Midrapidity K⁻ spectra from TOFR at 20 AGeV

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Data set and event selection

Data set : 2002 Pb+Pb @ 20 AGeV central, 1/8 STD+

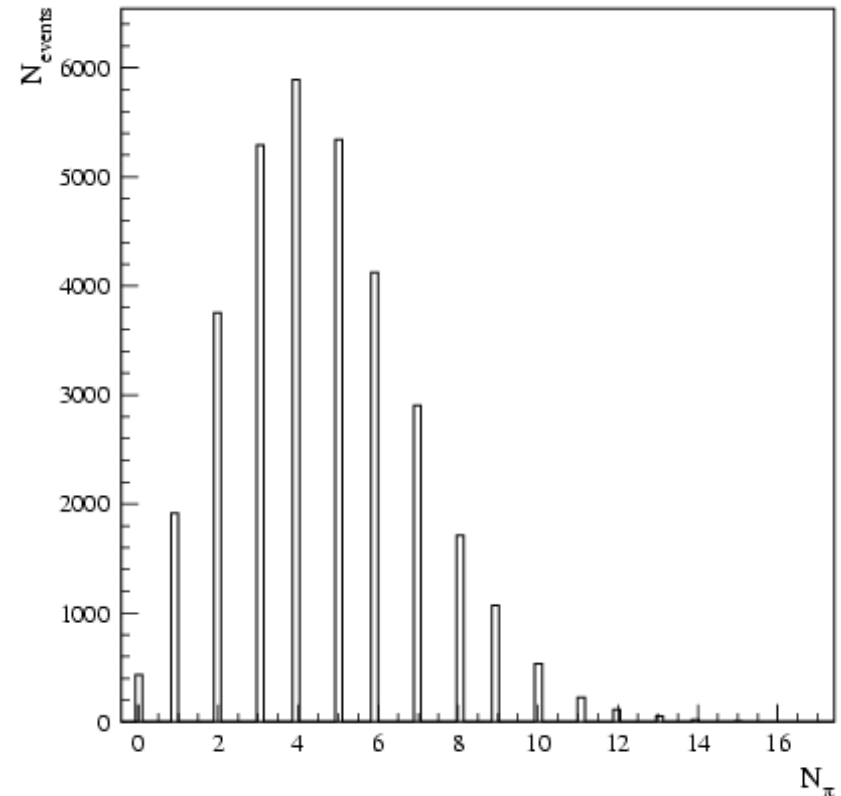Production : 03A

Event selection : $N_{hit,\pi} > 1$ (91.4 %)

328.103 events used

New method of event-by-event calibration!
(Old criterium : $N_{hit,\pi} > 3$ (40%) $\rightarrow$ bias ?)

Definition of pion hit for selfcalibration:
$\pm$ 8% from pion dE/dx
$\pm$ 800 ps from calculated TOF_π

Track selection

- track.iflag = 0

- right-side tracks (px < 0)

- last point at MTPC border

- $l_{MTPC} > 3m$

- $b_x < 2$ cm ; $b_y < 1$ cm

- require found points in VTPC if potential points

Analysis strategy

- Define windows in dE/dx-m^2 (or intervals in m^2)

- Call every track in this window a K^-

- Give this track a weight for   - PID efficiency (dep. on momentum)

                                    - contamination (dep. on momentum)

                                    - TOF efficiency (dep. on channel)

- Fill track with this weights into y-p_t histogram

- Correct each y-p_t bin for geometrical acceptance

- Construct p_t spectrum by merging y-p_t bins

- Same for m_t spectrum

- Fit thermal distribution to spectra

- Sum measured bins and extrapolate with fit function to obtain dn/dy
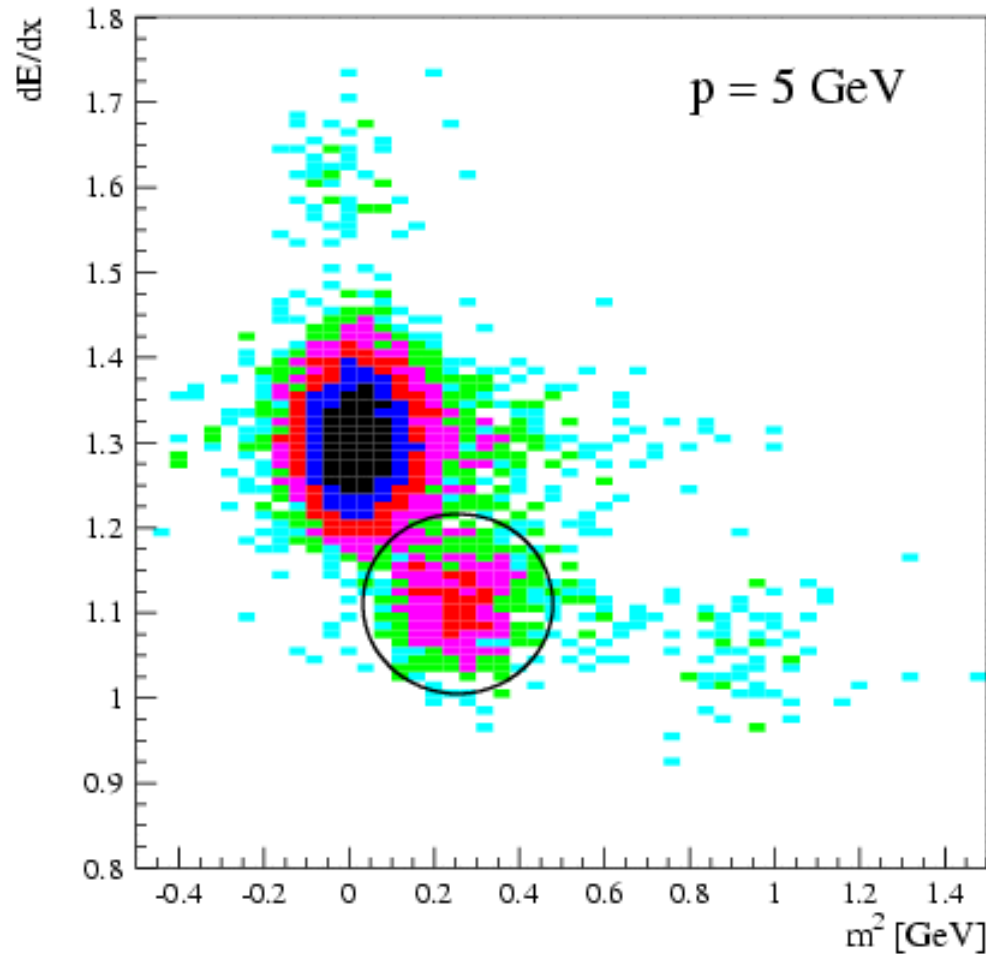
Kaon identification by m^2
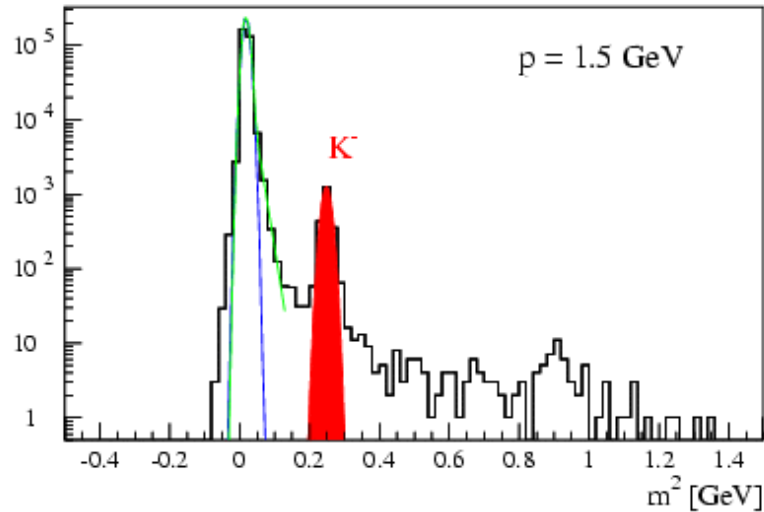
Momentum range 1 − 2.5 GeV
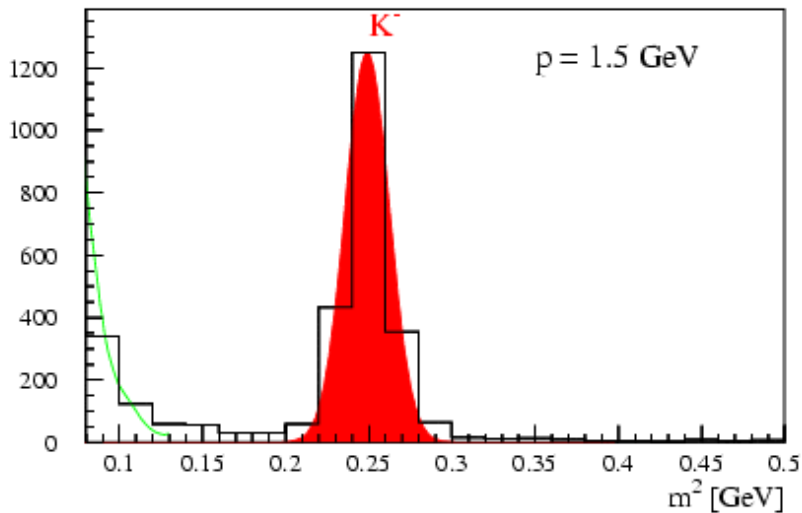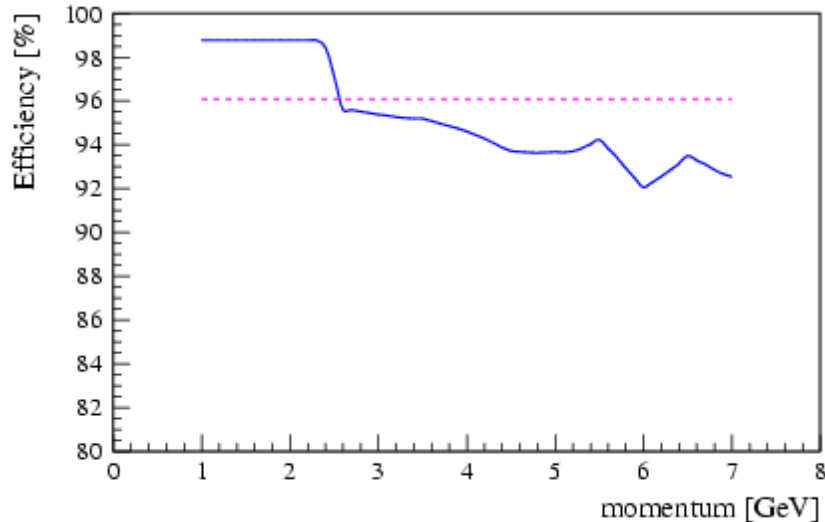
Selection window :
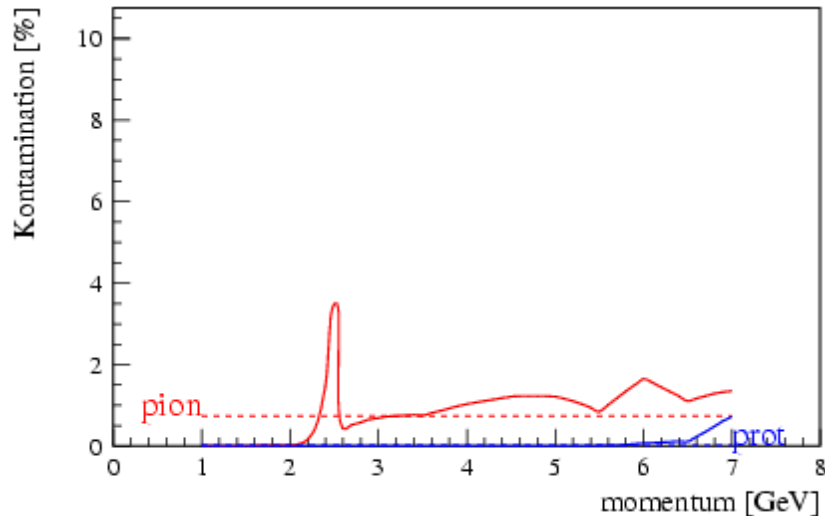Interval ~ σ_{m2}

Kaon identification by m² and dE/dx

Momentum range 2.5 – 7 GeV

Standard selection window :
Ellipse with half axes ~ $\sigma_{dE/dx, m2}$

PID efficiency and contamination

calculated from (dE/dx-) m^2 parametrisation as function of momentum

mean PID efficiency : 96 %
mean contamination : ~ 1 %
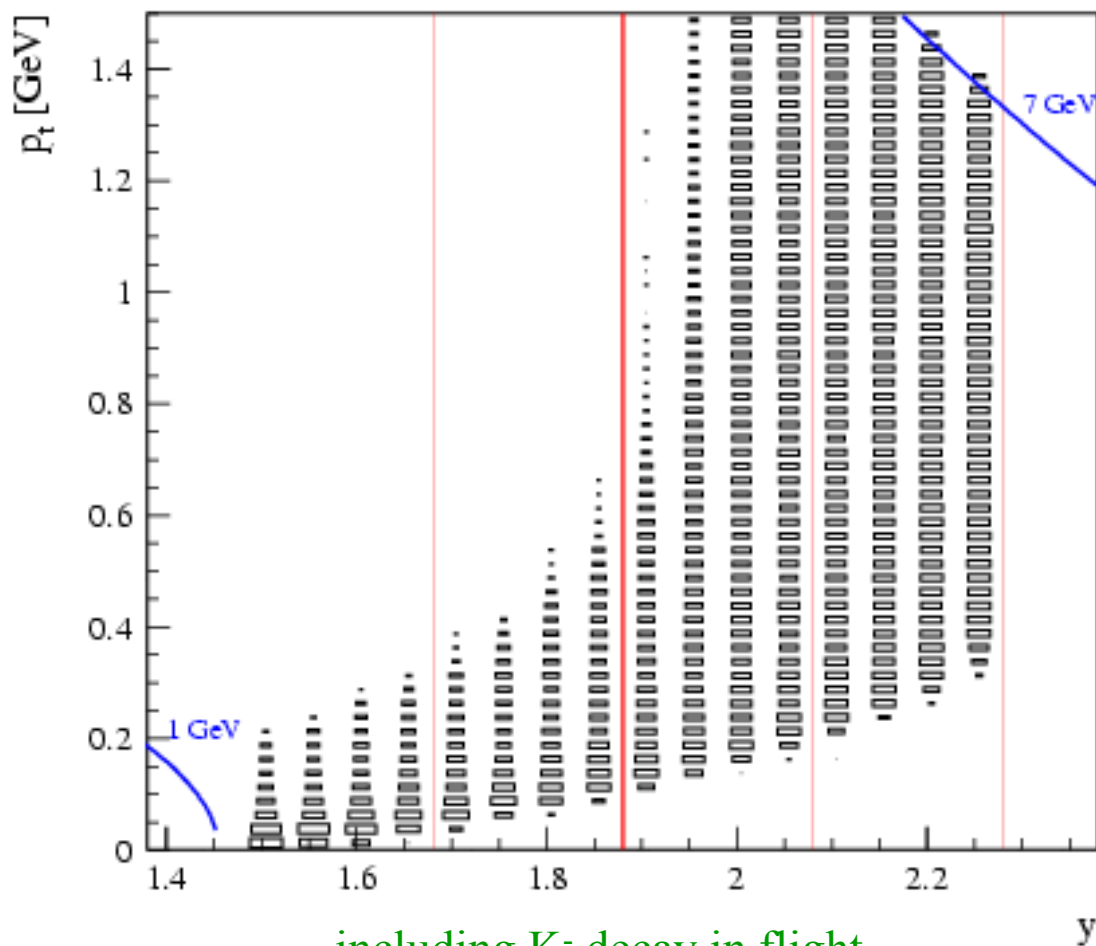
TOF efficiency

Losses due to:

- ❑ track extrapolation (inexact geometry)   10 %

- ❑ Mutiple hits in scintillators   2 %

- ❑ Fiducial QDC-cut ($0.8 < q_{norm} < 1.6$)   12 %

calculated and corrected for each channel

Mean TOFR efficiency : ~ 77 %

Geometrical acceptance

TOFR acceptance for K⁻, 20 AGeV (1/8 STD+)

including K⁻ decay in flight

pure GEANT
reconstruction losses disregarded

Extraction of p_t spectra :
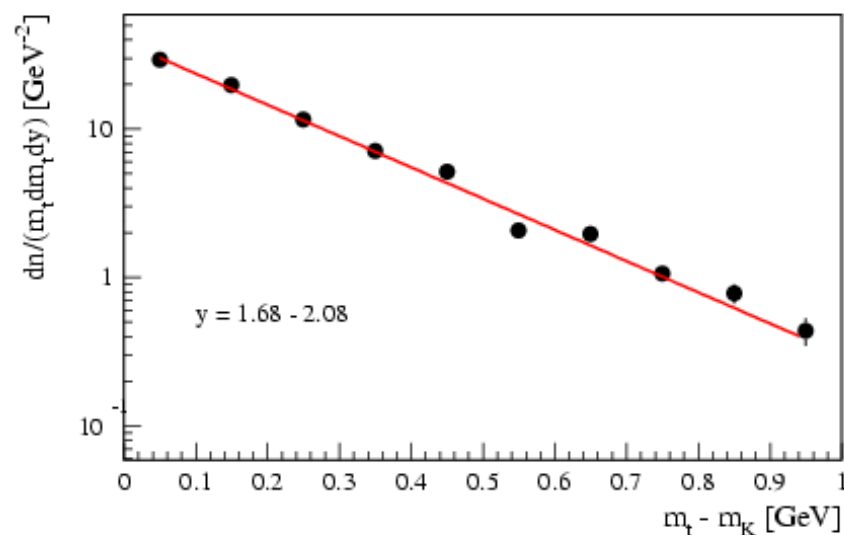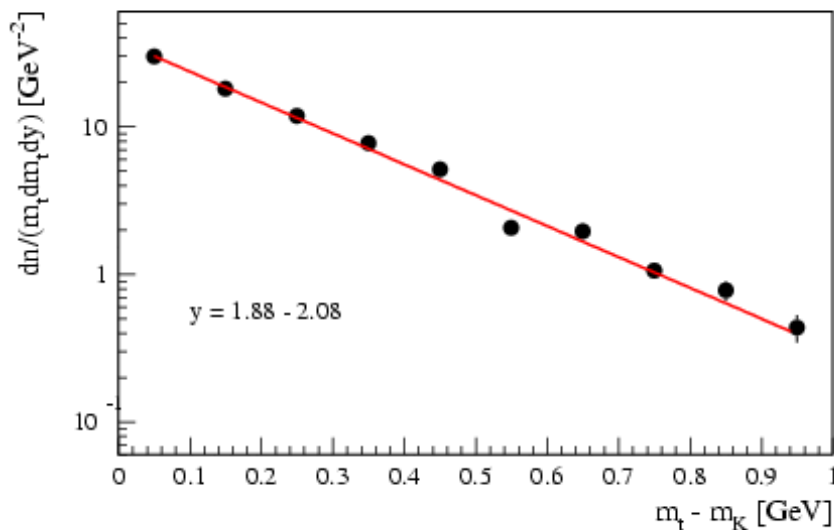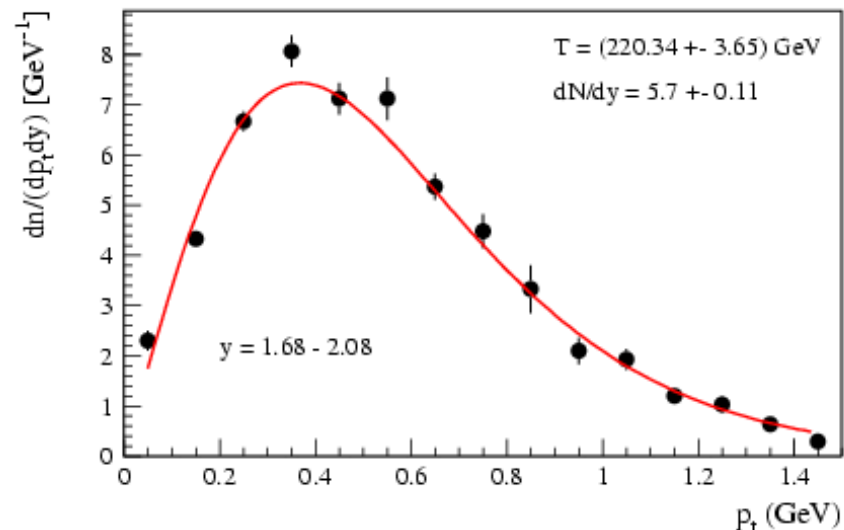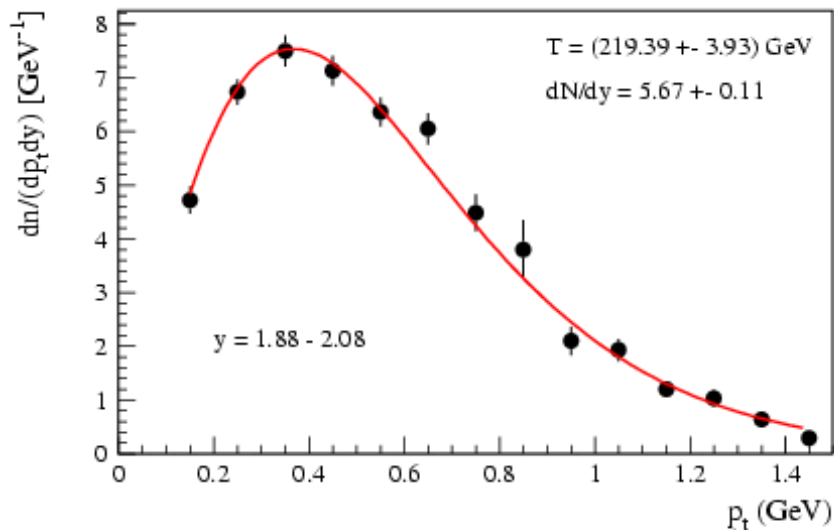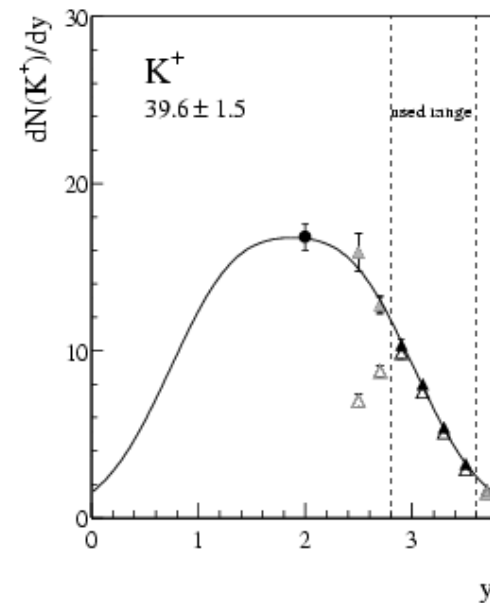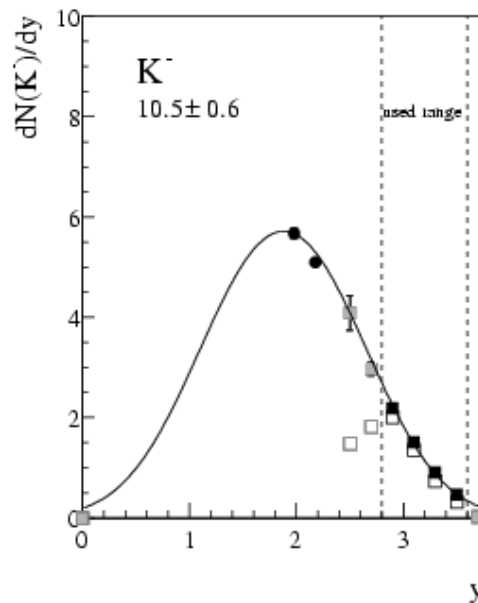$y = 1.88 - 2.08$
$y = 2.08 - 2.28$

Full p_t coverage :
$y = 1.68 - 2.08$

Transverse spectra, y = 1.88 − 2.08

T = (219.39 +- 3.93) GeV

dN/dy = 5.67 +- 0.11

y = 1.88 - 2.08

T = (220.34 +- 3.65) GeV

dN/dy = 5.7 +- 0.11

y = 1.68 - 2.08

y = 1.88 - 2.08

y = 1.68 - 2.08

Transverse spectra, y = 2.08 – 2.28
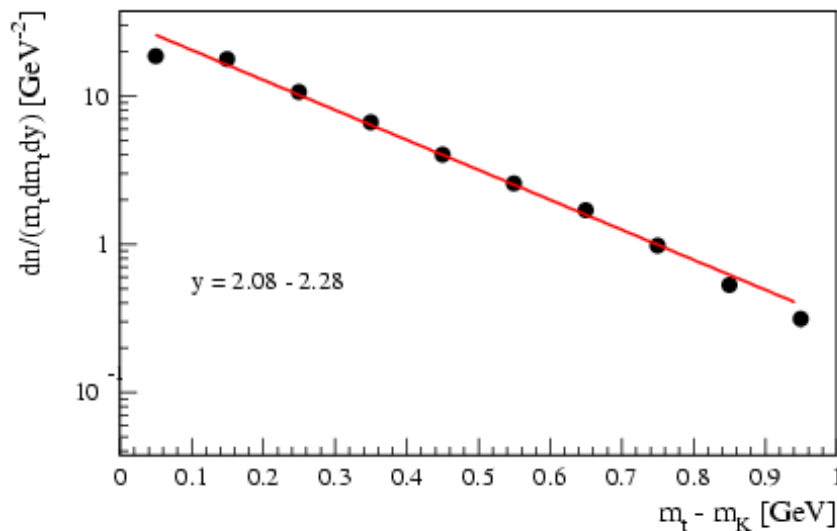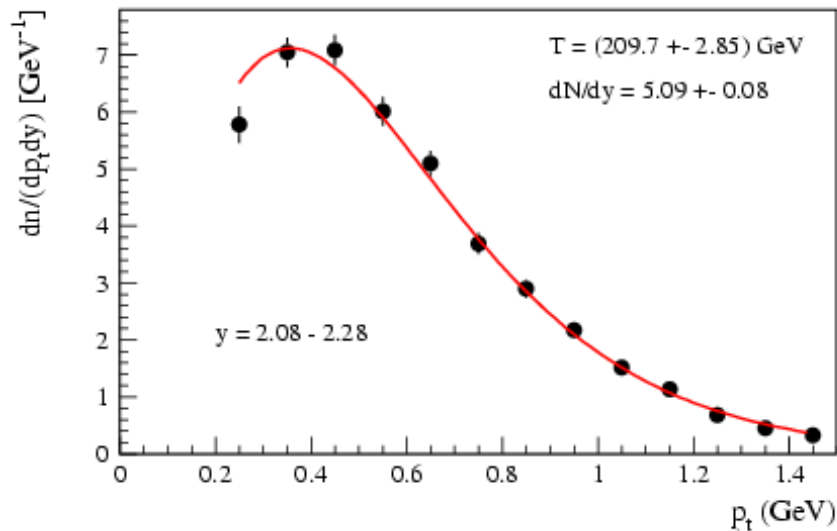
First systematics : Stability against PID criteria

$y = 1.88 - 2.08$

Note : not independent measurements
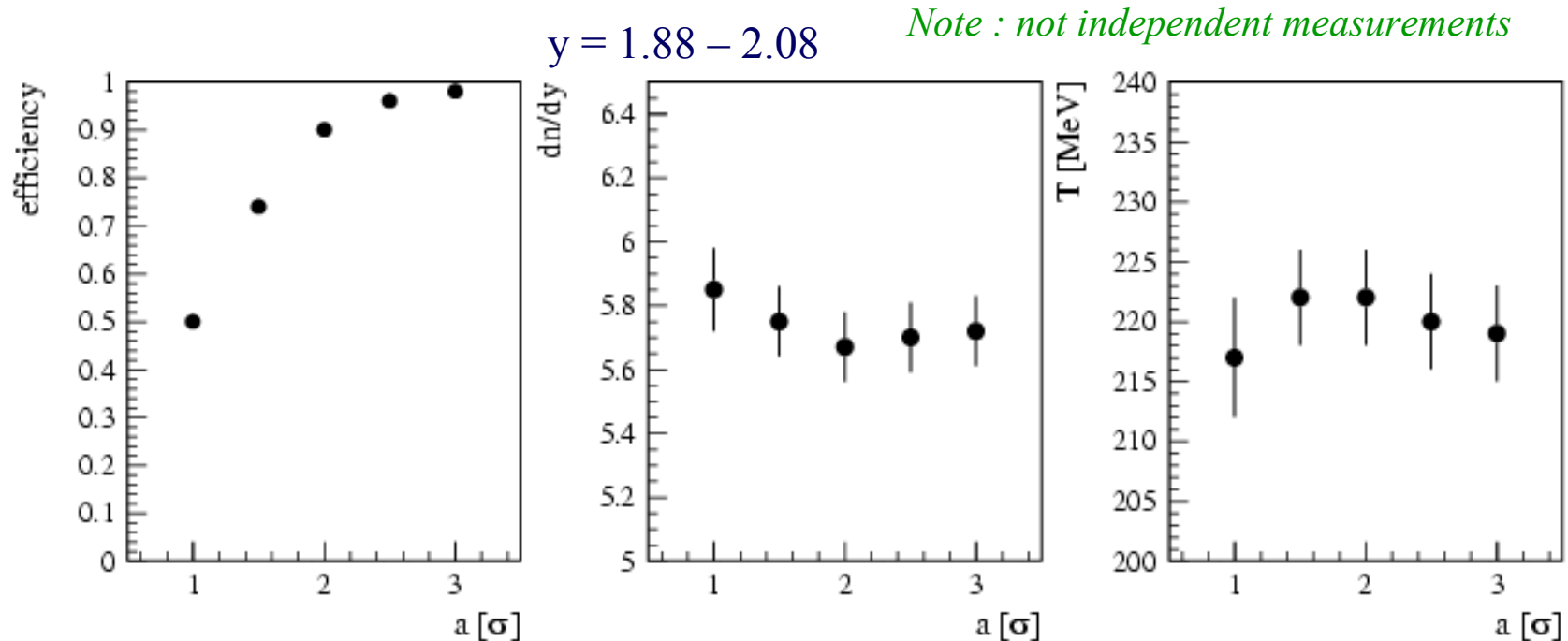
Stable (within stat. error) against variation of PID

Stability against event selection

$y = 1.88 - 2.08$ *Note : not independent measurements*
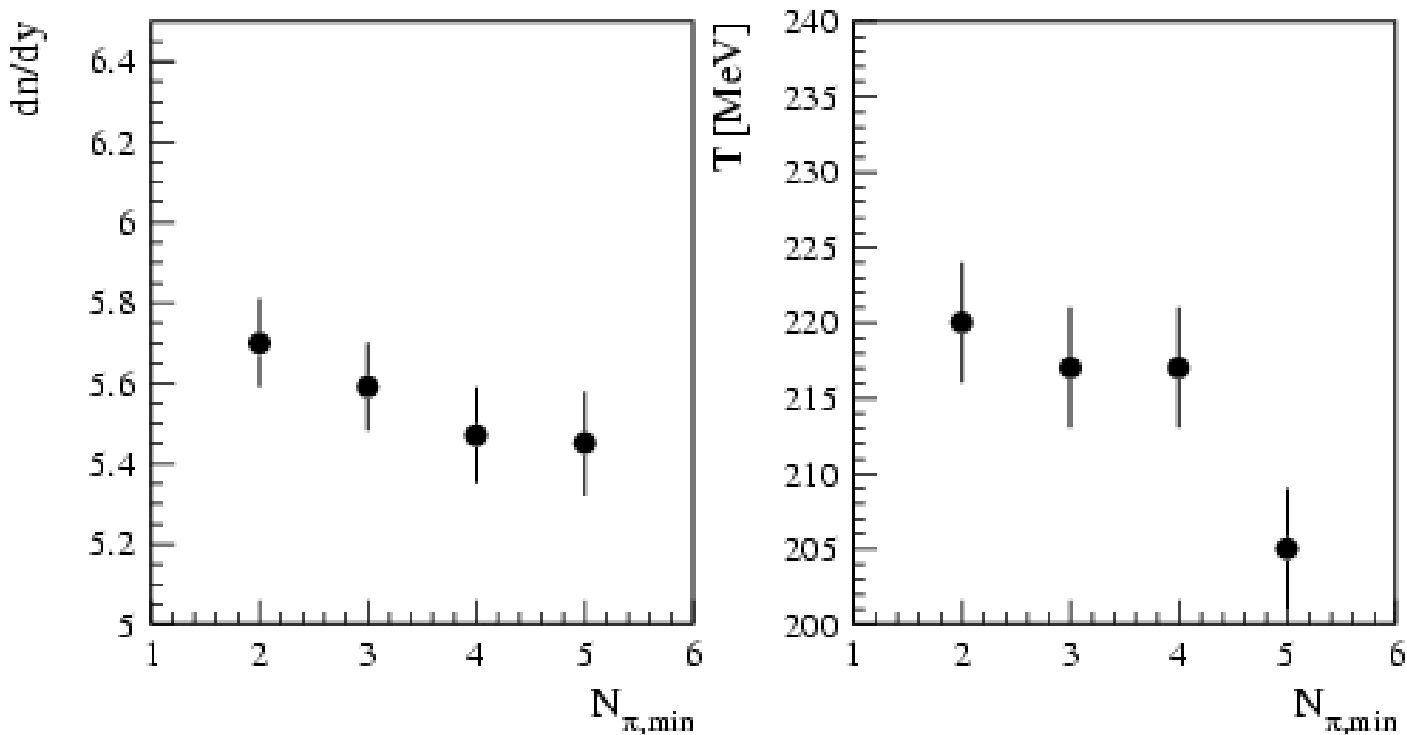
Systematics visible in dn/dy (T ?)

… to be studied