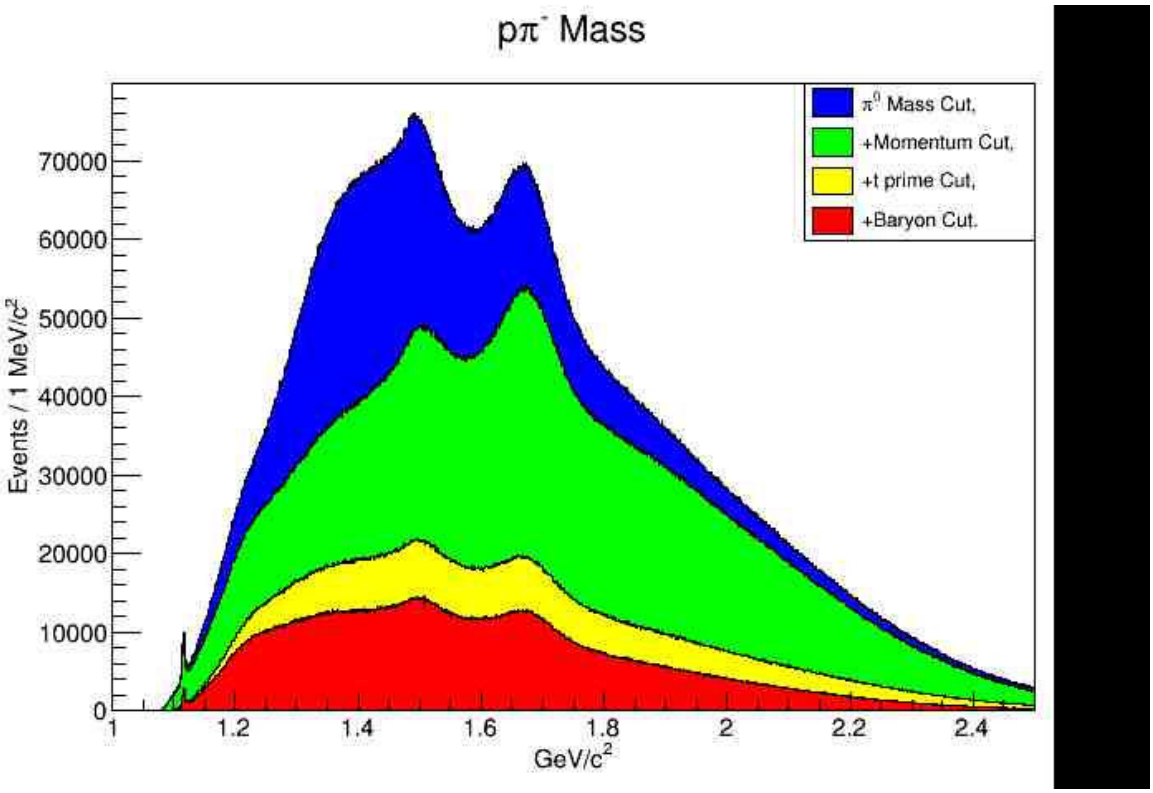
- Isolate signal for $\omega \rightarrow \pi^+\pi^-(\pi^o)$ where (π^o) is reconstructed by missing mass + (Kinematic Fit by M. Kunkel) – Basic cuts on event timing/pid – Fit prob. - tprime
- 3.6 GeV < E_photon < 5.4 GeV
- Dalitz Analysis – event-by-event acceptance correction using CLAS-PWA code
- Compare with theory – theory fits

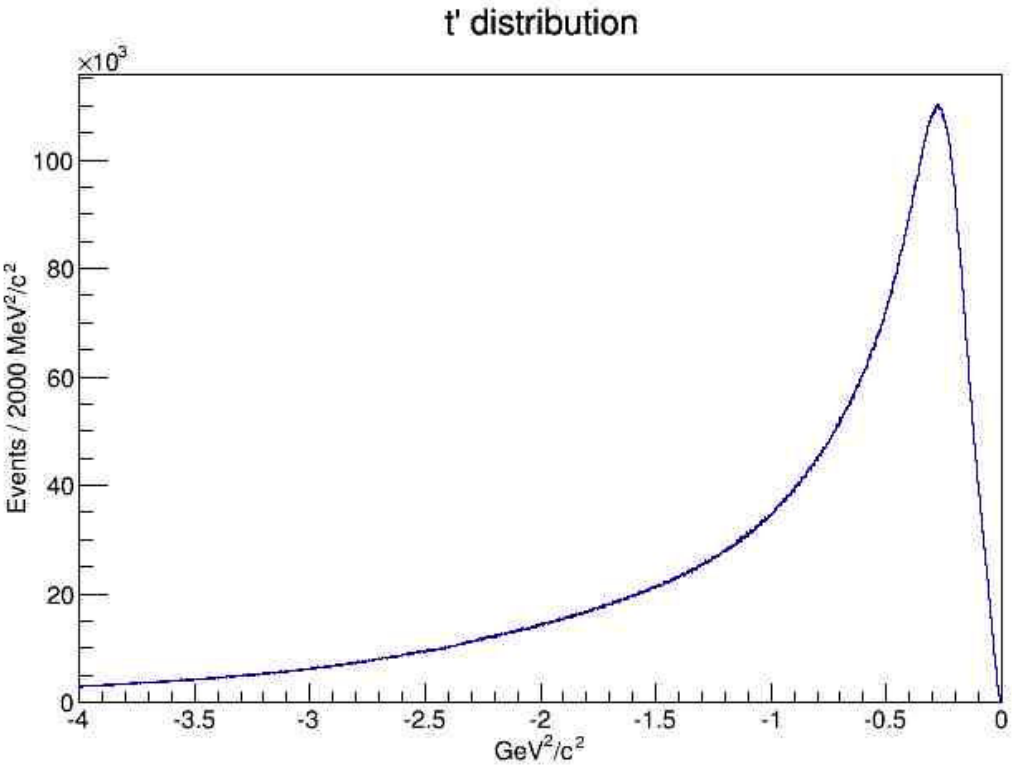
BELOW PLOTS ARE ALL – NON-CORRECTED (FOR ACCEPTANCE) DATA

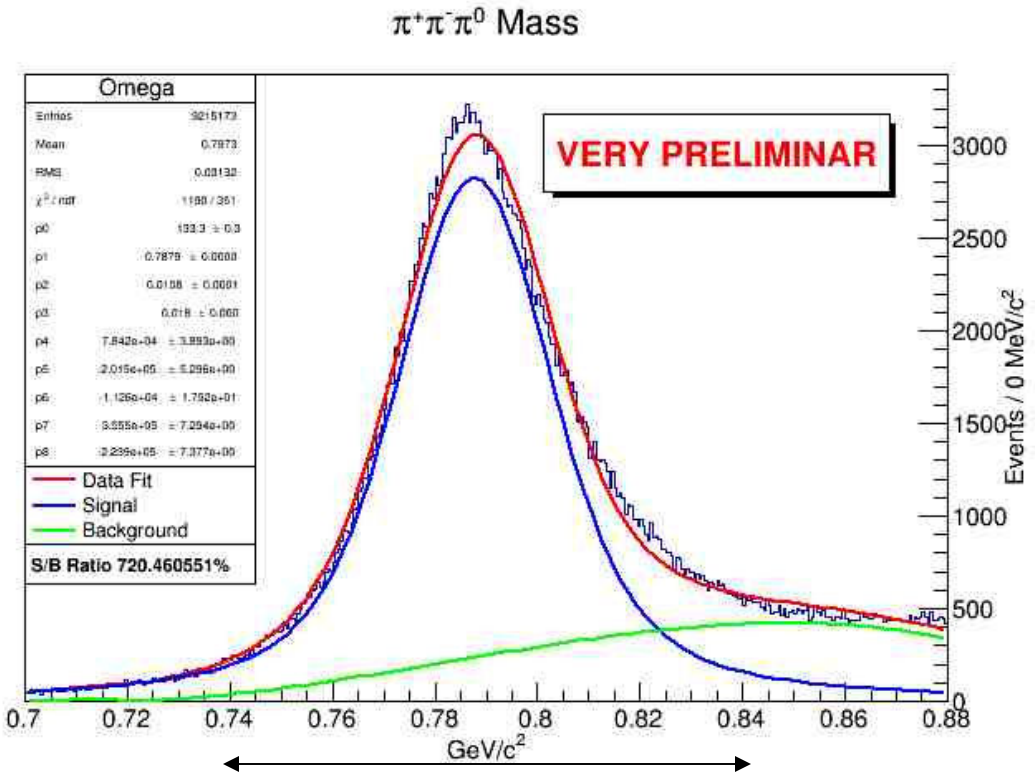


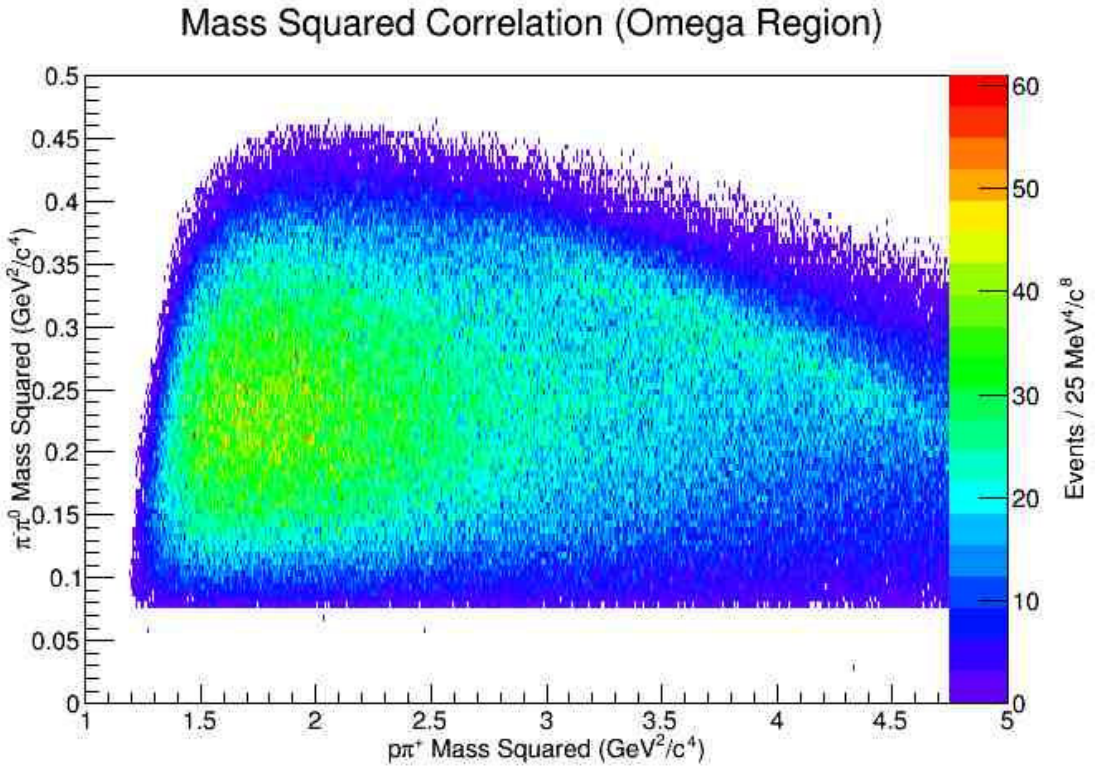

Proton Missing Mass
π^0 Mass Cut,
+Momentum Cut,
+t prime Cut,
+Baryon Cut.
Events / 1 MeV/c^2
GeV/c^2

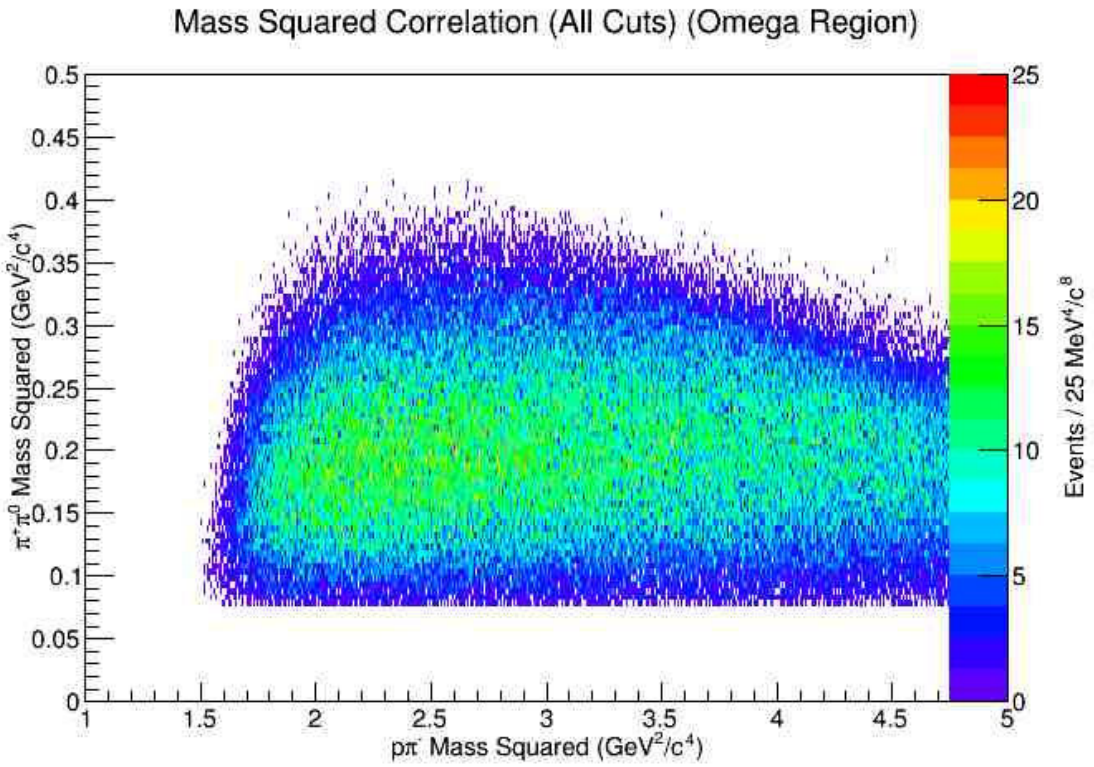

$p\pi^+$ Mass
$\times 10^3$
π^0 Mass Cut,
+Momentum Cut,
+t prime Cut,
Events / 1 MeV/c^2
GeV/c^2

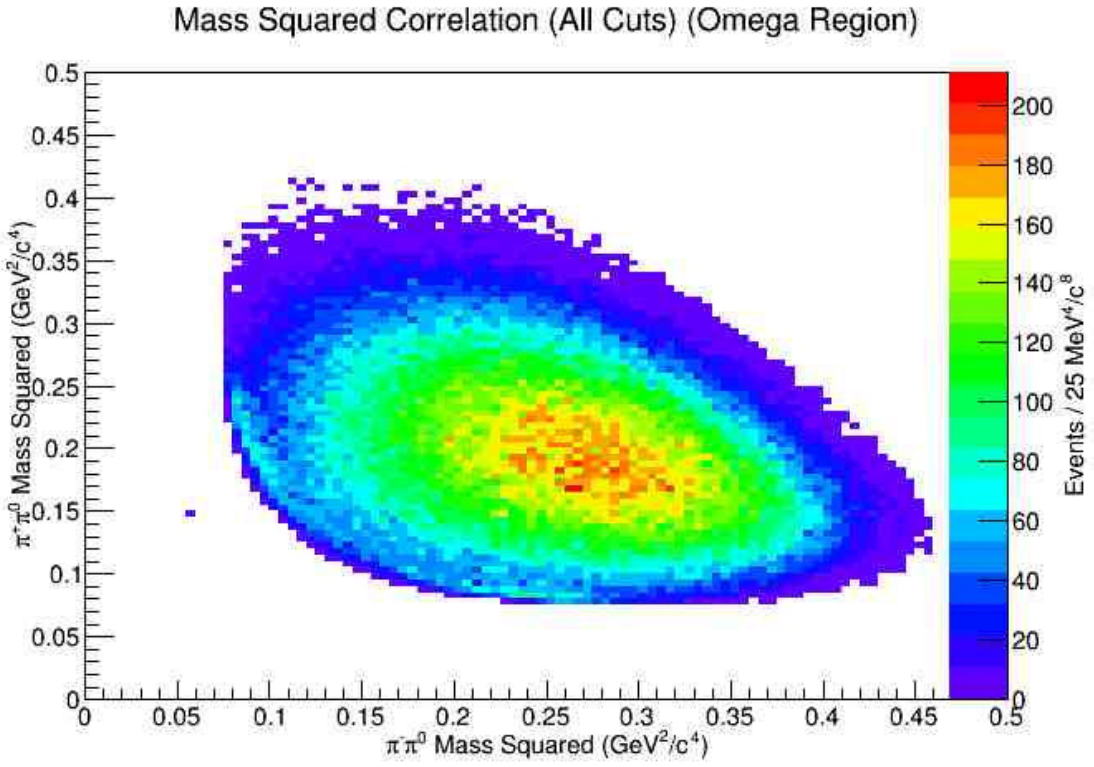

pπ⁻ Mass
π⁰ Mass Cut,
+Momentum Cut,
+t prime Cut,
+Baryon Cut.
Events / 1 MeV/c²
GeV/c²
0
10000
20000
30000
40000
50000
60000
70000
1
1.2
1.4
1.6
1.8
2
2.2
2.4

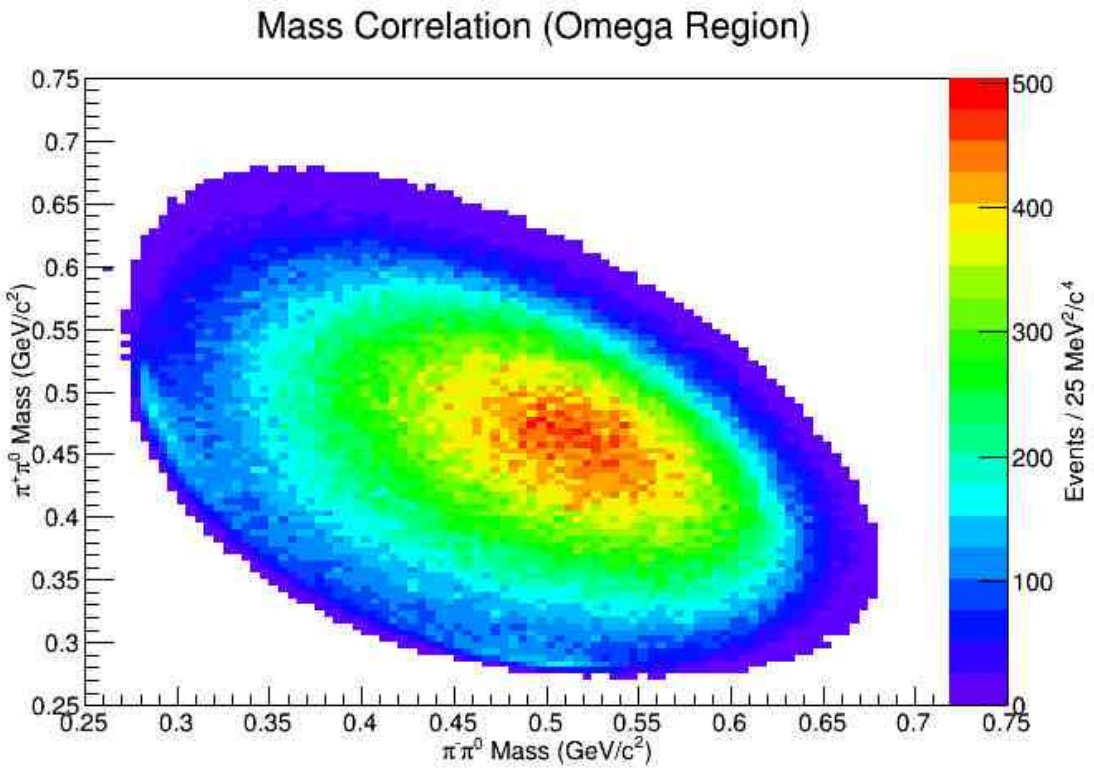

t' distribution
×10³
Events / 2000 MeV²/c²
GeV²/c²
0
20
40
60
80
100
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0

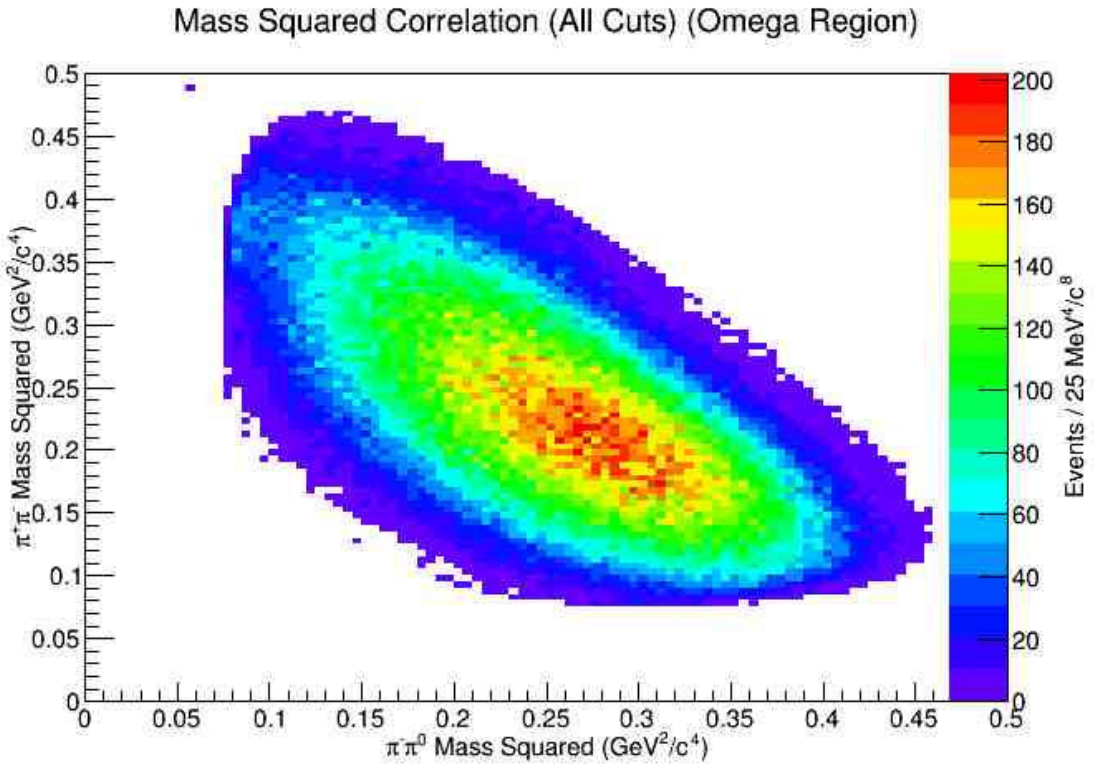

$\pi^+\pi^-\pi^0$ Mass
Omega
Entries 3215173
Mean 0.7873
RMS 0.03132
χ^2 / ndf 1188 / 361
p0 193.3 ± 0.3
p1 0.7879 ± 0.0000
p2 0.0158 ± 0.0001
p3 0.018 ± 0.000
p4 7.842e-04 ± 3.893e-06
p5 2.015e+05 ± 5.296e+00
p6 -1.126e-04 ± 1.792e-01
p7 3.555e-05 ± 7.294e-05
p8 2.235e+05 ± 7.377e+00
Data Fit
Signal
Background
S/B Ratio 720.460551%
VERY PRELIMINAR
Events / 0 MeV/c^2
GeV/c^2

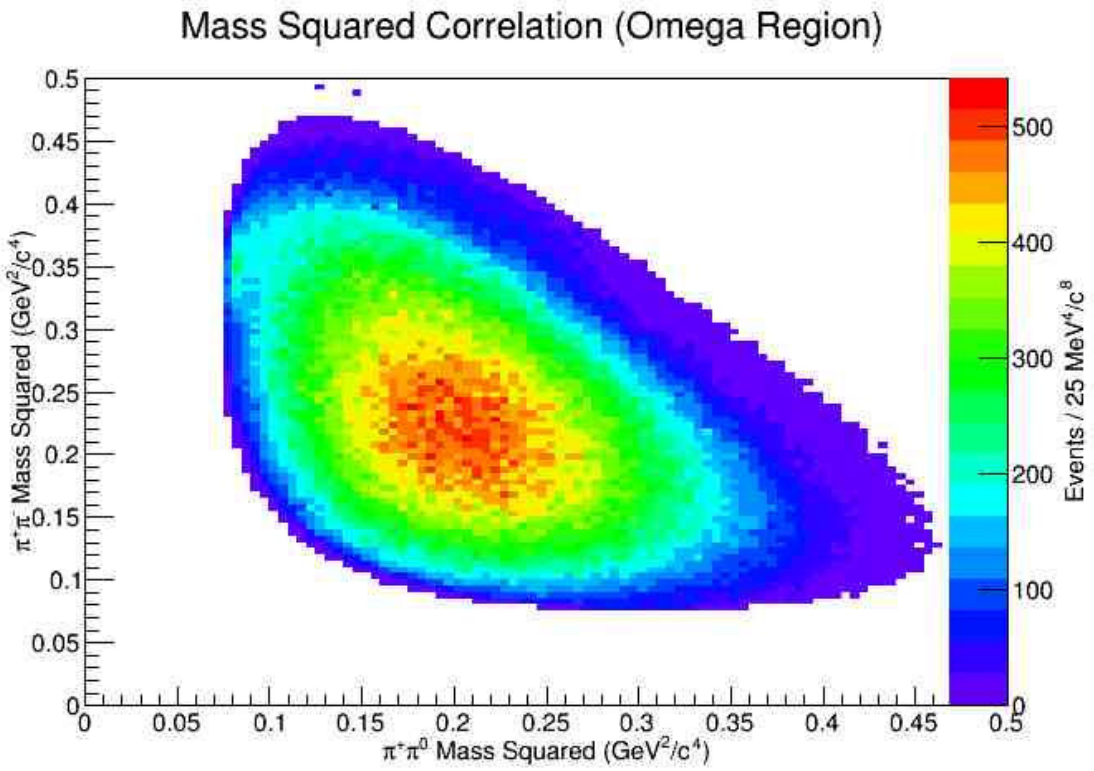

Mass Squared Correlation (Omega Region)
$\pi^-\pi^0$ Mass Squared (GeV^2/c^4)
$p\pi^+$ Mass Squared (GeV^2/c^4)
Events / 25 MeV^4/c^8

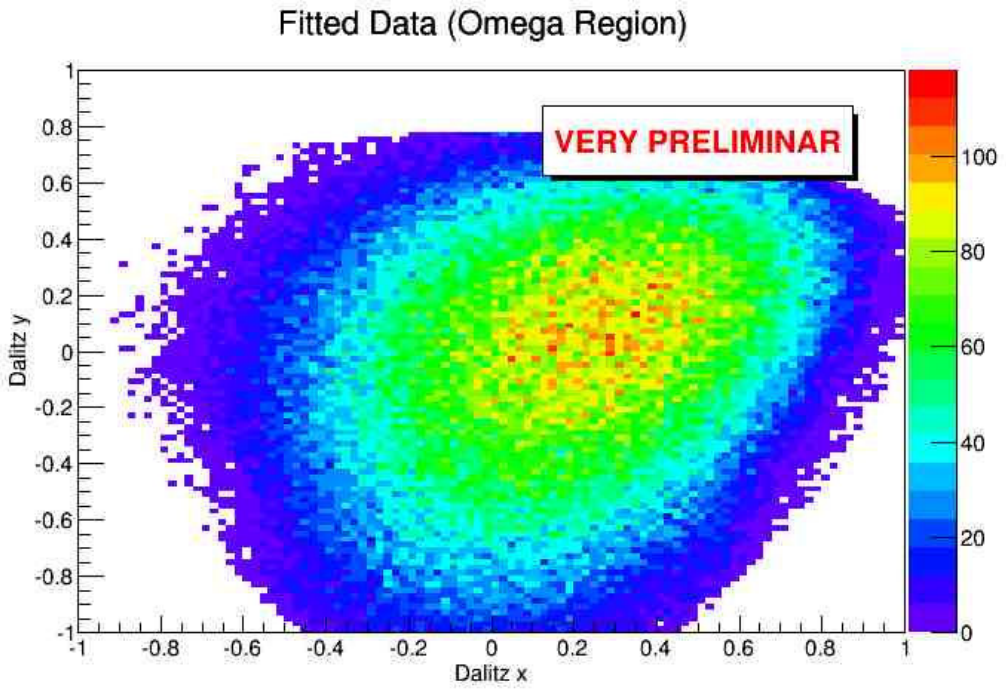

Mass Squared Correlation (All Cuts) (Omega Region)
$\pi^-\pi^0$ Mass Squared (GeV^2/c^4)
$p\pi^-$ Mass Squared (GeV^2/c^4)
Events / 25 MeV^4/c^8


Mass Squared Correlation (All Cuts) (Omega Region)
$\pi^-\pi^0$ Mass Squared (GeV^2/c^4)
$\pi^-\pi^0$ Mass Squared (GeV^2/c^4)
Events / 25 MeV^4/c^8


Mass Correlation (Omega Region)
$\pi^+\pi^0$ Mass (GeV/c^2)
$\pi^-\pi^0$ Mass (GeV/c^2)
Events / 25 MeV^2/c^4


Mass Squared Correlation (All Cuts) (Omega Region)
$\pi^+\pi^-$ Mass Squared (GeV^2/c^4)
$\pi^-\pi^0$ Mass Squared (GeV^2/c^4)
Events / 25 MeV^4/c^8


Mass Squared Correlation (Omega Region)
$\pi^+\pi^-$ Mass Squared (GeV^2/c^4)
$\pi^+\pi^0$ Mass Squared (GeV^2/c^4)
Events / 25 MeV^4/c^8
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
100
200
300
400
500



Dispersive analysis of $\omega \to 3\pi$ and $\phi \to 3\pi$ decays

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$$x = \frac{t-u}{\sqrt{3}R_V} \,, \quad y = \frac{s_0 - s}{R_V} \,,$$

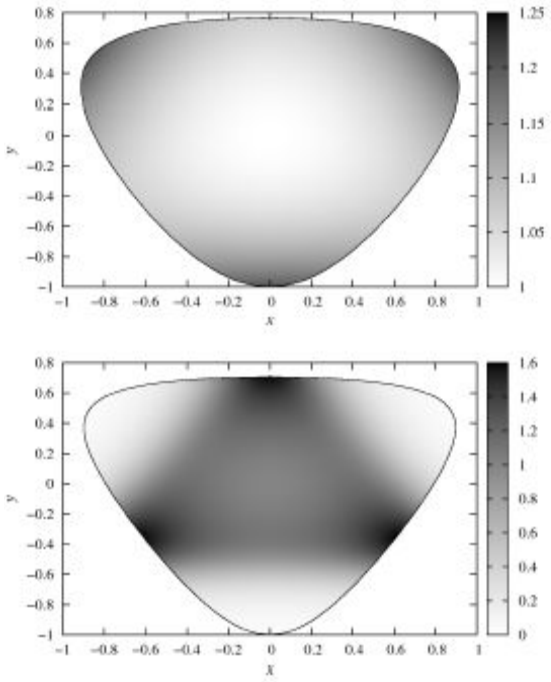

Fig. 5. Dalitz plots for $\omega \to 3\pi$ (upper panel) and $\phi \to 3\pi$ (lower panel), normalized by the P-wave phase space.