Azimuthal Correlations in Au+Au Collisions at $\sqrt{s_{NN}} = 200$ GeV

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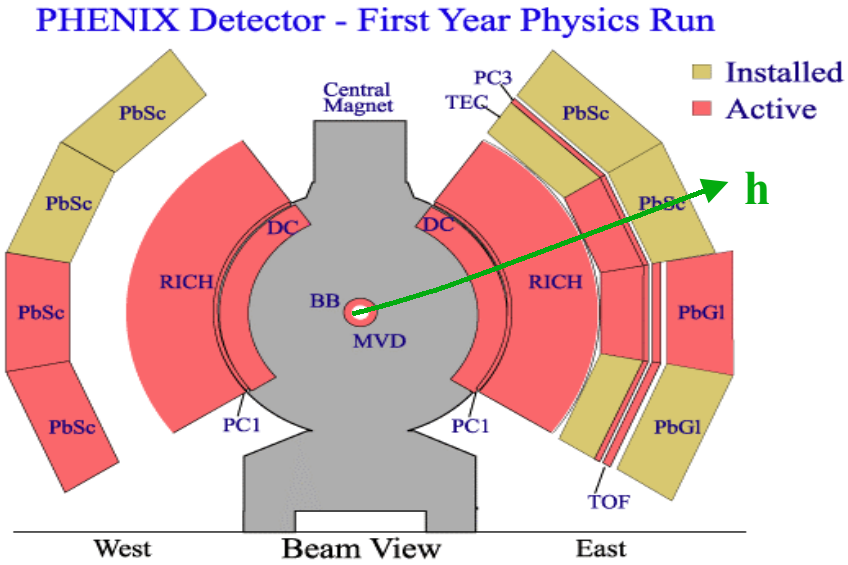
For

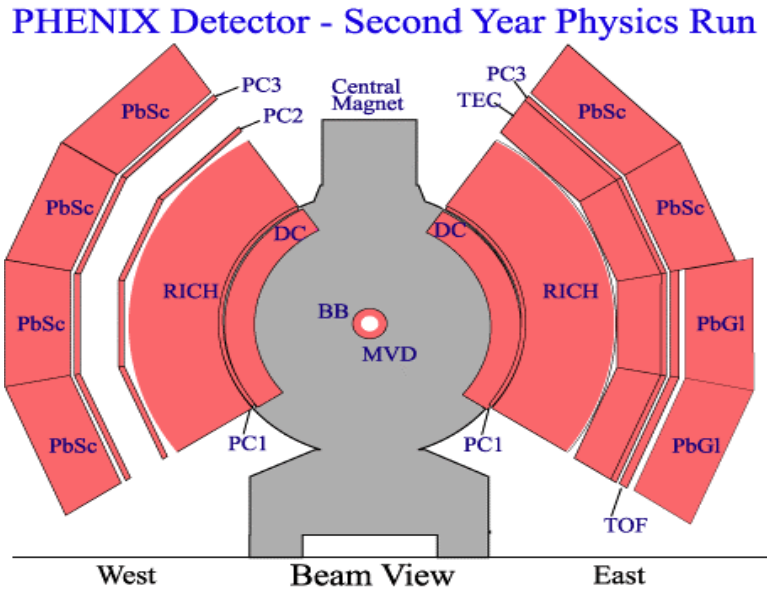
the PHENIX Collaboration

PHENIX Setup



Azimuthal Correlations Using DC+PC1 Tracks

1.4M minimum bias events



Azimuthal Correlations Using DC+PC1+PC3+EMC Tracks

92M min bias events

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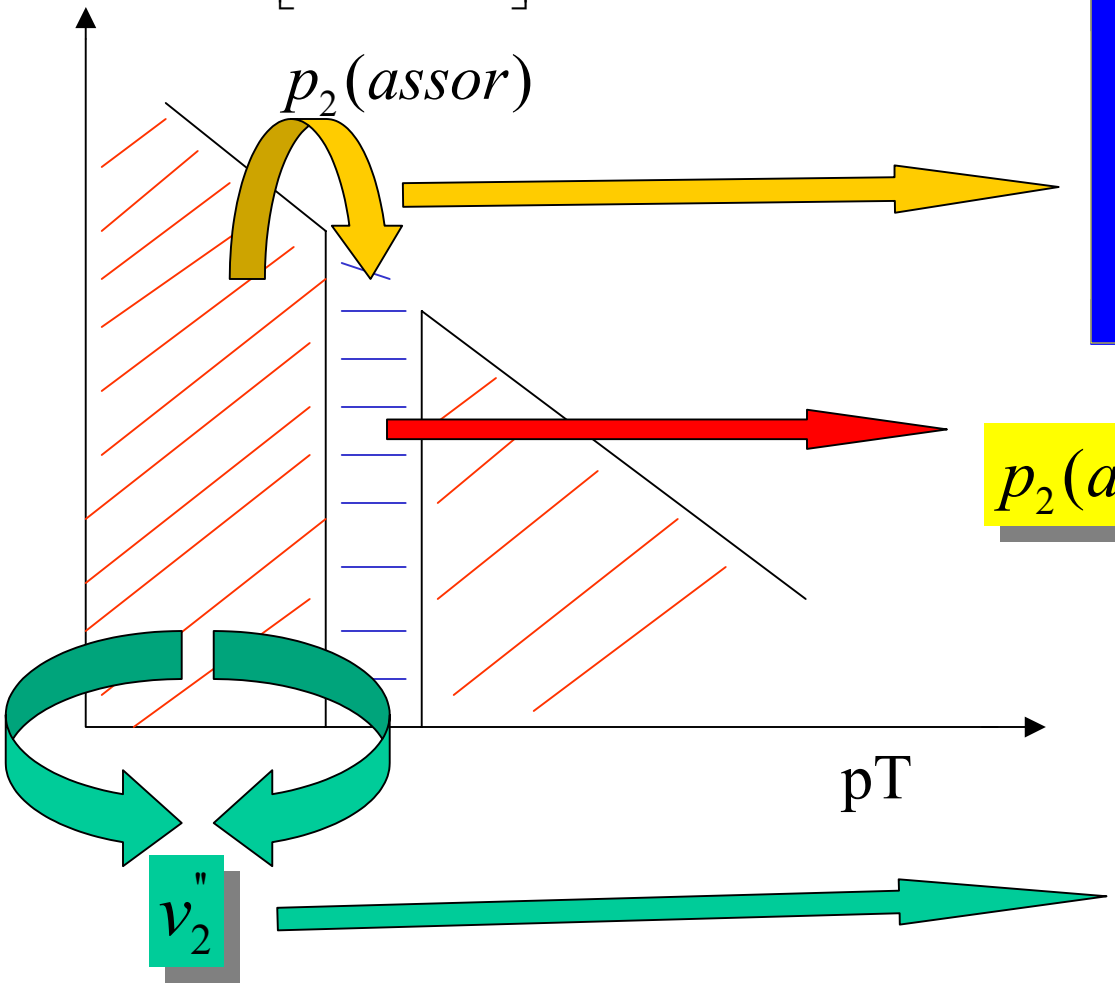
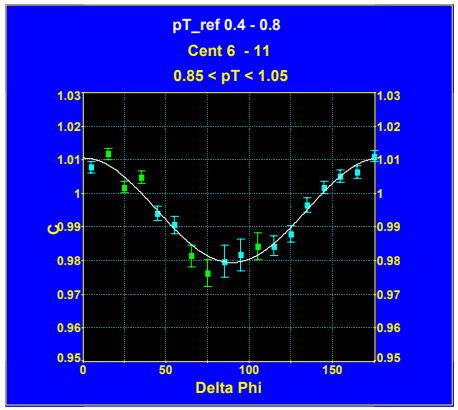
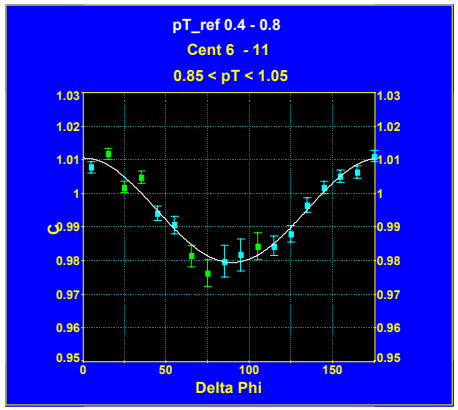
PHENIX Setup

$$C(\Delta\phi) = b \times \exp\left[-\frac{1}{2} \times \left(\frac{\Delta\phi}{\sigma}\right)^2\right] + a \times (1 + 2c \times \cos(2 \times (\Delta\phi)))$$





$$p_2(assor) = v_2'(p_t) \times v_2''$$



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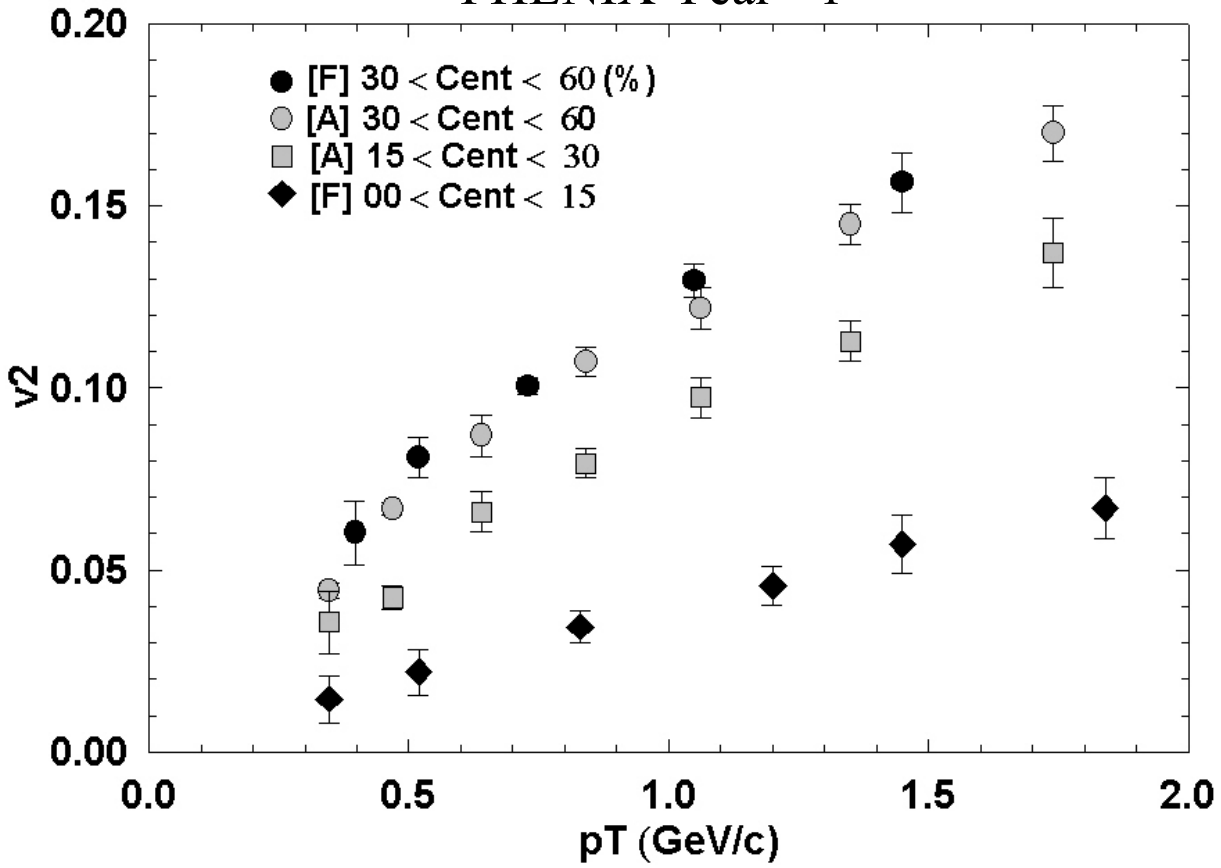
PHENIX Year - 1



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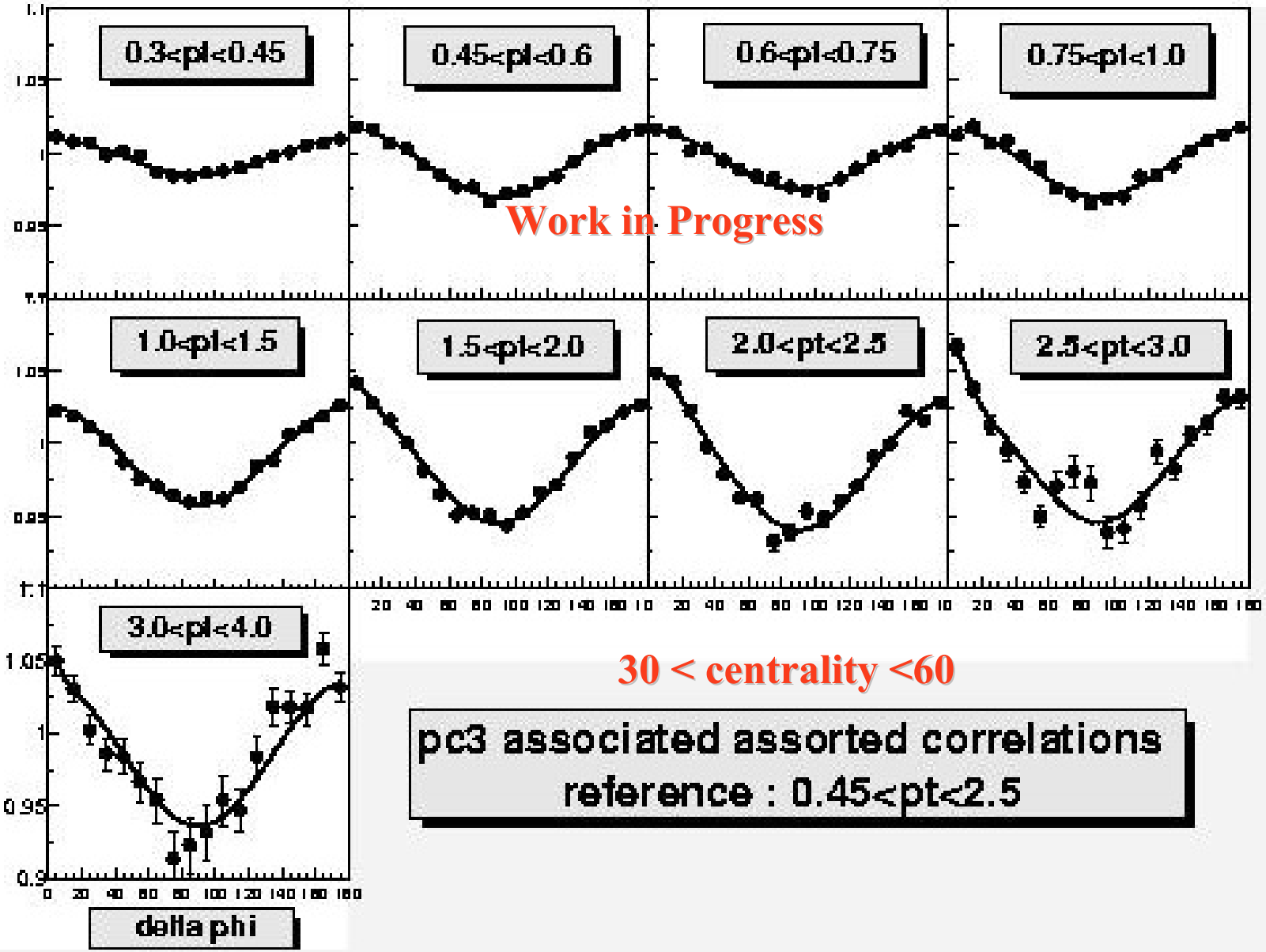
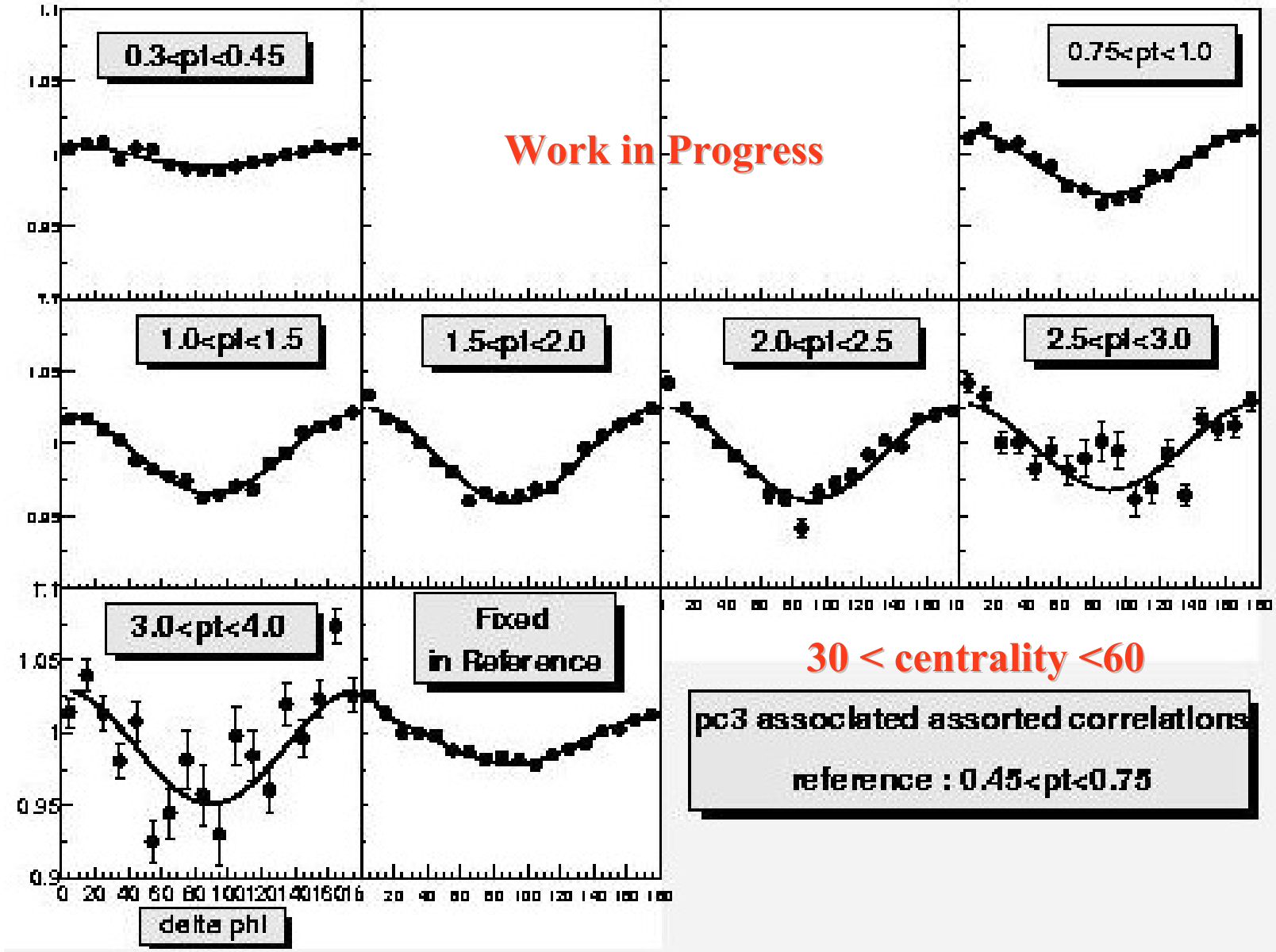

0.3<pt<0.45
0.45<pt<0.6
0.6<pt<0.75
0.75<pt<1.0
1.0<pt<1.5
1.5<pt<2.0
2.0<pt<2.5
2.5<pt<3.0
3.0<pt<4.0
delta phi
Work in Progress
30 < centrality <60
pc3 associated assorted correlations
reference : 0.45<pt<2.5



Work in Progress

30 < centrality <60

pc3 associated assorted correlations

reference : 0.45<pt<0.75

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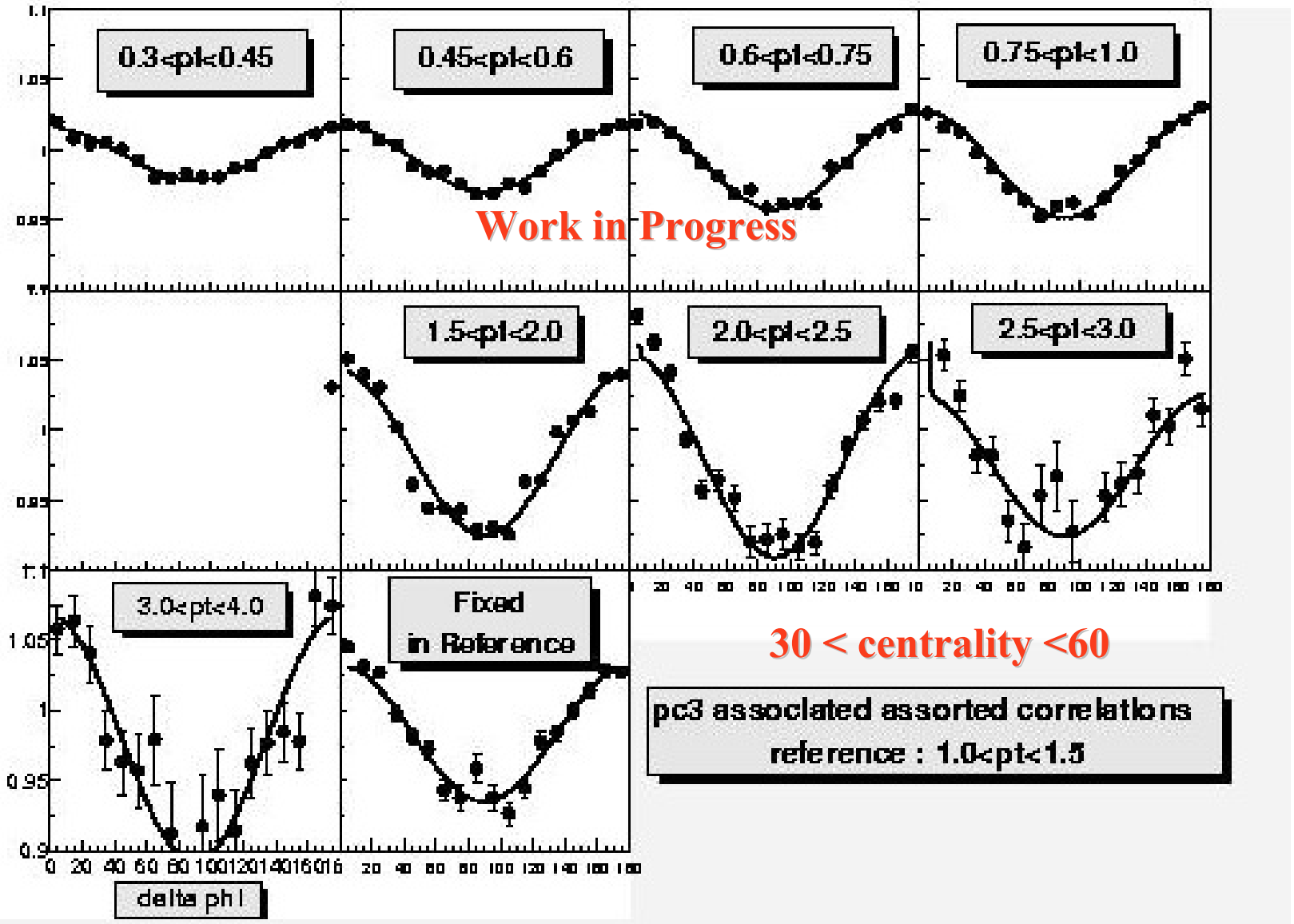
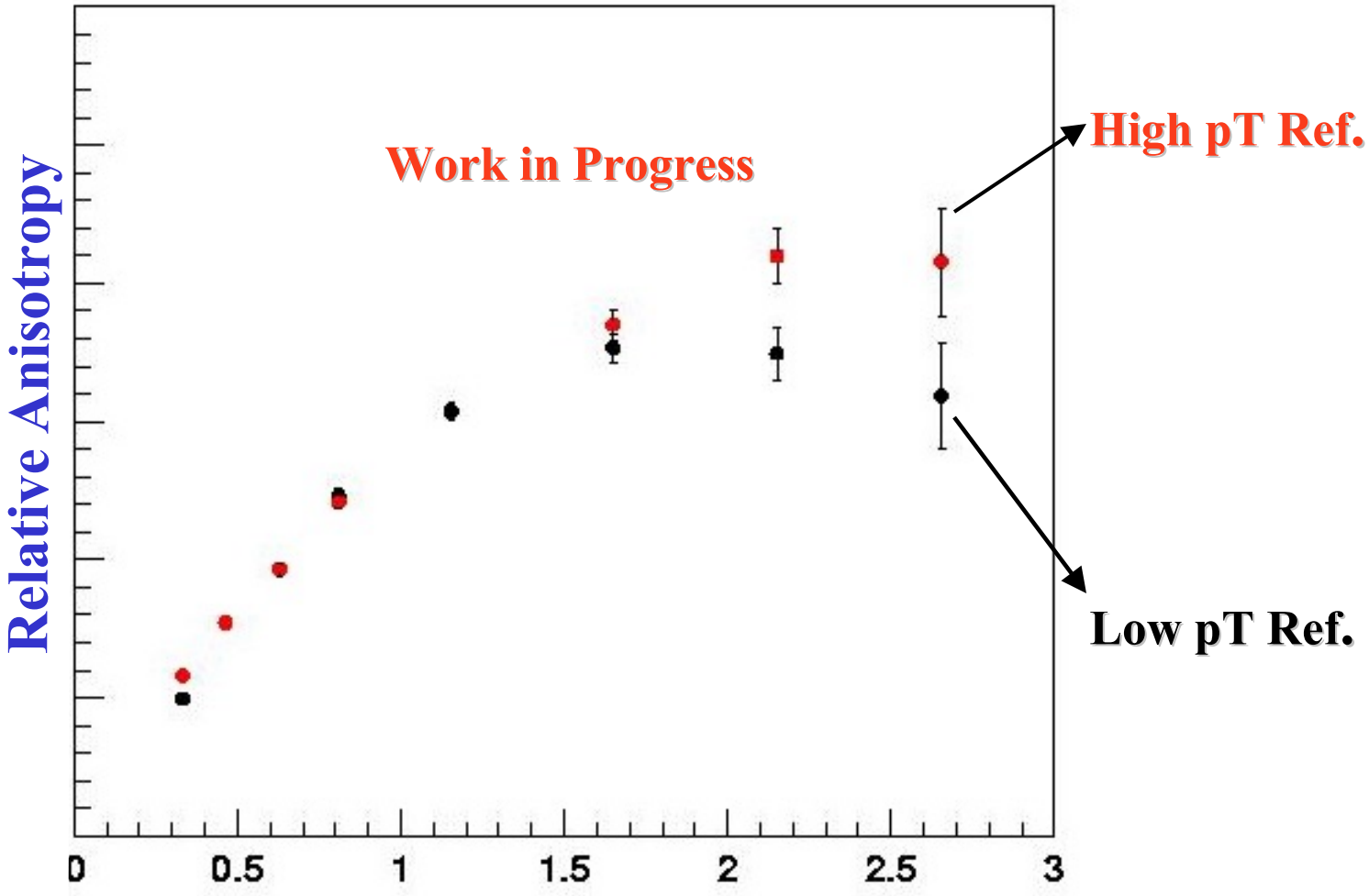
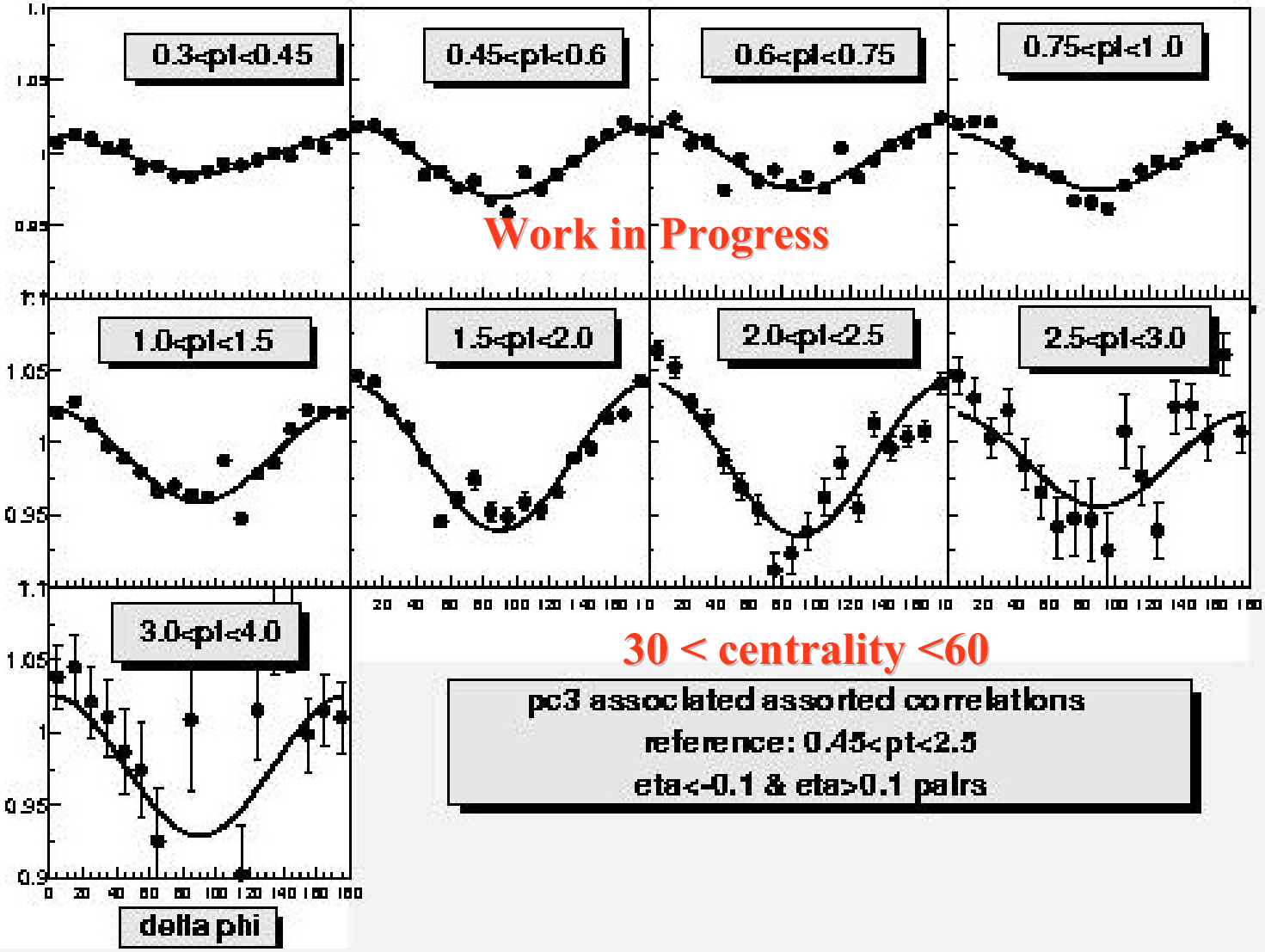
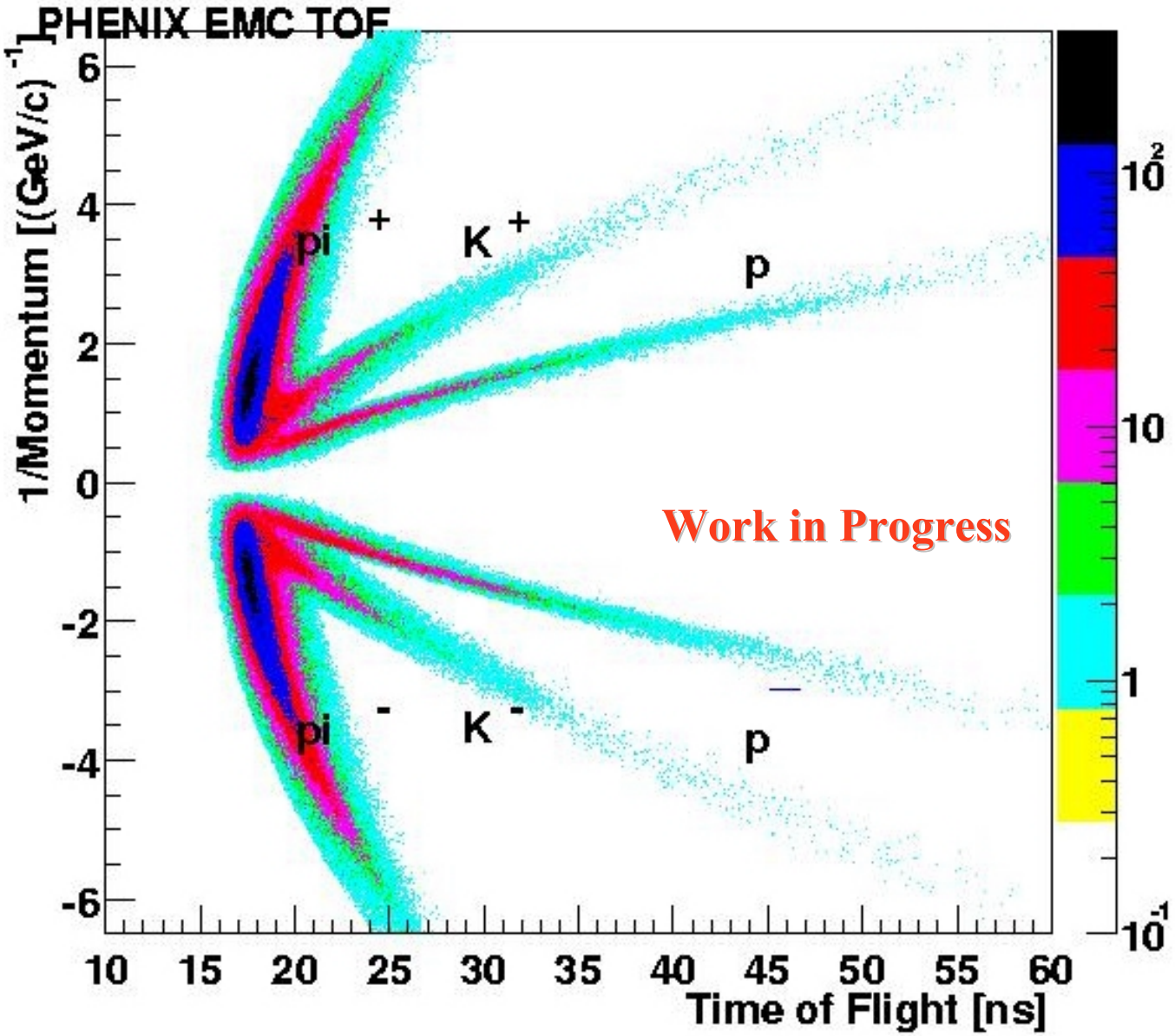

0.3<pt<0.45
0.45<pt<0.6
0.6<pt<0.75
0.75<pt<1.0
Work in Progress
1.5<pt<2.0
2.0<pt<2.5
2.5<pt<3.0
3.0<pt<4.0
Fixed
in Reference
delta phi
30 < centrality <60
pc3 associated assorted correlations
reference : 1.0<pt<1.5


Relative Anisotropy
Work in Progress
High pT Ref.
Low pT Ref.
0
0.5
1
1.5
2
2.5
3


0.3<pt<0.45
0.45<pt<0.6
0.6<pt<0.75
0.75<pt<1.0
1.0<pt<1.5
1.5<pt<2.0
2.0<pt<2.5
2.5<pt<3.0
3.0<pt<4.0
Work in Progress
30 < centrality <60
pc3 associated assorted correlations
reference: 0.45<pt<2.5
eta<-0.1 & eta>0.1 pairs
delta phi


PHENIX EMC TOF
1/Momentum [(GeV/c)^-1]
6
4
2
0
-2
-4
-6
pi +
K +
p
pi -
K -
p
Work in Progress
10^2
10
1
10^-1
10
15
20
25
30
35
40
45
50
55
60
Time of Flight [ns]

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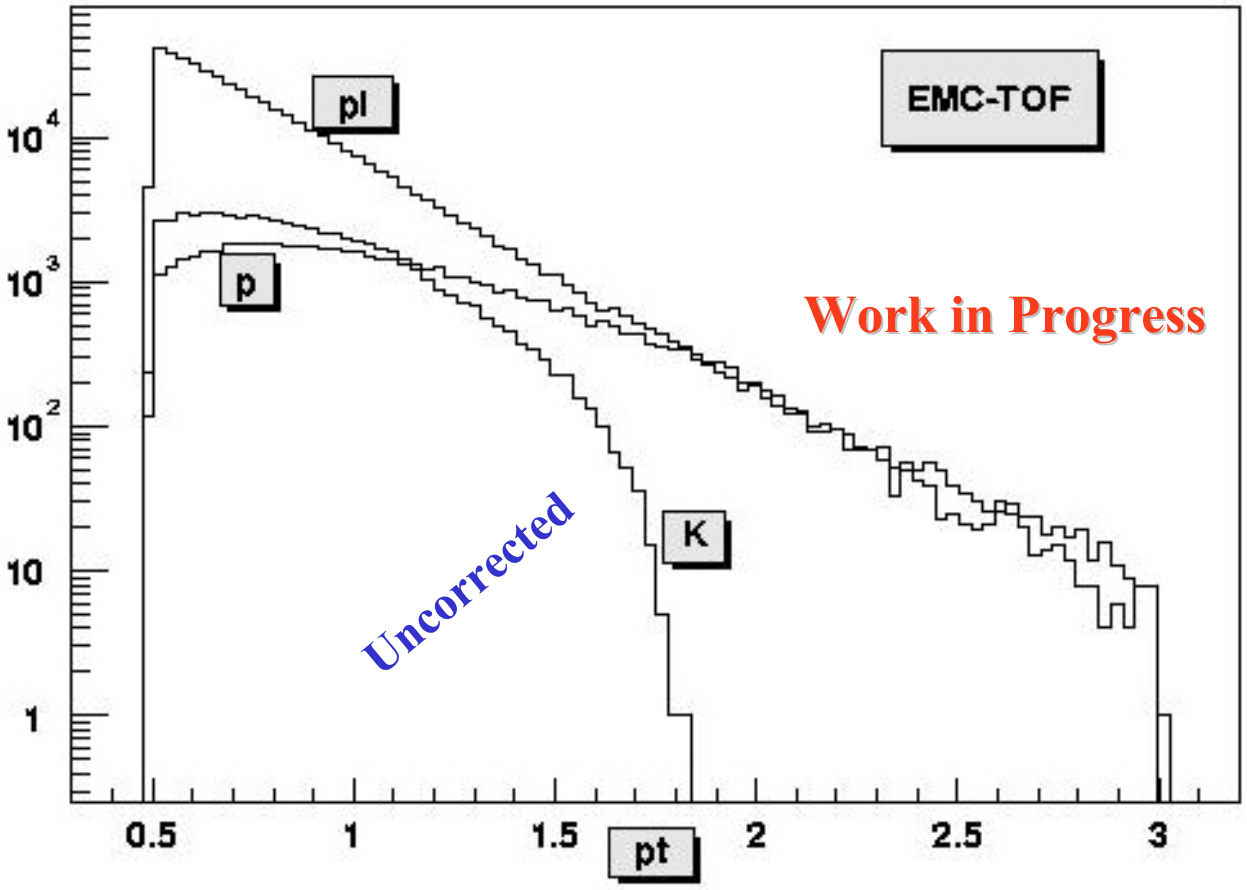
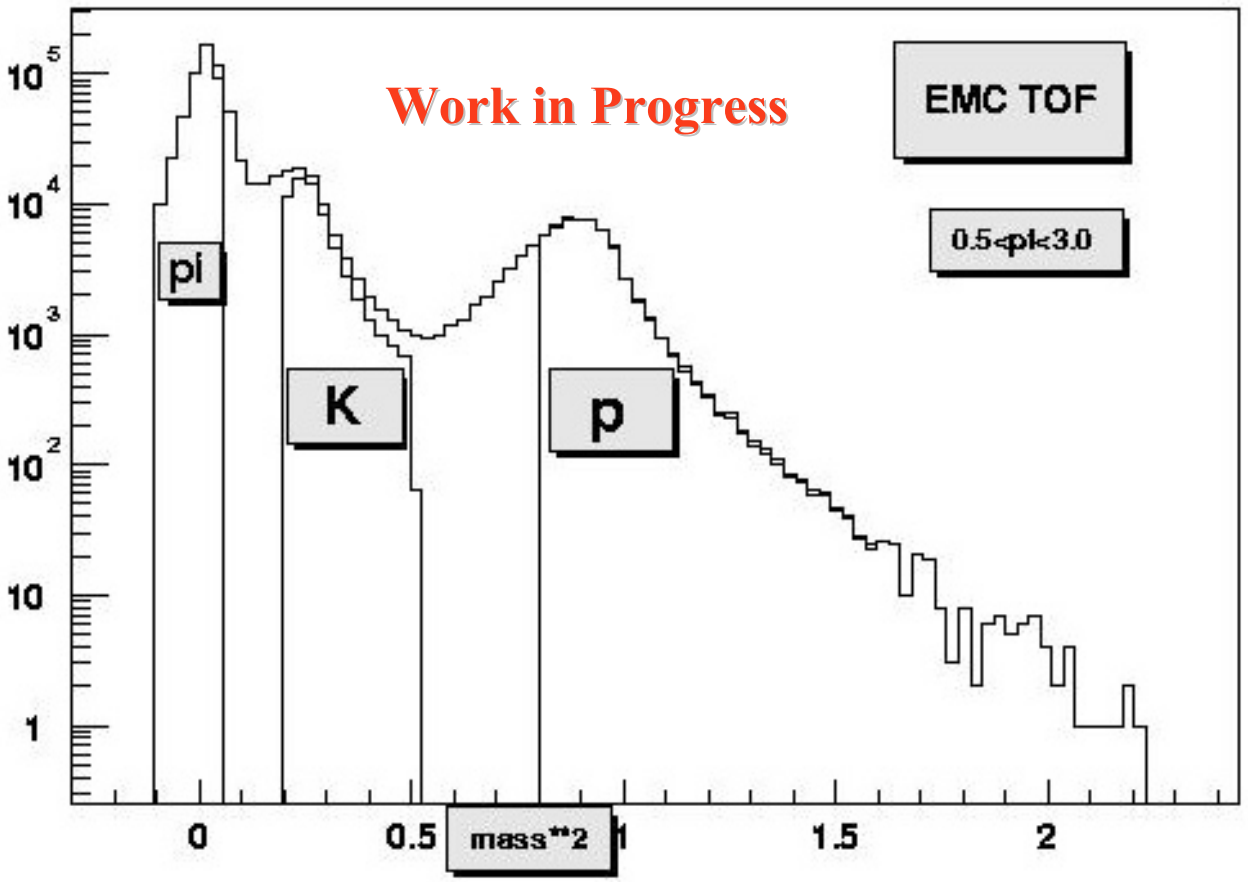
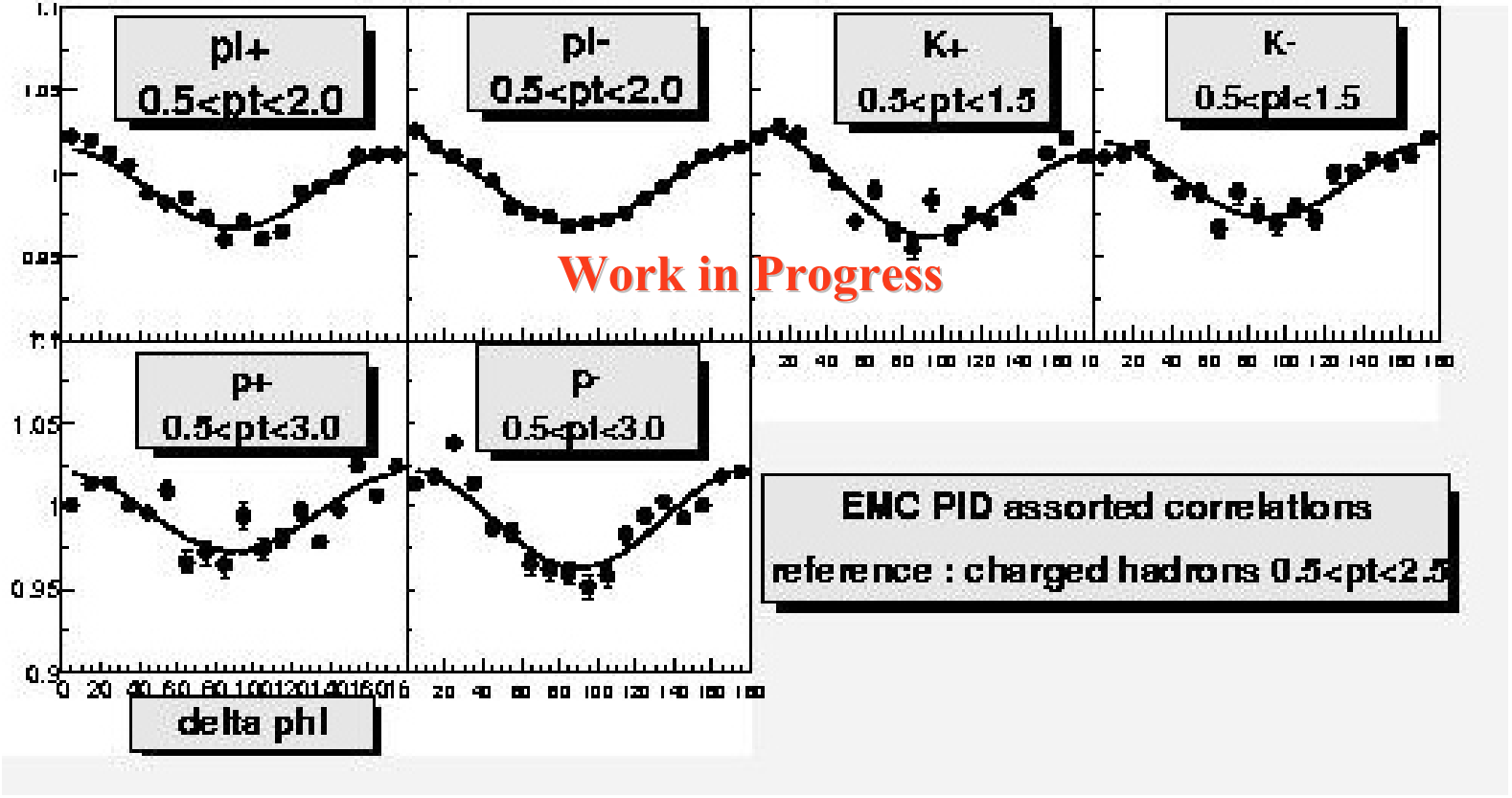
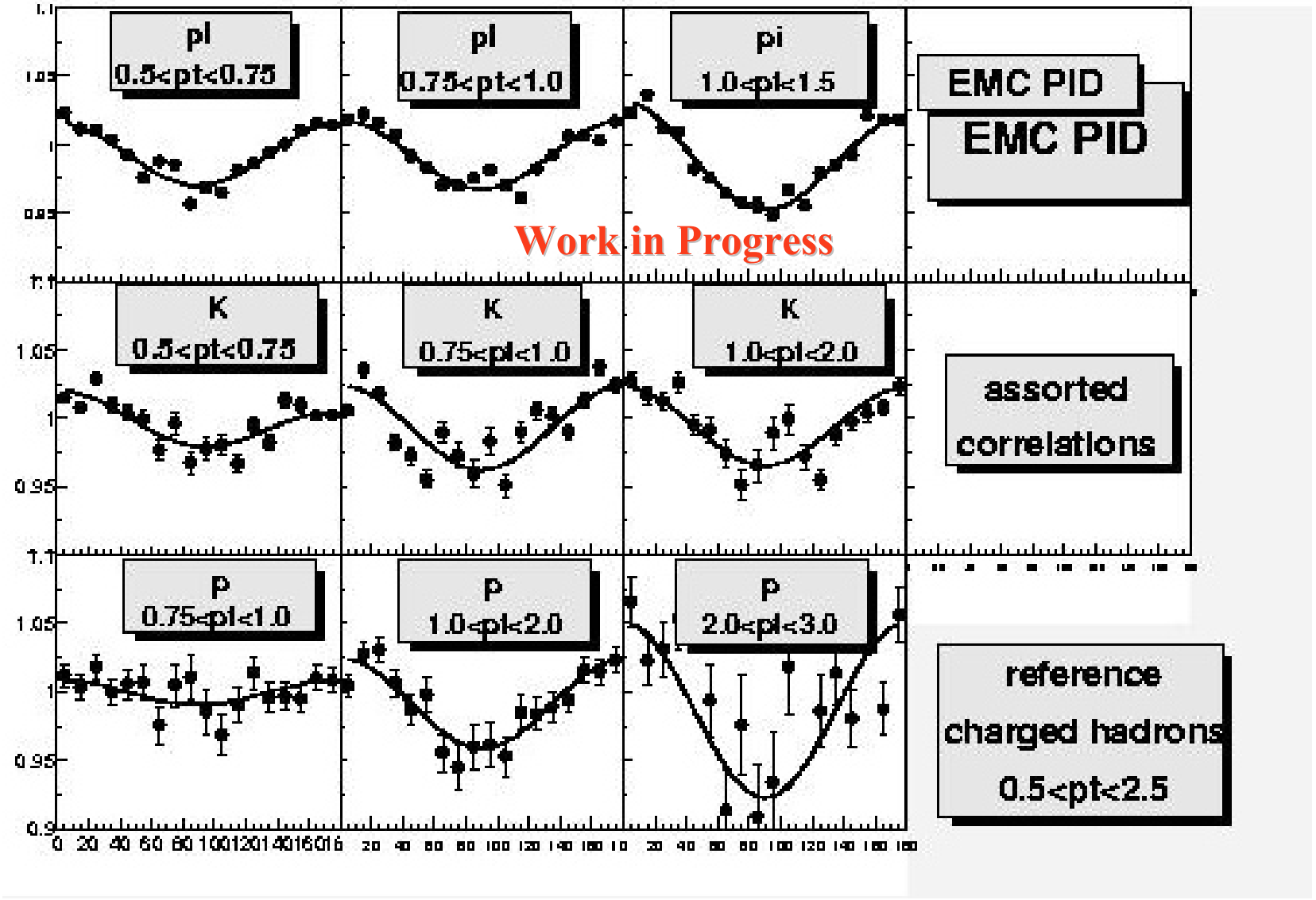

EMC-TOF
pl
p
K
Work in Progress
Uncorrected
10^4
10^3
10^2
10
1
0.5
1
1.5
2
2.5
3
pt


Work in Progress
EMC TOF
0.5<pk<3.0
pi
K
p
10^5
10^4
10^3
10^2
10
1
0
0.5
mass**2
1.5
2


pl+
0.5<pt<2.0
pl-
0.5<pt<2.0
K+
0.5<pt<1.5
K-
0.5<pt<1.5
Work in Progress
p+
0.5<pt<3.0
p-
0.5<pt<3.0
EMC PID assorted correlations
reference : charged hadrons 0.5<pt<2.5
delta phi


pi
0.5<pt<0.75
pi
0.75<pt<1.0
pi
1.0<pt<1.5
EMC PID
EMC PID
Work in Progress
K
0.5<pt<0.75
K
0.75<pt<1.0
K
1.0<pt<2.0
assorted
correlations
p
0.75<pt<1.0
p
1.0<pt<2.0
p
2.0<pt<3.0
reference
charged hadrons
0.5<pt<2.5

Conclusion and outlook

Extensive differential two-particle and multi-particle azimuthal correlations studies underway

(pT, y, centrality, flavor, etc..)

- **Track association with outer detectors (eg. PC3) results in significant background suppression.**
- **Strong pT and centrality dependent anisotropies observed**
- **The EMC TOF has been used to obtain azimuthal correlations of identified charged hadrons.**
- Assorted Correlations with different reference pT ranges are currently being used for assessing non-flow effects

The flavor dependence of high pT hadrons is currently being studied with specific reference to the reported high pt saturation of the elliptic flow of charged hadrons.

Second and fourth order flow studies via cumulants underway.

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