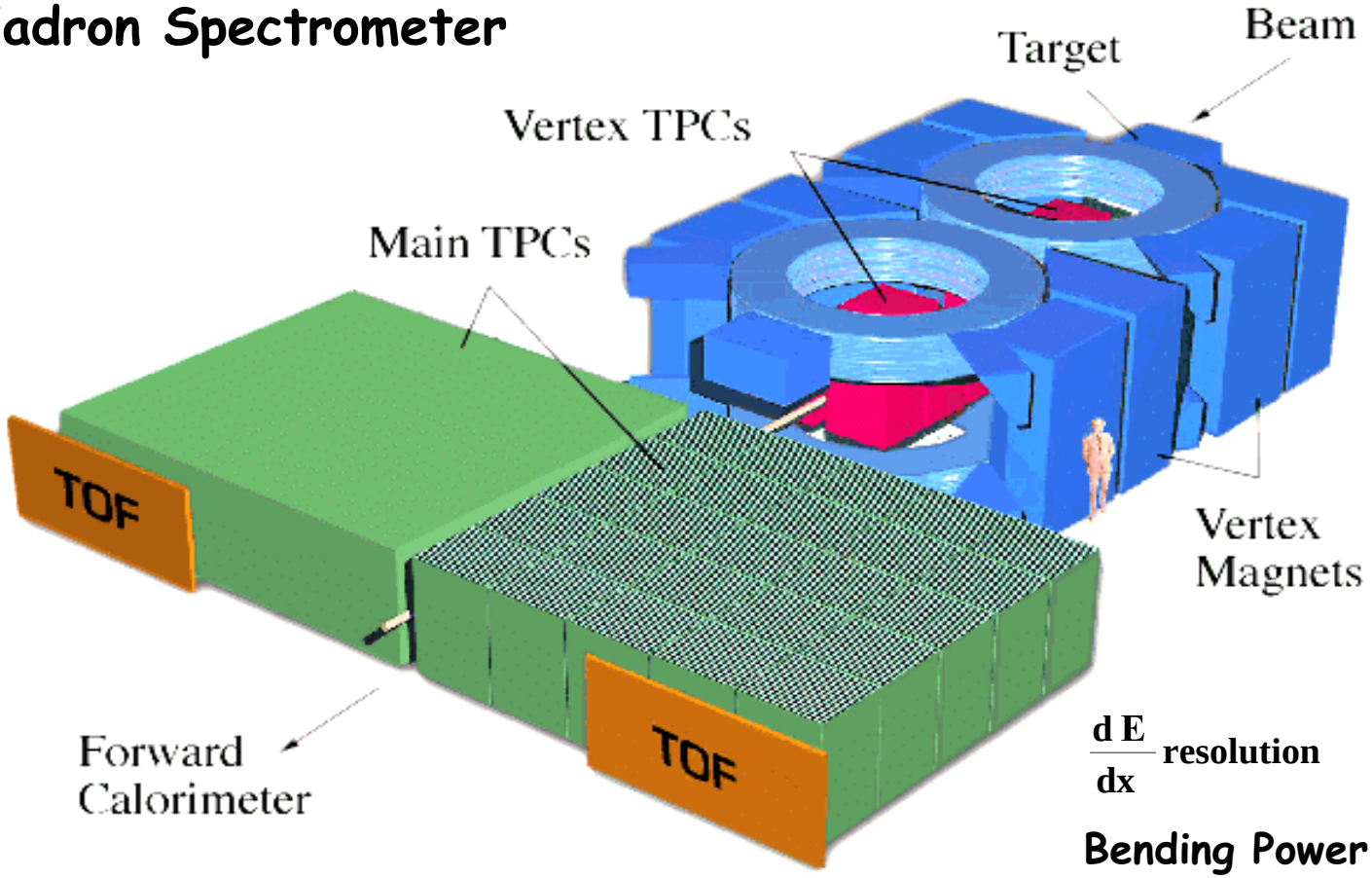
NA49 Experiment at CERN-SPS

Hadron Spectrometer



$\frac{dE}{dx}$ resolution = 3 - 4%

Bending Power 9Tm

$$\frac{\sigma(p)}{p^2} = 0.3 \cdot 10^{-4} (\mathrm{GeV}/c)^{-1}$$

Motivation

- Excitation Function for Λ-Production
  -> This Talk: 40,80 and 158 *AGeV*

- Special Interest in the Region between
  top *AGS* (~11 *AGeV*) and low SPS (40 *AGeV*)
  -> Because there are
  high Baryon Density Effects at mid-rapidity

  - Our Contribution is the Result
    that the Net-Hyperon Density has a Maximum

  - SIS 200 at *GSI* (10-40 *AGeV*)

Acceptance Regions for Lambdas

Analysed Data:

central Pb+Pb Events

- 380k @ 40 *AGeV*

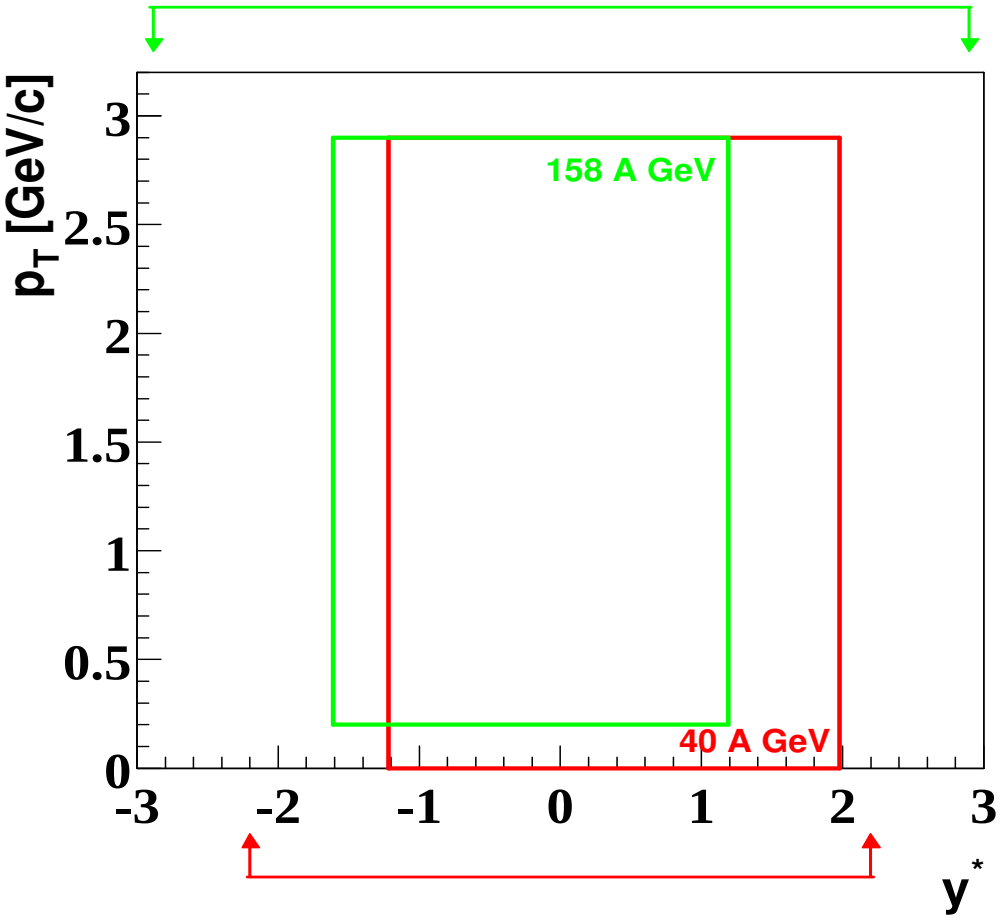
  7% cross-section -> <Np> ≈ 349

- 300k @ 80 *AGeV*

  7% cross-section -> <Np> ≈ 349

- 400k @158 *AGeV*

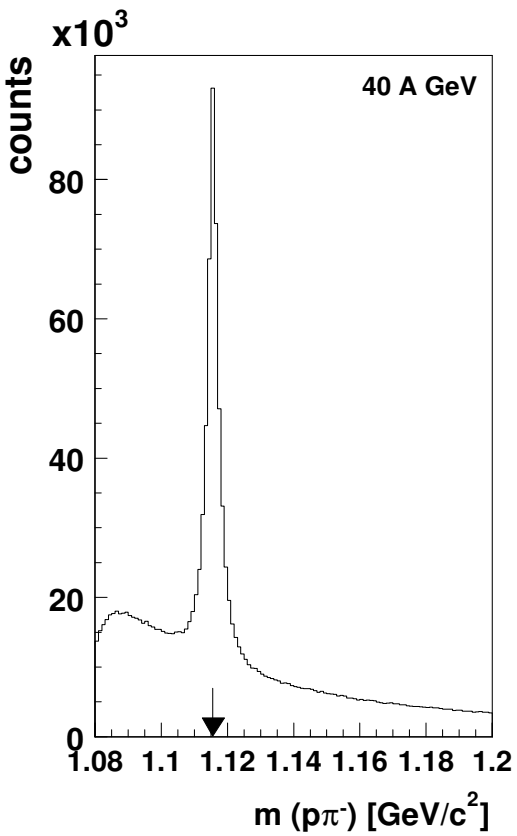
  10% cross-section -> <Np> ≈ 335



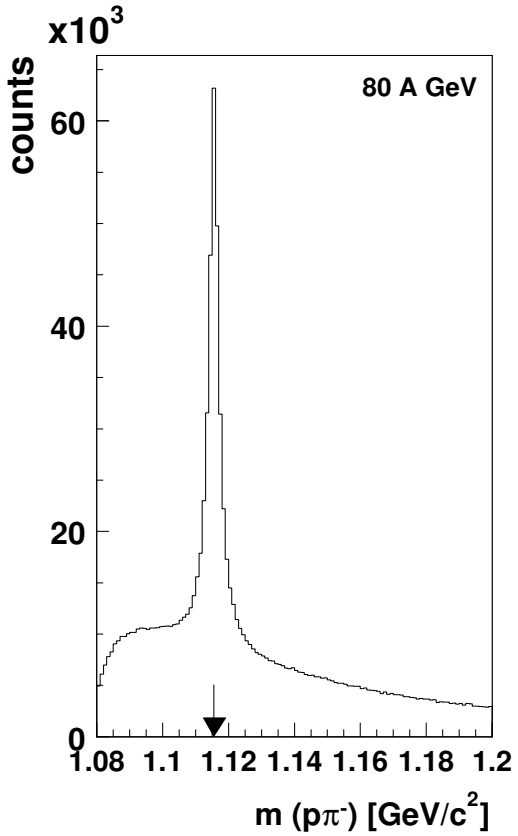
Large Acceptance

Invariant Mass for Λ-Hypothesis

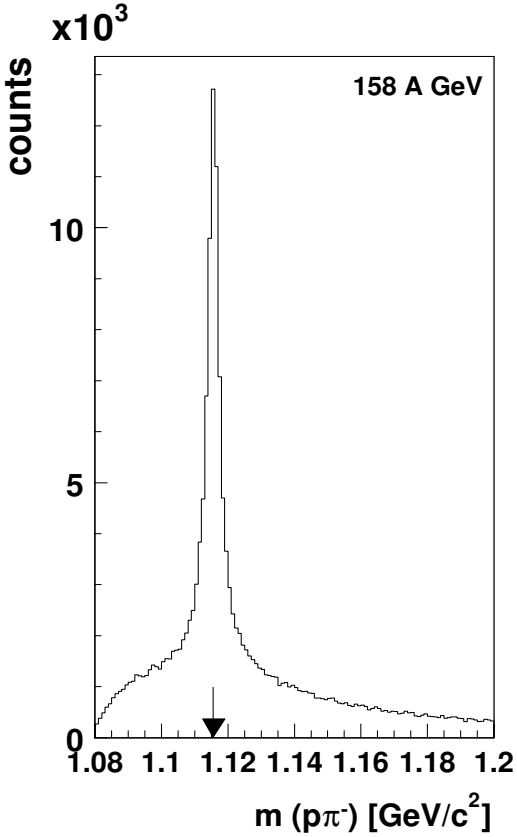
NA49 preliminary



σ_{mass} = 2.0MeV
340,000 raw Lambdas



σ_{mass} = 1.9MeV
220,000 raw Lambdas



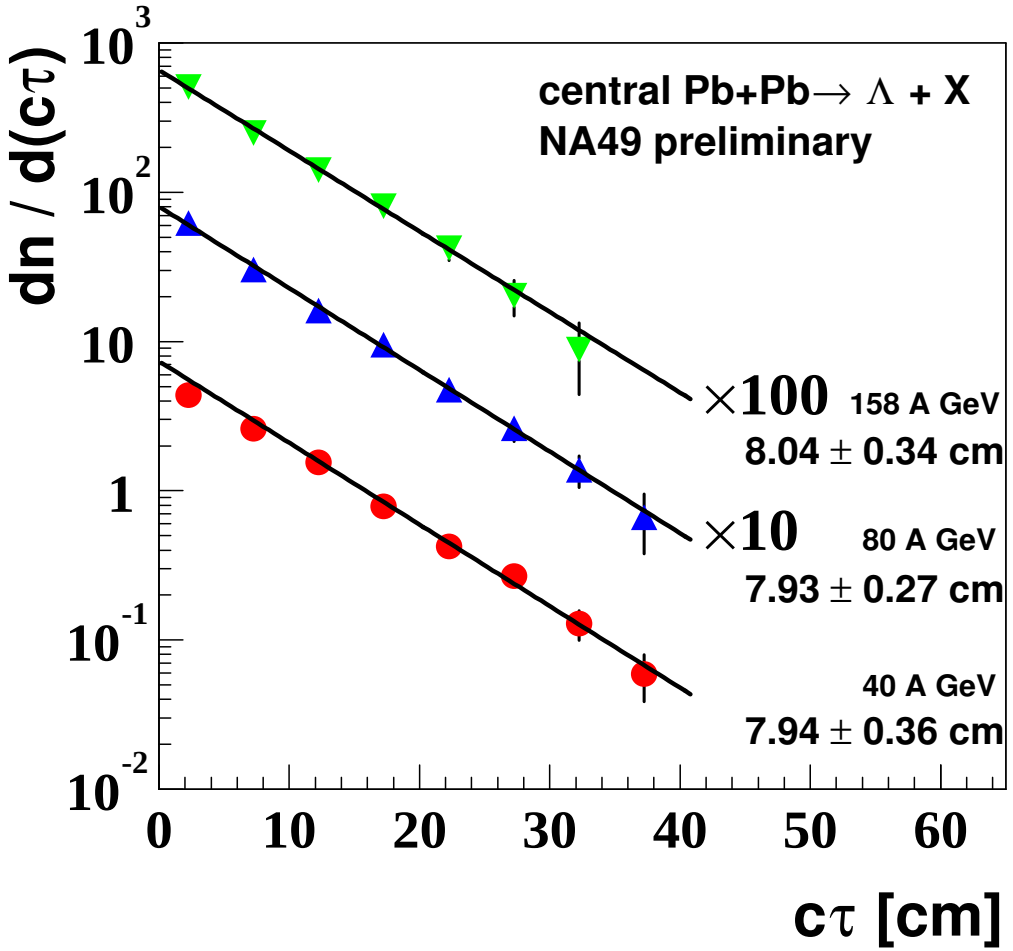
σ_{mass} = 2.2MeV
54,000 raw Lambdas

Lambda Analysis

- Lambdas are reconstructed by their Decay Topology

$$\Lambda \rightarrow p + \pi^- \quad \text{(B.R. 64.1\%)}$$

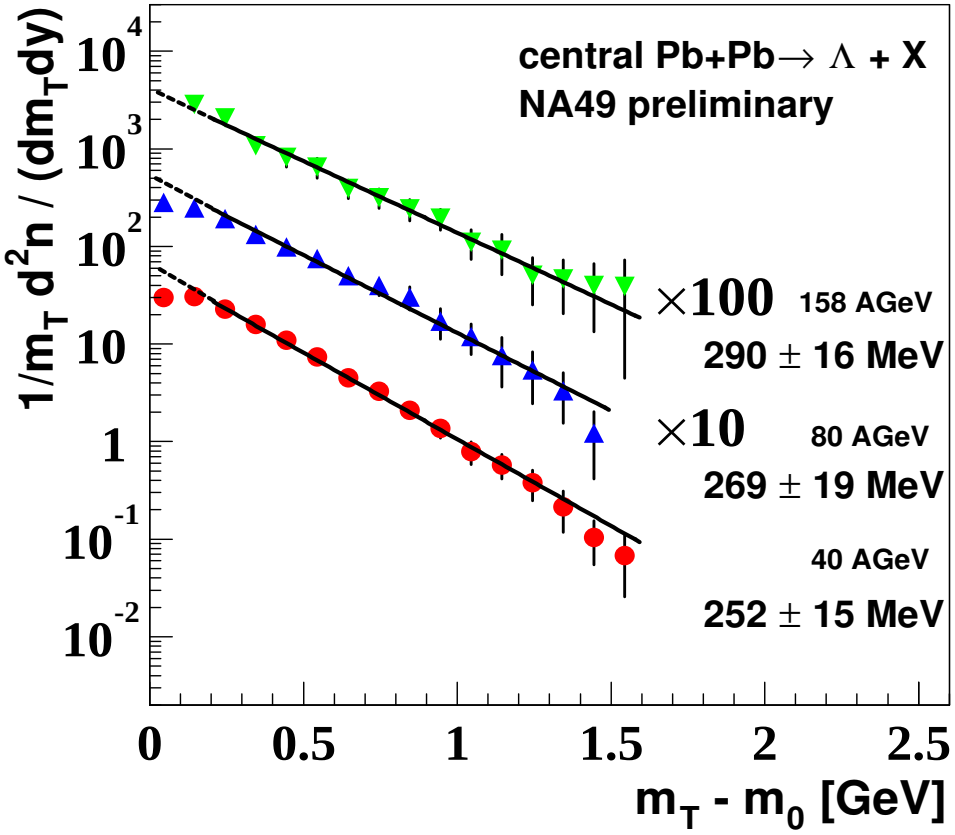
- Corrections for
  - Background
  - Geometrical Acceptance
  - Efficiency
  - Branching Fraction

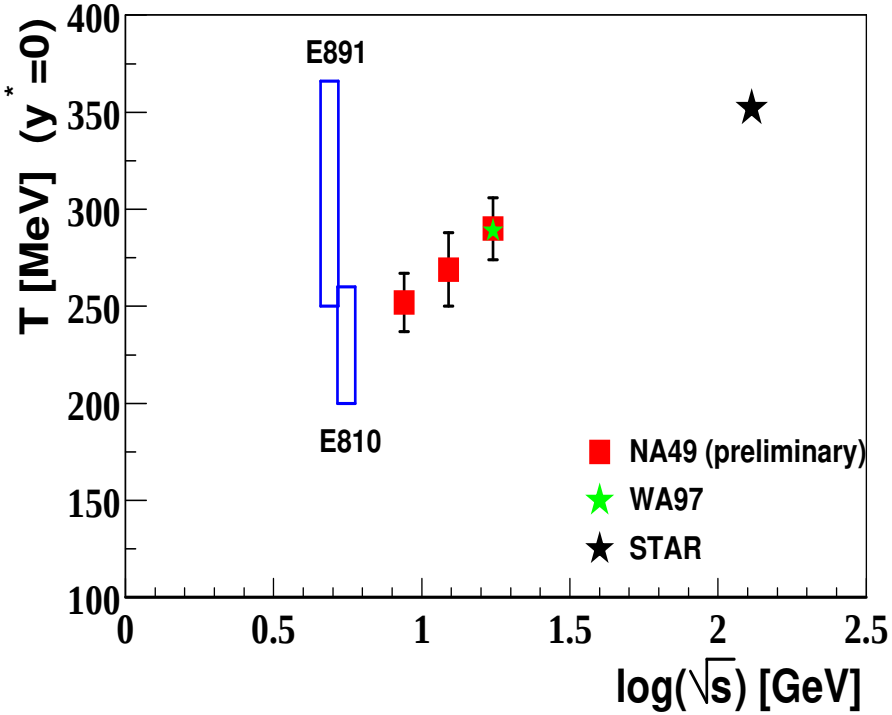


PDG: cτ = 7.89 cm

Transverse Mass for Lambdas

$|y^*| \leq 0.5$

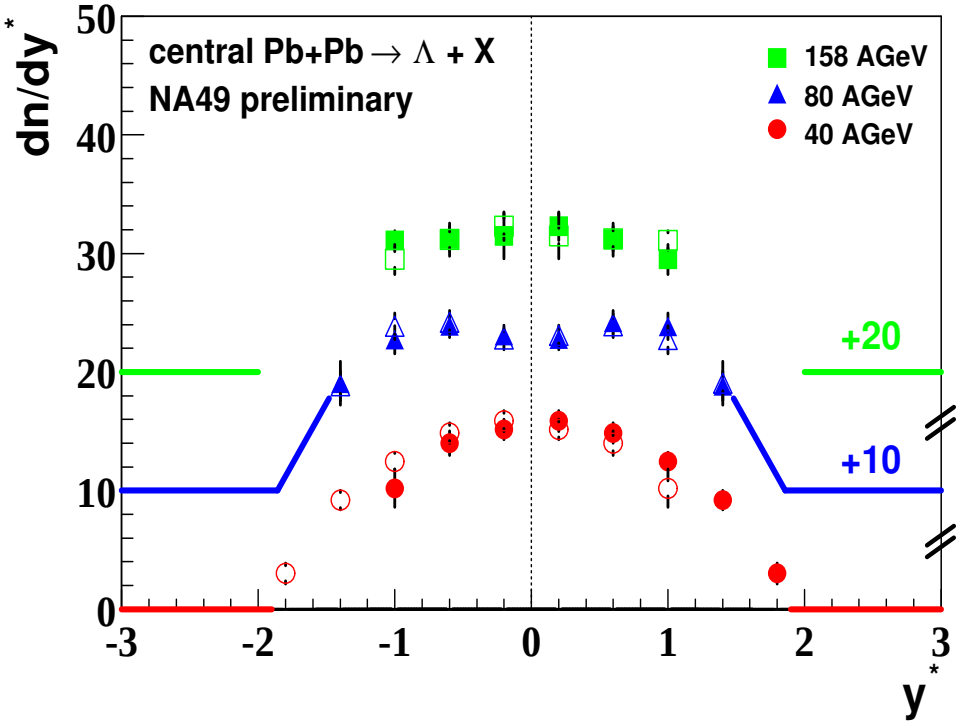




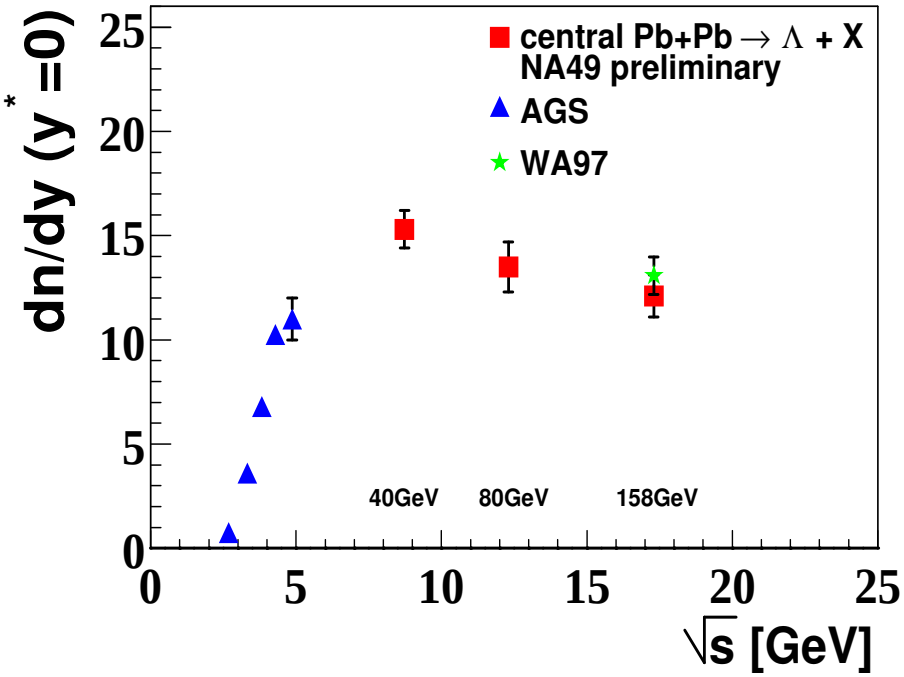
$$\frac{1}{m_T}\frac{d^2n}{d(m_T)dy} \propto \exp\left(\frac{-m_T}{T}\right)$$

-> Different Slopes

Rapidity Spectra for Lambdas



Λ yield
at mid-rapidity

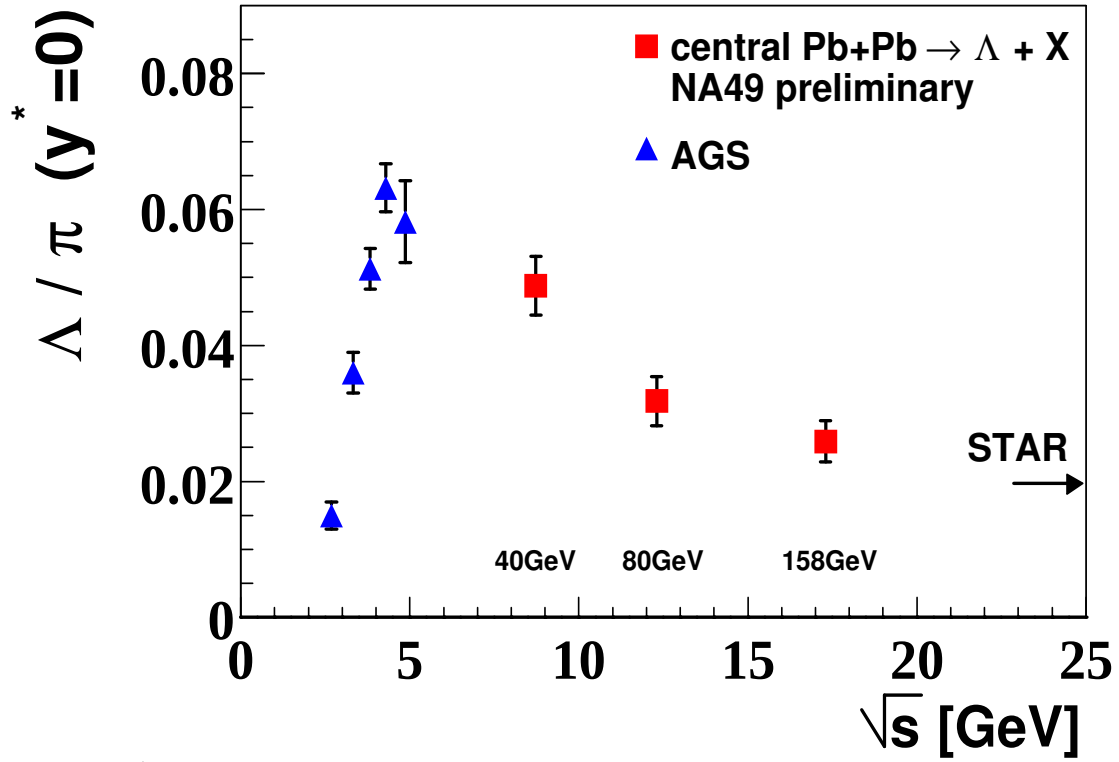


-> The Shape is changing

-> highest Rapidity Density
at or below 40 AGeV

Energy Dependence 1

Λ/π ratio
at mid-rapidity



$\pi = 1.5 \cdot (\pi^+ + \pi^-)$

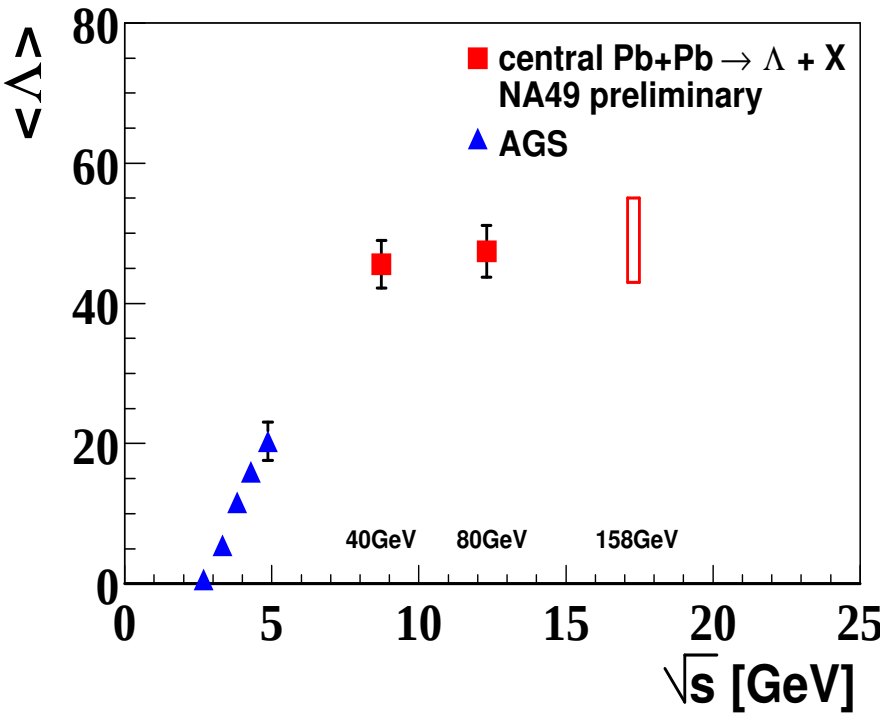
E895: D.Best, QM'99
E891: nucl-ex/9803006

-> Effect of highest Rapidity Density is even enhanced in Λ/π ratio

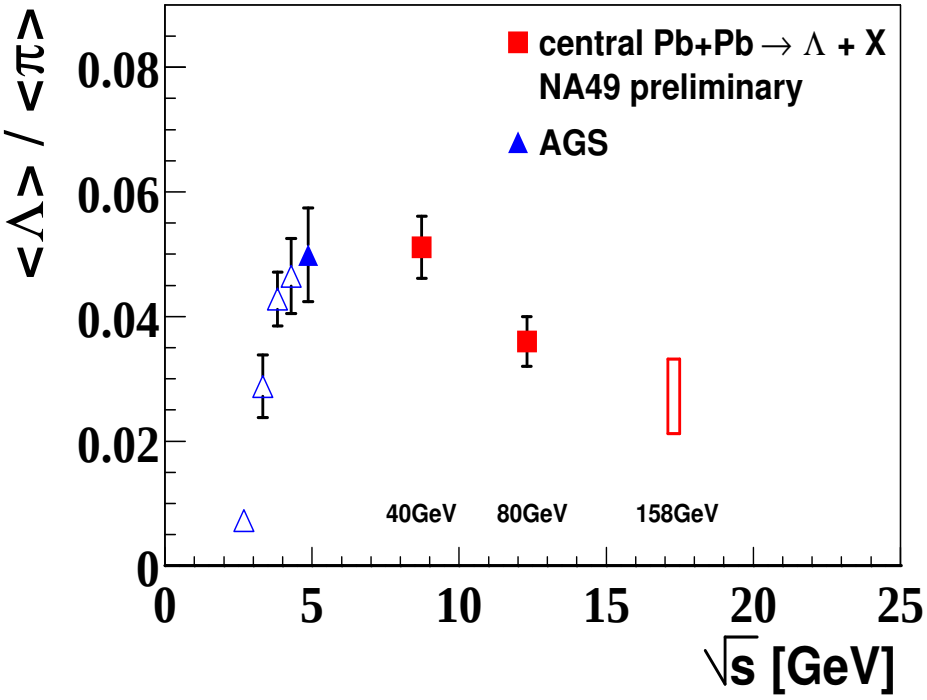
Energy Dependence 2

4π-values

total yields



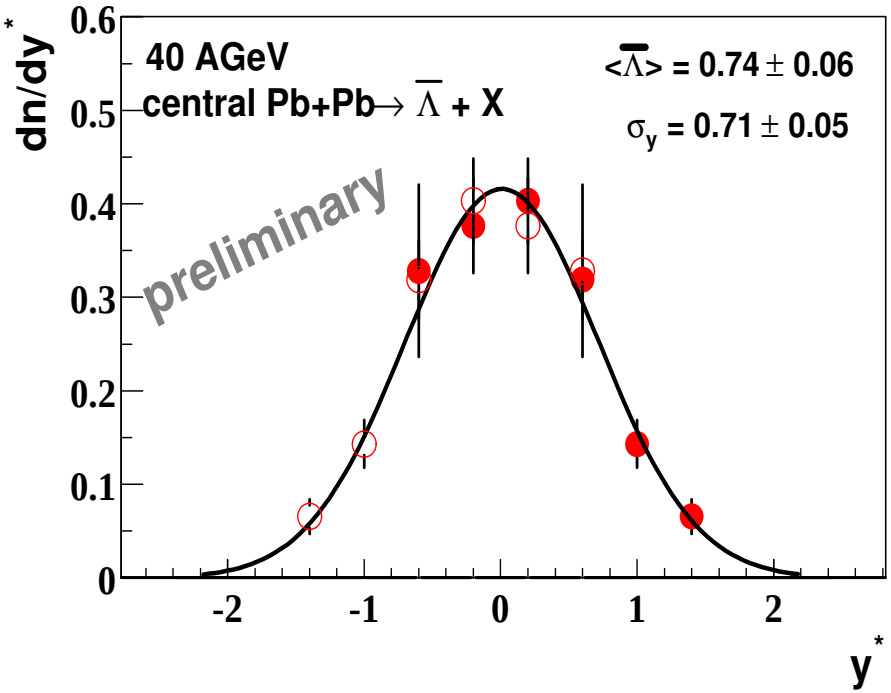
Λ/π ratios

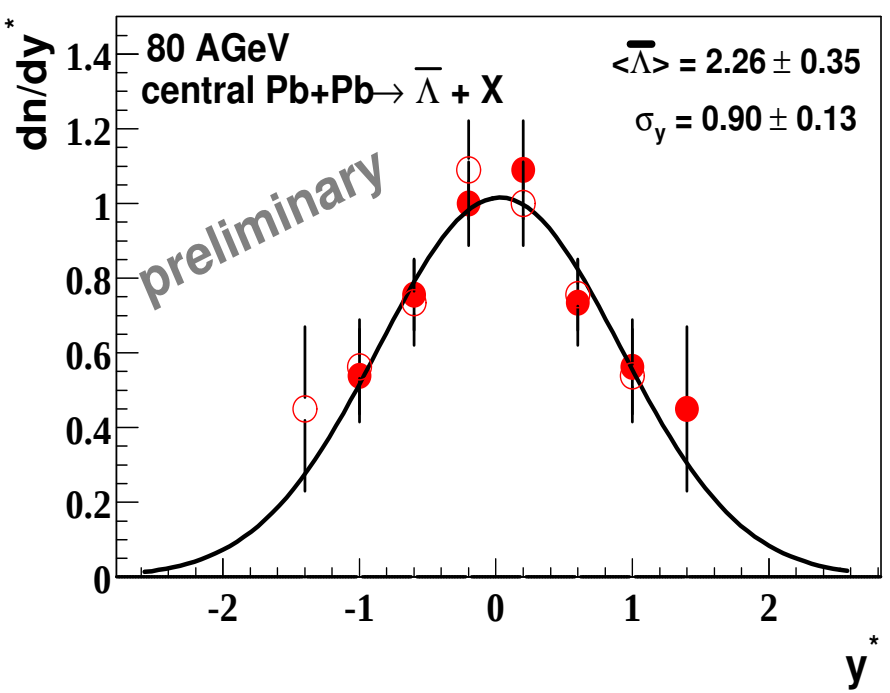


-> Non-monotonic
Energy Dependence

E891: C.Pinkenburg, QM2001

First Results on Antilambdas





40->80 AGeV: -> Rapidity Distribution becomes broader

-> Maximum increases by a factor of 2.5

$\bar{\Lambda}/\Lambda$ ratios

NA49 preliminary	$\bar{\Lambda}/\Lambda$	
	mid-rapidity	4 π
40 AGeV	0.025 ± 0.0023	0.016 ± 0.0018
80 AGeV	0.079 ± 0.01	0.048 ± 0.005

$\bar{\Lambda}/\Lambda$= 0.023 ± 0.001

(y*=0) NA57,QM2001

- $\bar{\Lambda}/\Lambda$ ratio increase by a factor ~3

  40->80 AGeV for mid-rapidity and 4π

-> Effect of Baryon Density

Summary and Outlook

- First Results for 40 and 80 *AGeV* are available

  also π, K: see talk T.Kollegger, Friday 9:00

- Energy Dependence of Λ-Production

  Λ/π ratio at 40 *AGeV* higher than in 158 *AGeV*

  -> Evidence of Non-monotonic Behavior

- Inverse Slope (y*=0) seems to increase slightly with increasing Energy -> Transverse Flow

Next: - $\bar{\Lambda}$ Spectra

- Λ in *C+C* collisions at 158 *AGeV* -> system size dependence
- Ξ at 40 and 80 *AGeV* and Ω at 158 *AGeV*
- ϕ at 40 and 80 *AGeV*

The NA49 Collaboration

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