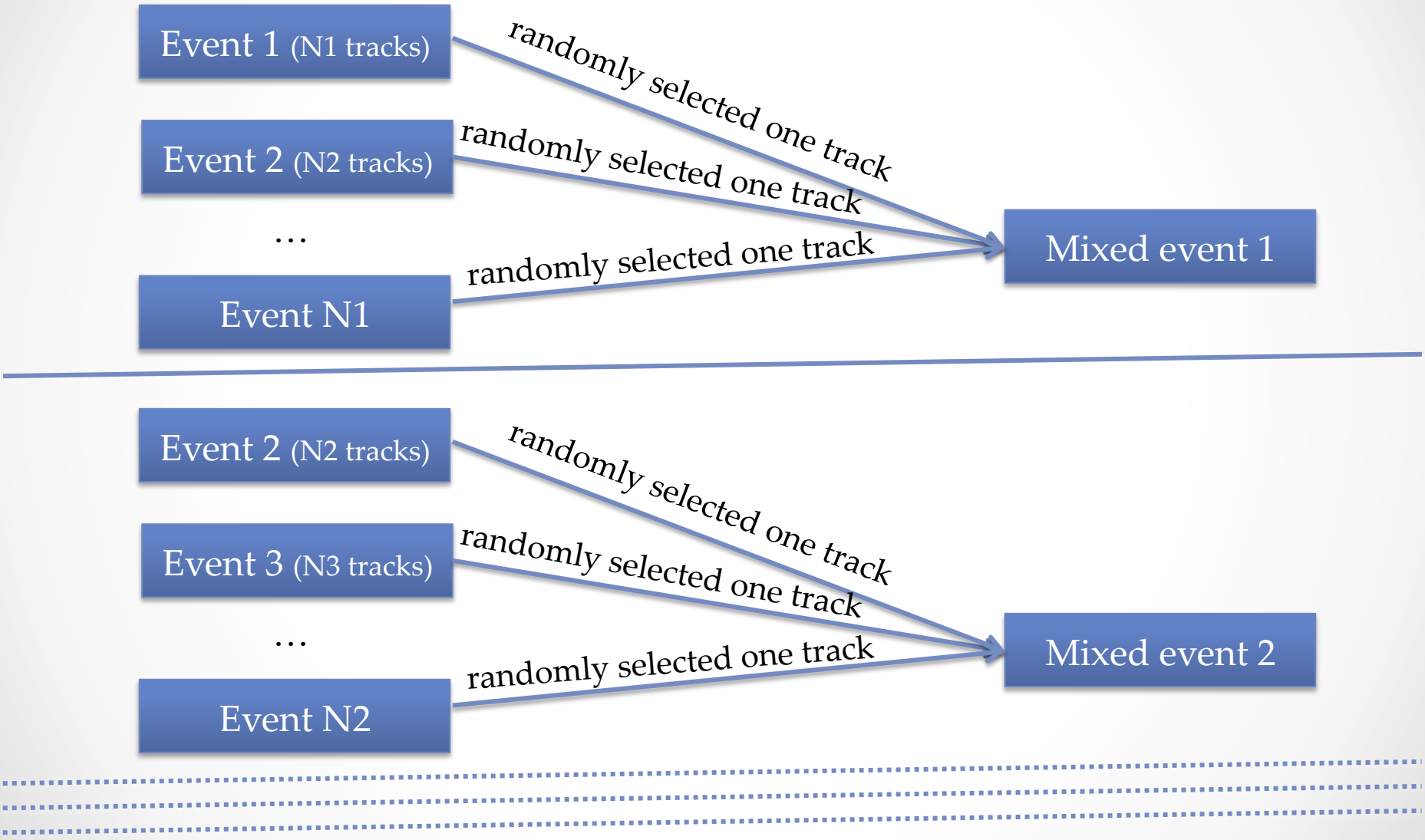
Investigation of systematics stemming from kaon identification

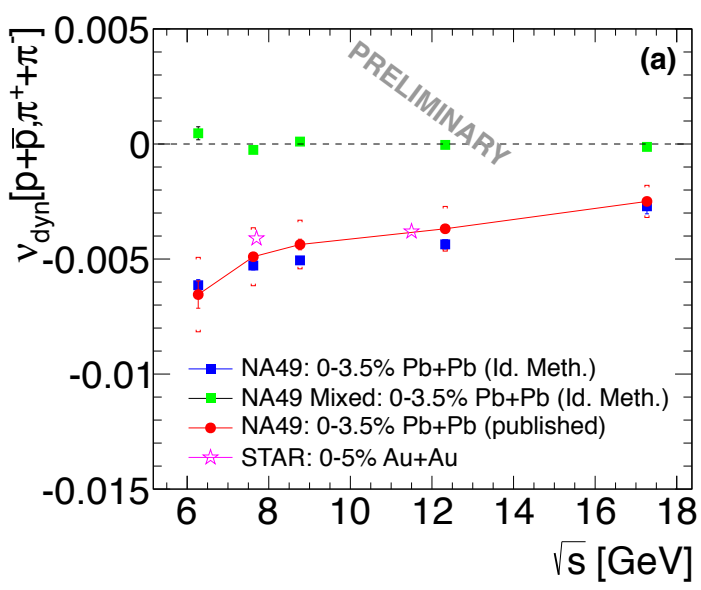
A. Rustamov

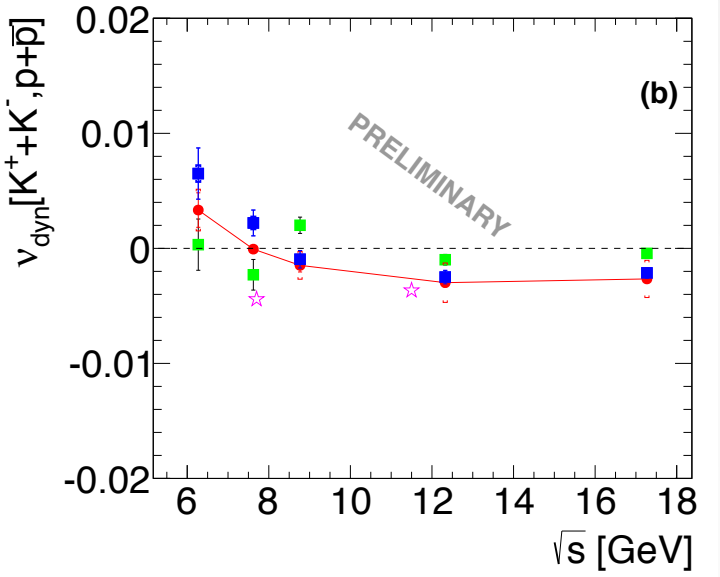
NA49 VIDYO Meeting, 05 July 2013

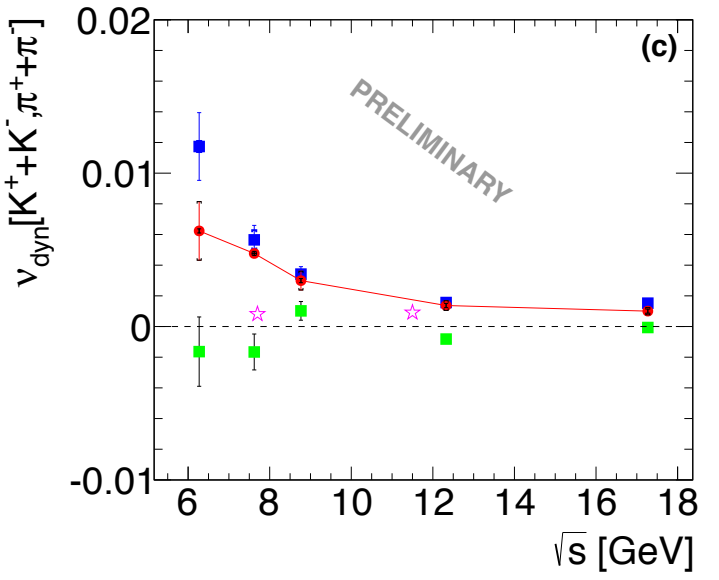
Event mixing-Strategy (TIdentityEvent)



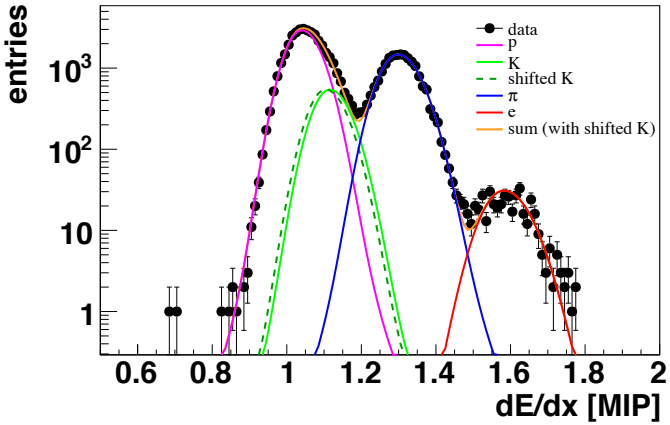
Results from Mixed events (green)

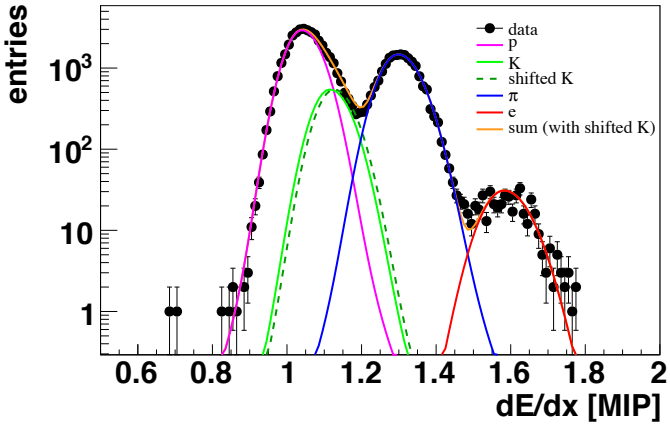


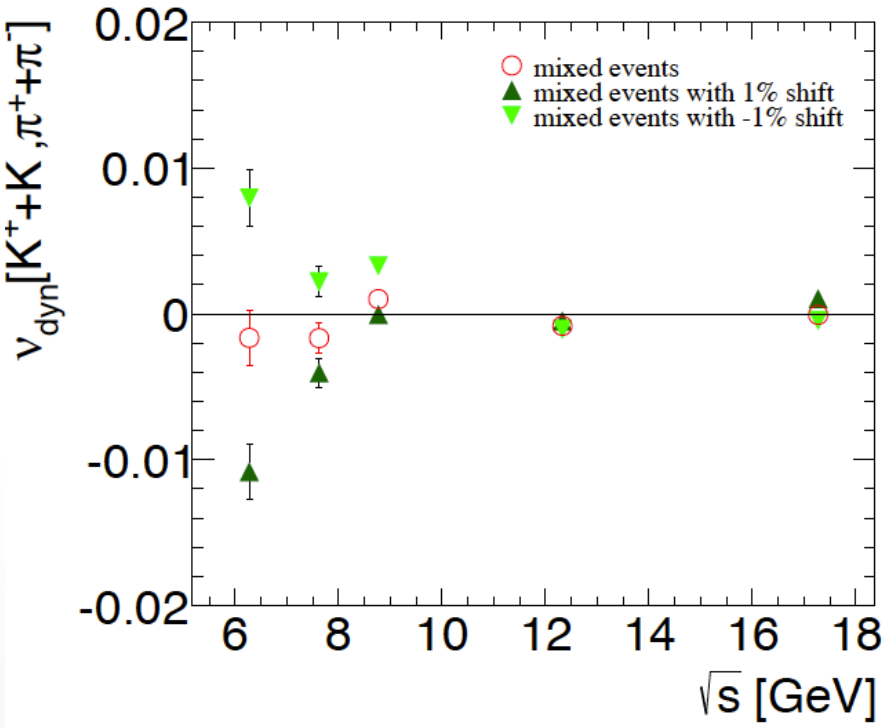




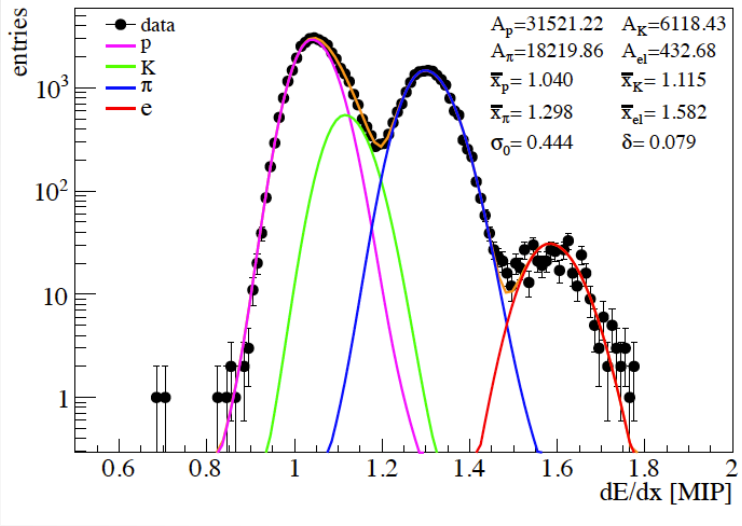
Shifted K positions

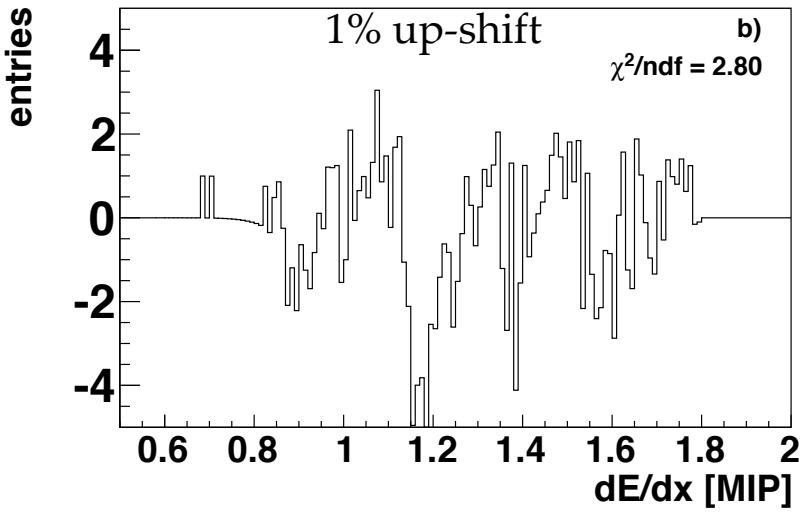


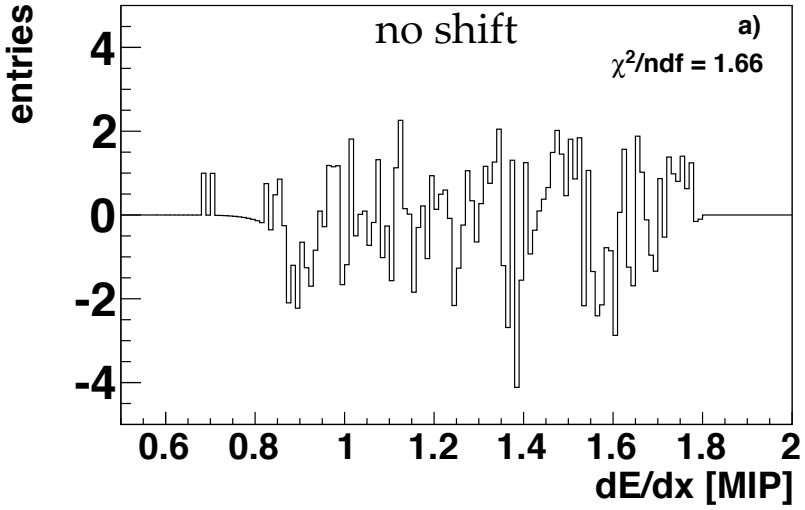


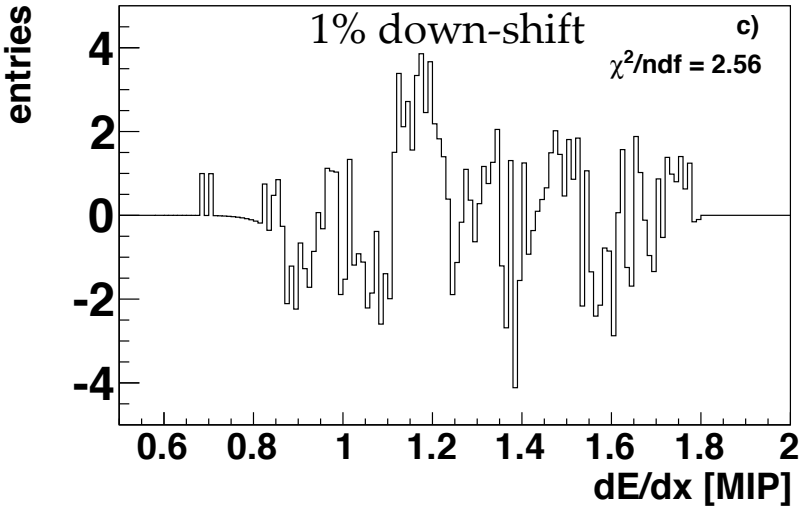


Residuals (1% K position shift)

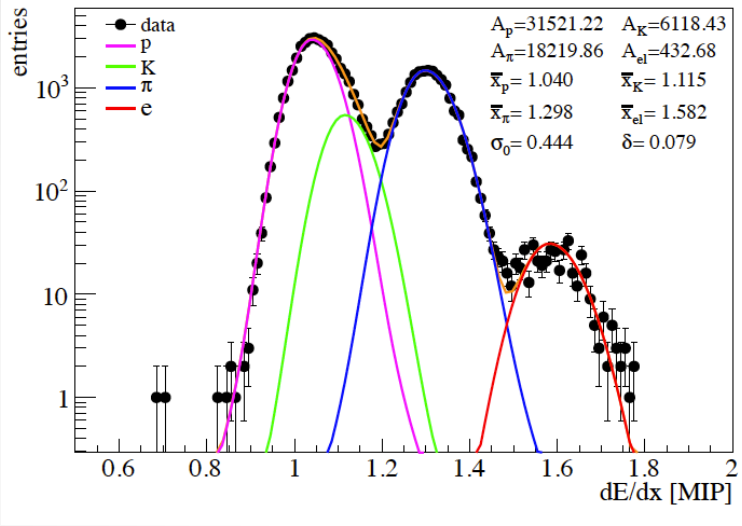


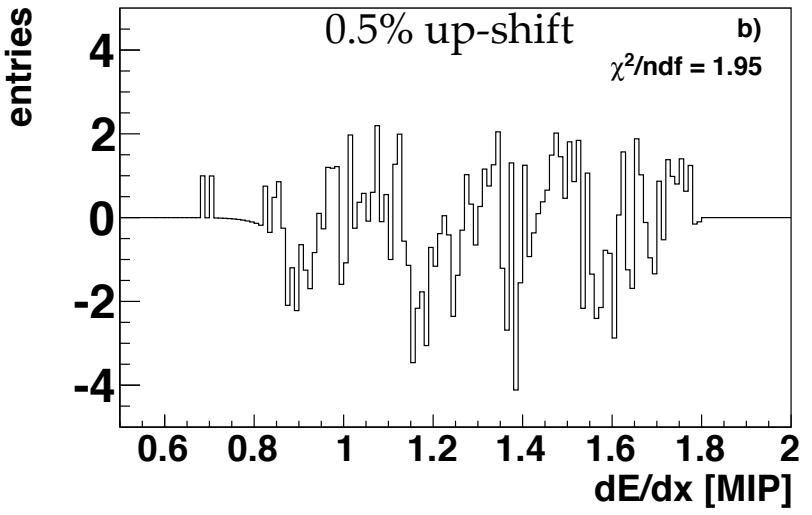


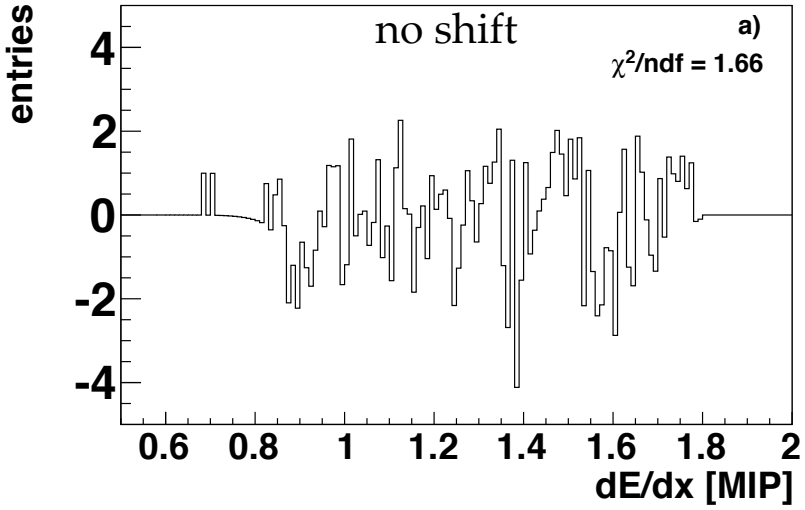


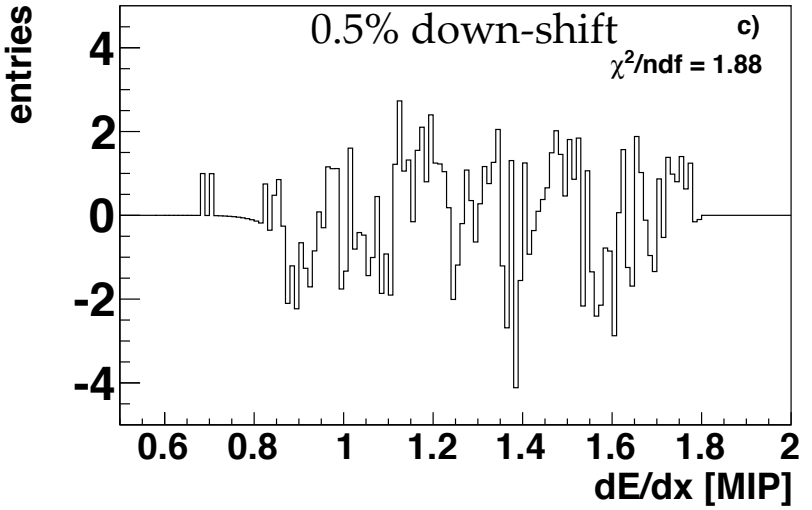


Residuals (0.5% K position shift)

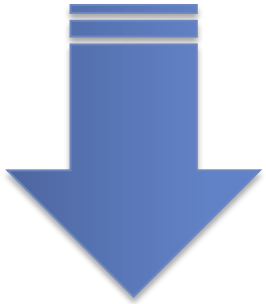








Residuals and/or chi2 check are not enough
to
quantify the K position shift



HYPOTHESIS TESTING

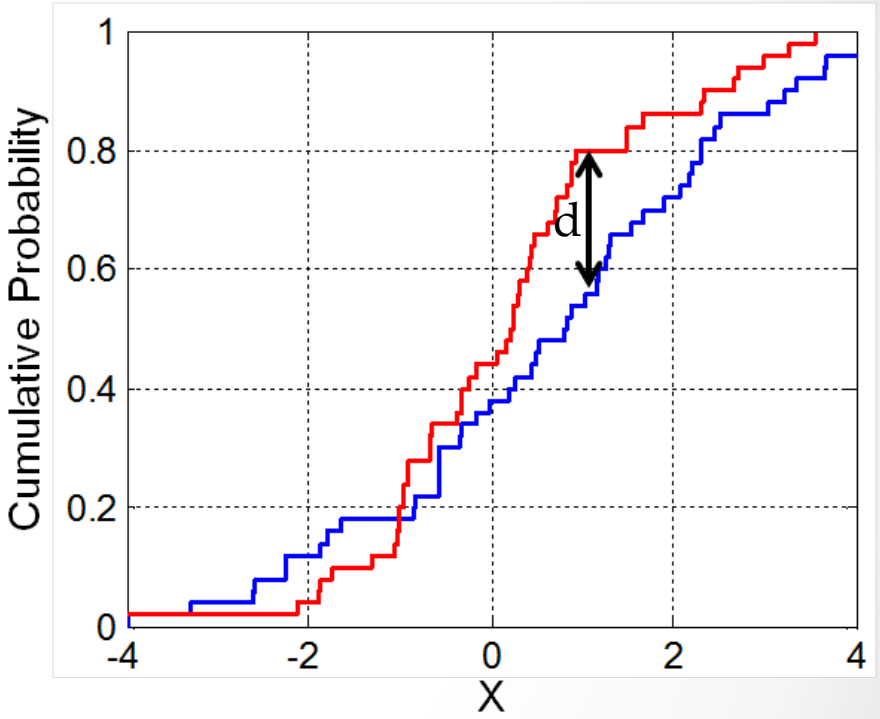
Kolmogorov-Smirnov test

Define null Hypothesis, H_0

H_0 – no difference between underlying probability distributions

(for example, between dE/dx spectra and fit functions)

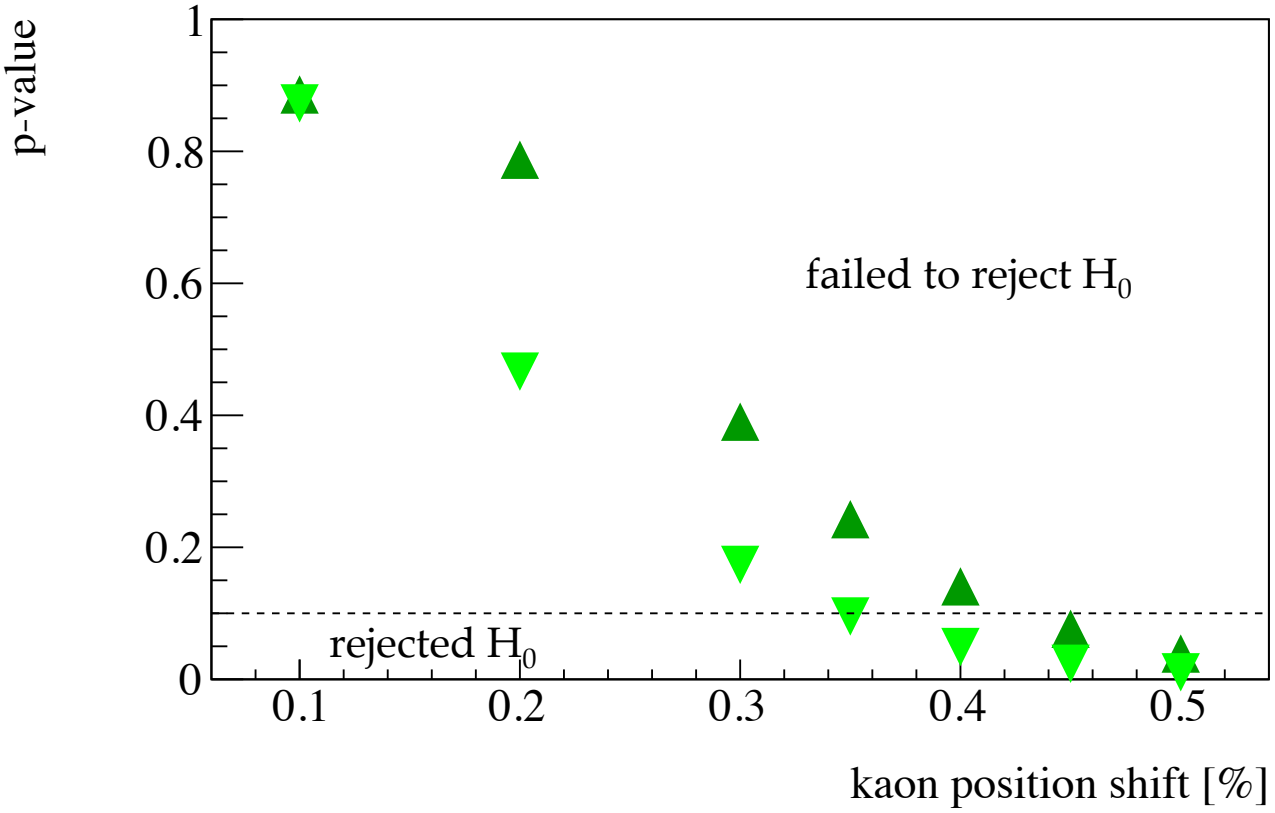
Calculate a p-value from Kolmogorov-Smirnov cdf for maximum vertical distance d between empirical distribution functions.



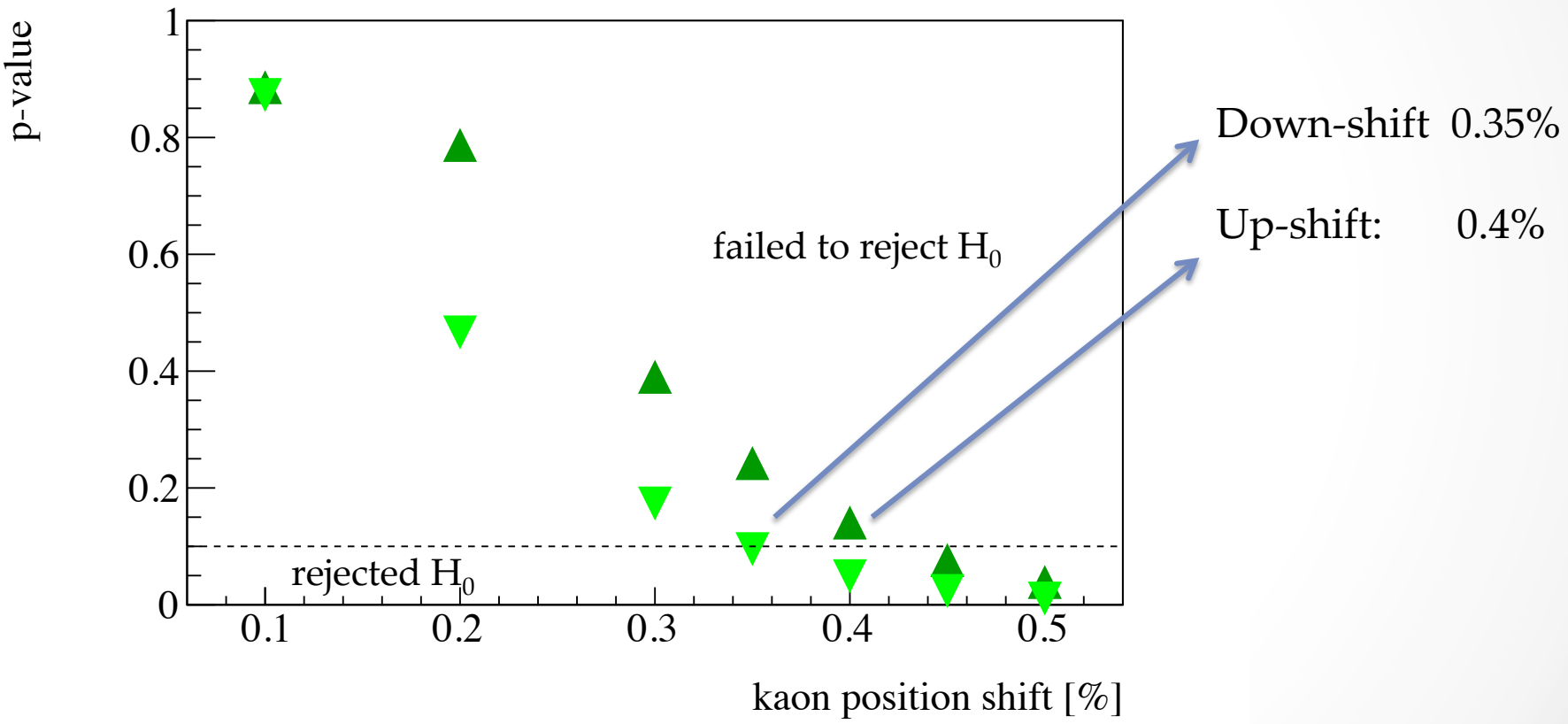
NOTE: d-should be properly normalized to the sample size: d*sqrt(na*nb/(na+nb))

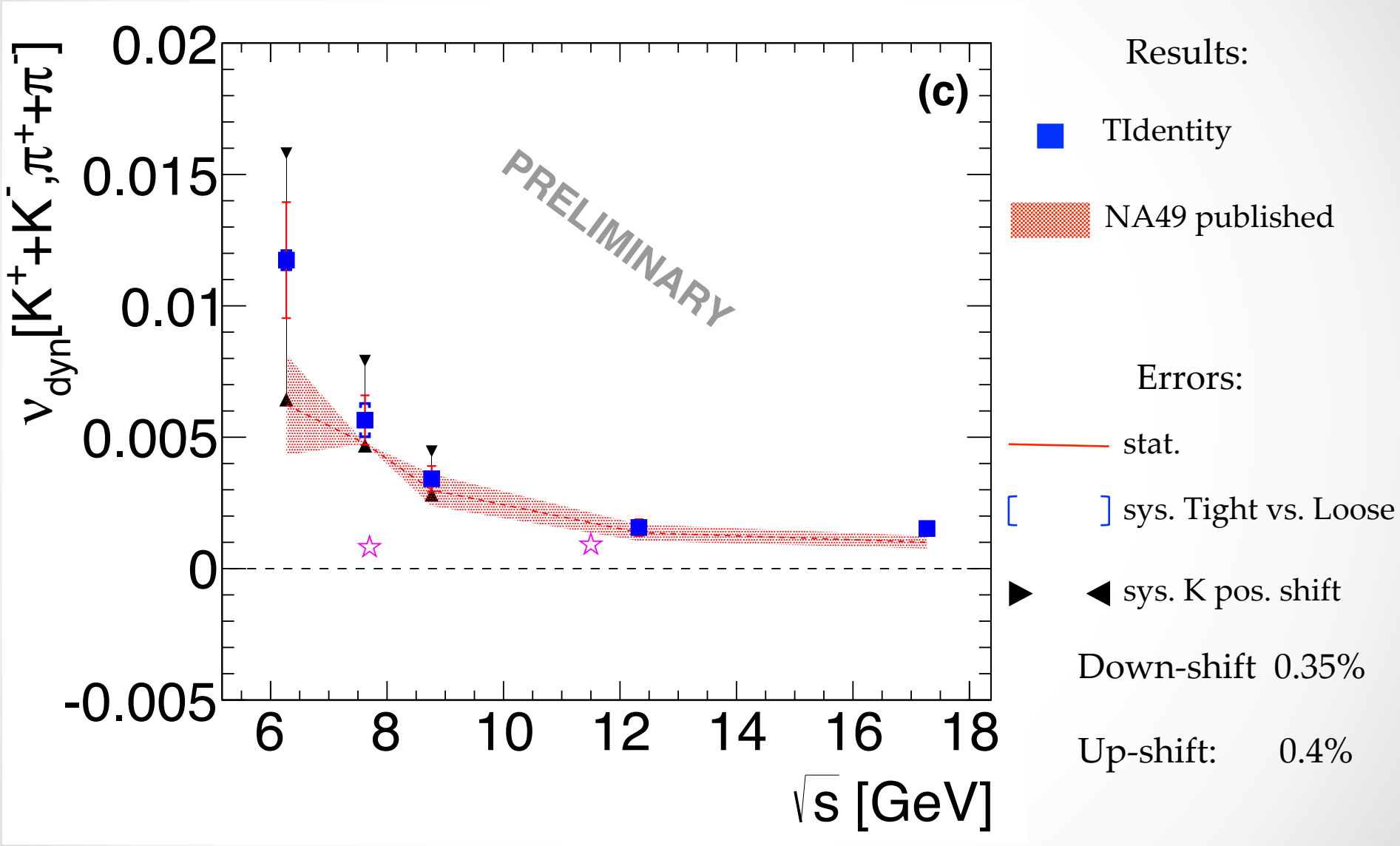
p-value < significance level: H_0 is rejected;

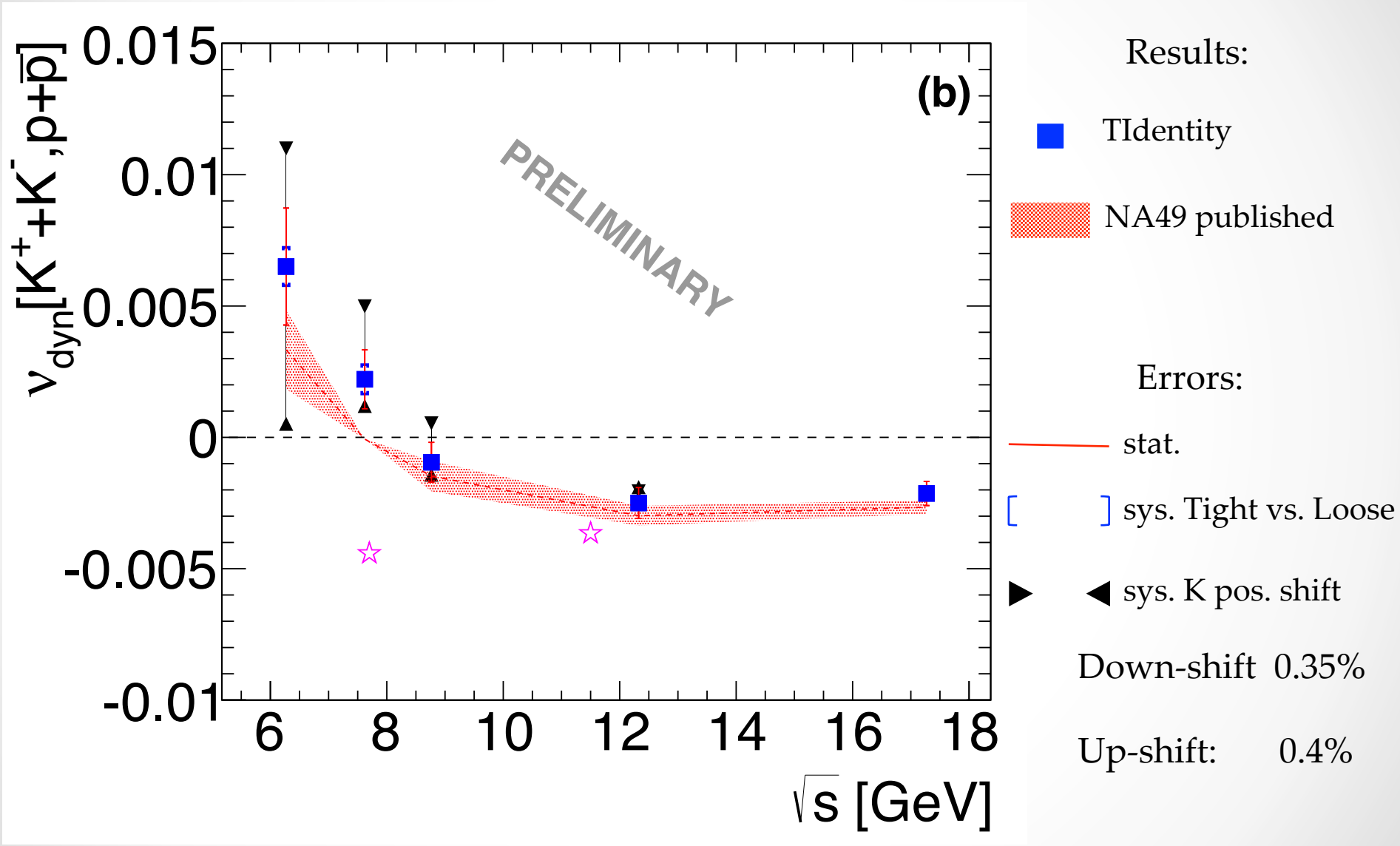
Kolmogorov-Smirnov test



Kolmogorov-Smirnov test




(c)
PRELIMINARY
$\nu_{dyn}[K^+,K^-,\pi^+,\pi^-]$
0.02
0.015
0.01
0.005
0
-0.005
6
8
10
12
14
16
18
$\sqrt{s}$ [GeV]
Results:
TIdentity
NA49 published
Errors:
stat.
sys. Tight vs. Loose
sys. K pos. shift
Down-shift 0.35%
Up-shift: 0.4%


0.015
0.01
0.005
0
-0.005
-0.01
6
8
10
12
14
16
18
$\nu_{dyn}[K^+,K^-,p+\bar{p}]$
$\sqrt{s}$ [GeV]
(b)
PRELIMINARY
Results:
TIdentity
NA49 published
Errors:
stat.
sys. Tight vs. Loose
sys. K pos. shift
Down-shift 0.35%
Up-shift: 0.4%