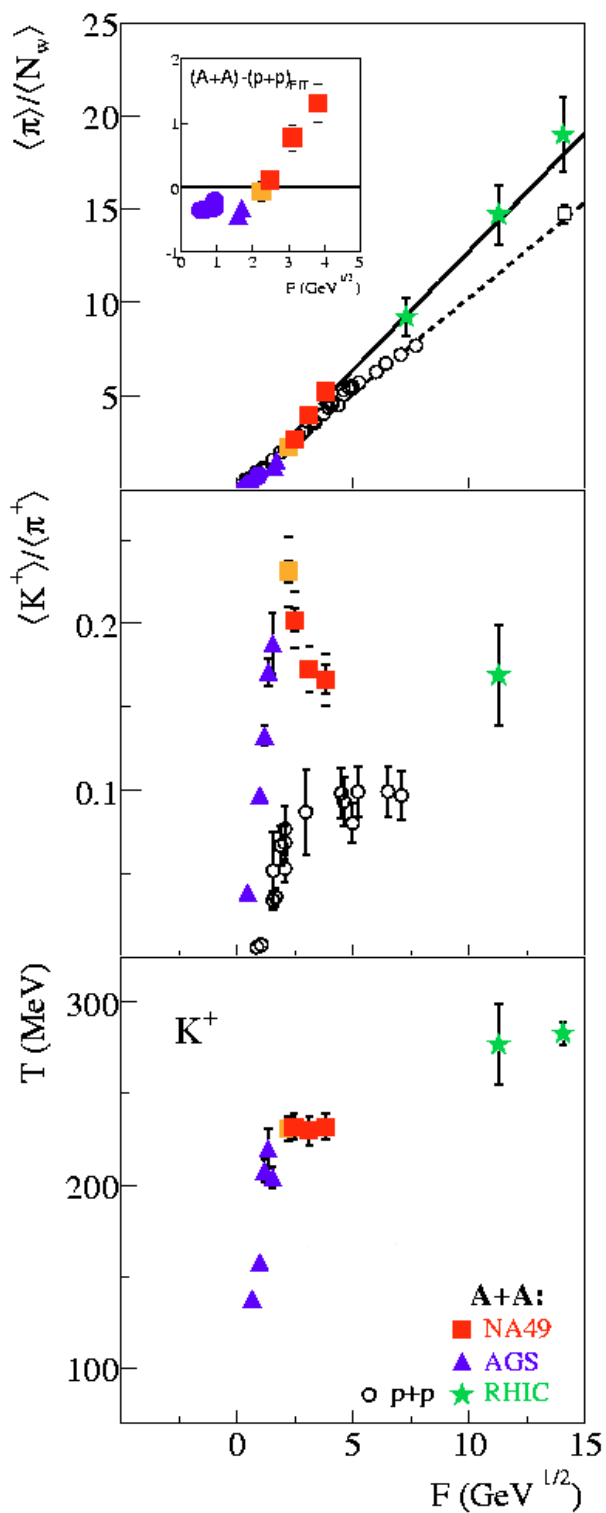


# Energy dependence of transverse mass spectra of kaons produced in p+p and p+p interactions A compilation

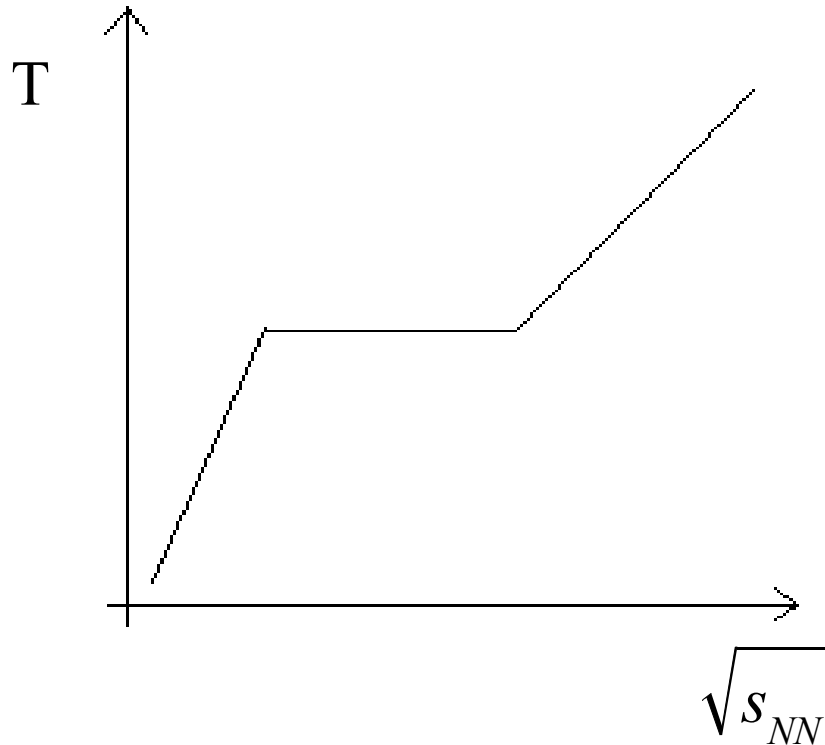
Benjamin Lungwitz and Michael Kliemant

- Anomaly observed in the  $T$  vs  $\sqrt{s_{NN}}$  dependence for central Pb+Pb collisions
- How does this dependence look like for p+p interactions?

See also in our paper: [arXiv:hep-ex/0308002](https://arxiv.org/abs/hep-ex/0308002)

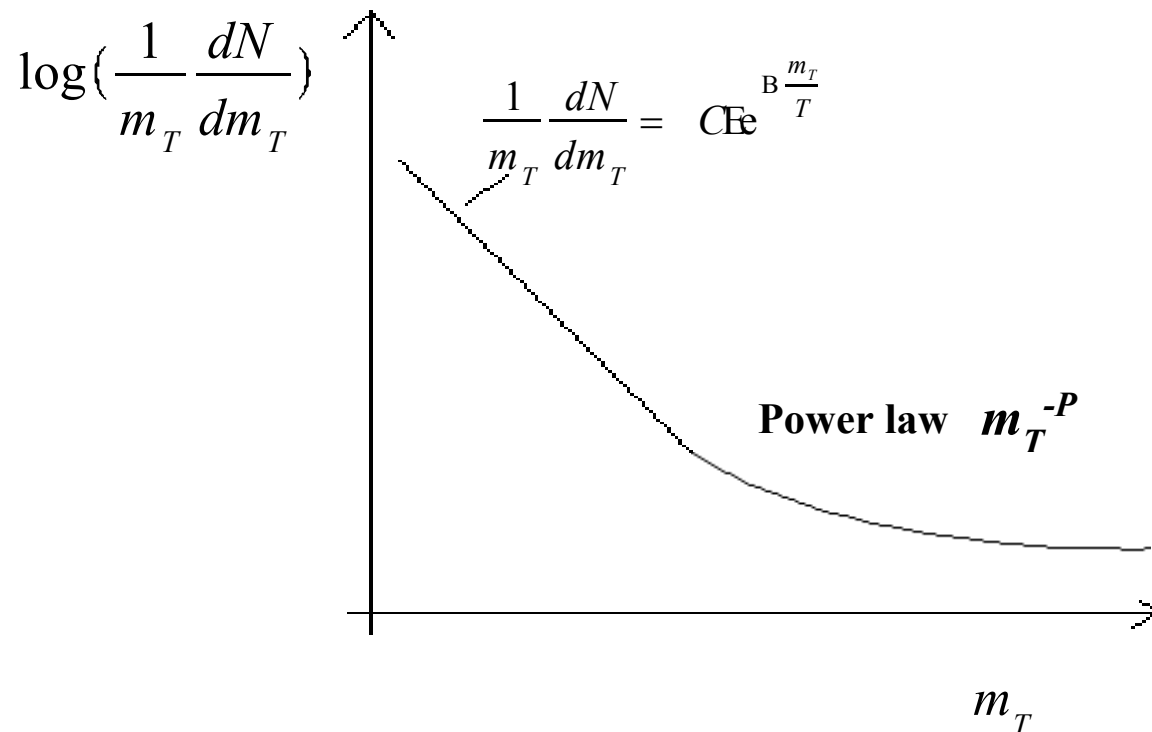


- Pion multiplicity  
a compilation of p+p data existed
- Kaon multiplicity  
a compilation of p+p data existed
- Kaon inverse slope parameter  
a compilation of p+p data  
did not exist

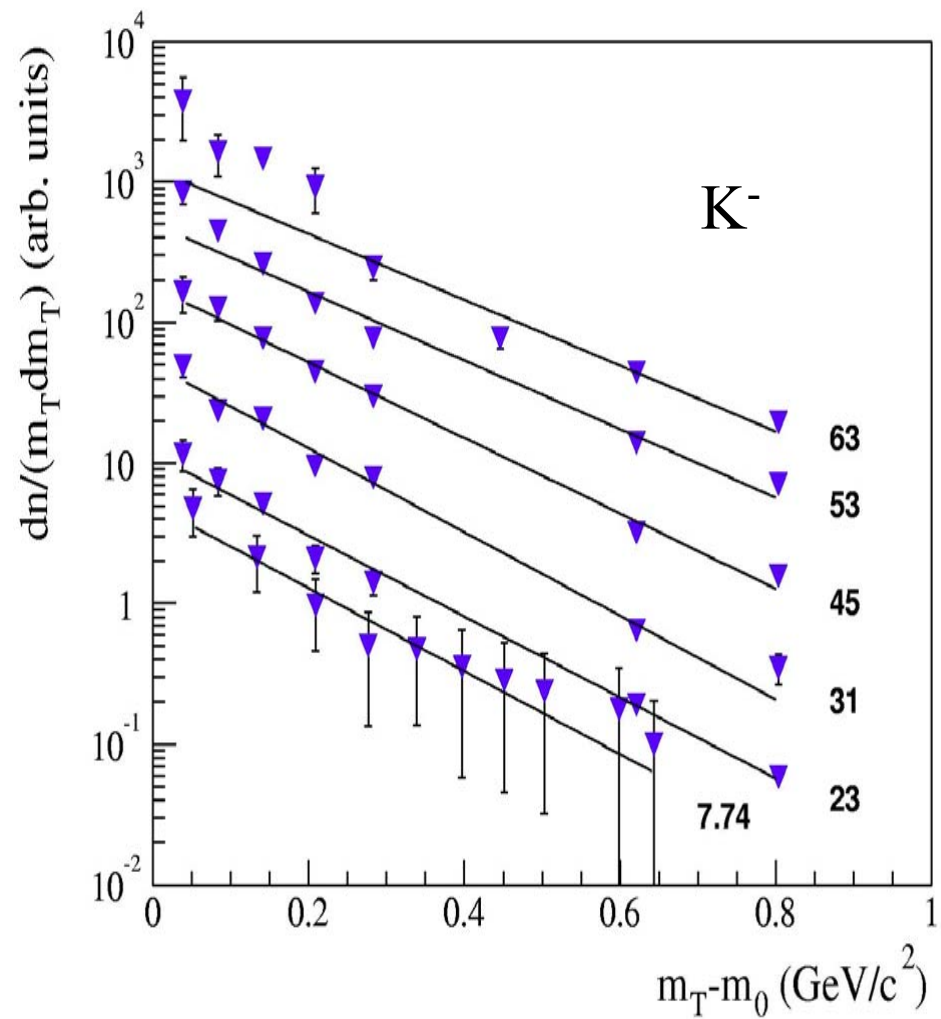
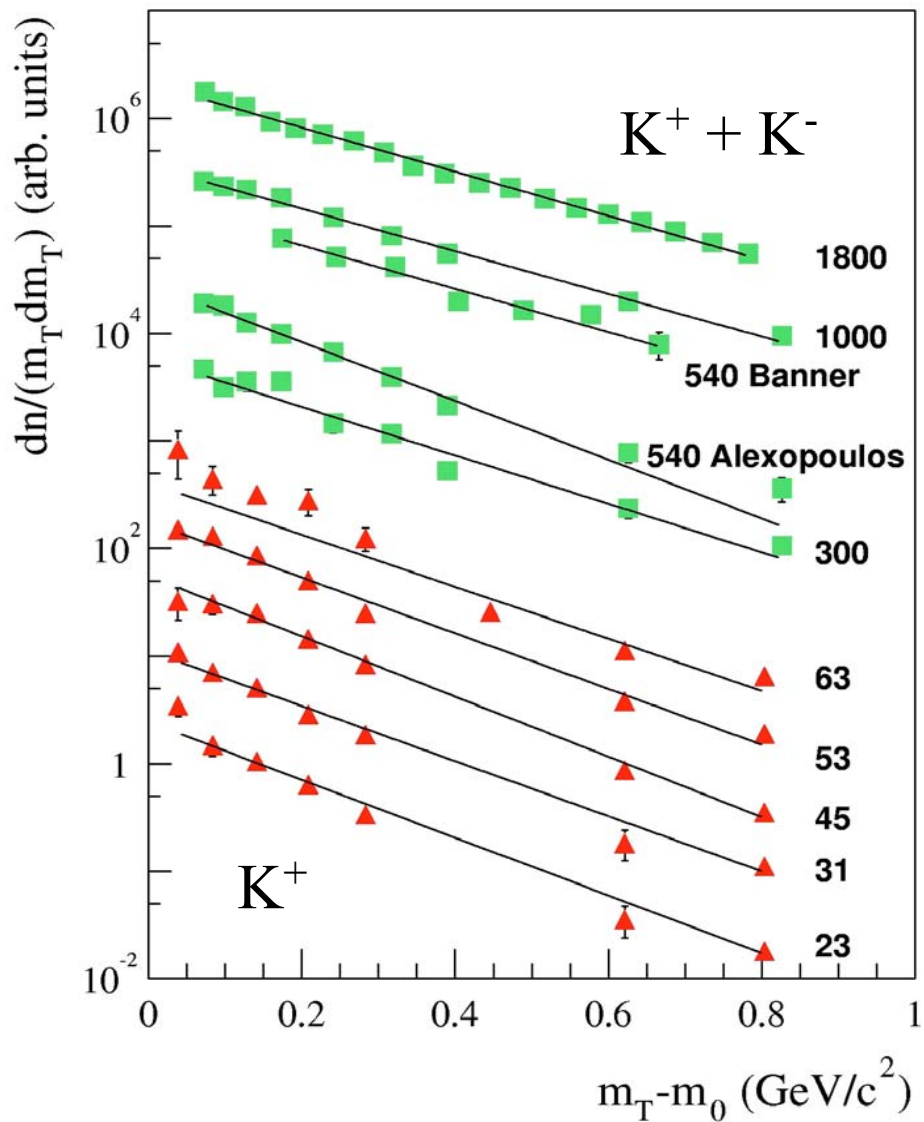


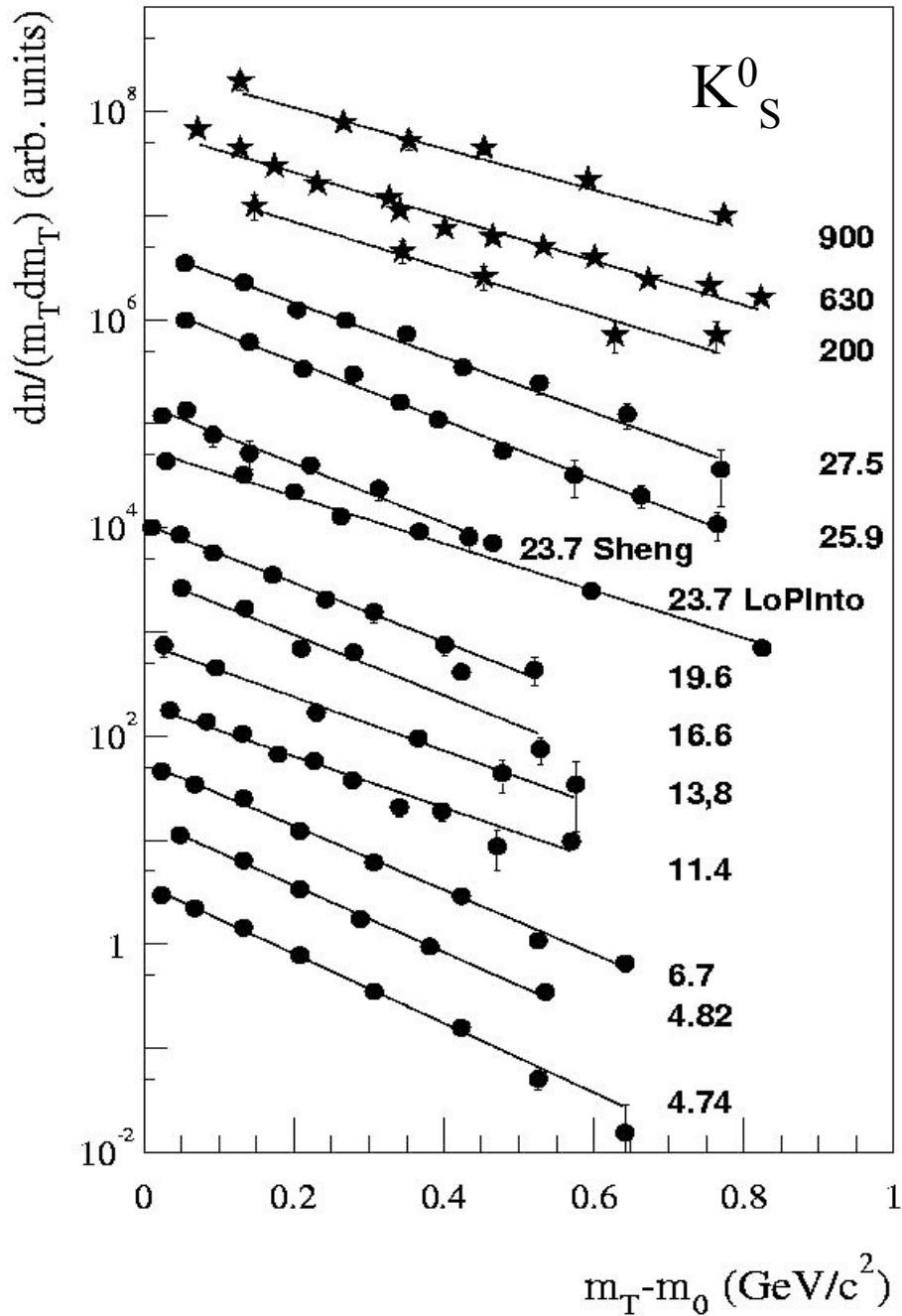
- The Pb+Pb results show
  - a phase transition like □
  - behaviour (□ caloric curve □
  - Kochtopfmodel □)
- Do we see a similar dependence for p+p?

- We compiled and analyzed data on  $m_T$  spectra of  $K^0_S$ ,  $K^+$  and  $K^-$  in  $p+p$ ,  $p+\bar{p}$  interactions at all energies ( $\sqrt{s_{NN}} = 4.74\text{GeV}-1.8\text{TeV}$ ). The data originate from fixed target and collider experiments performed during the last 30 years.
- The spectra were fitted by a simple exponential function
- This parametrization is valid only in low  $m_T$  region ( $m_T < 1.2\text{GeV}$ ); at higher  $m_T$  the power law behaviour  $m_T^{-P}$



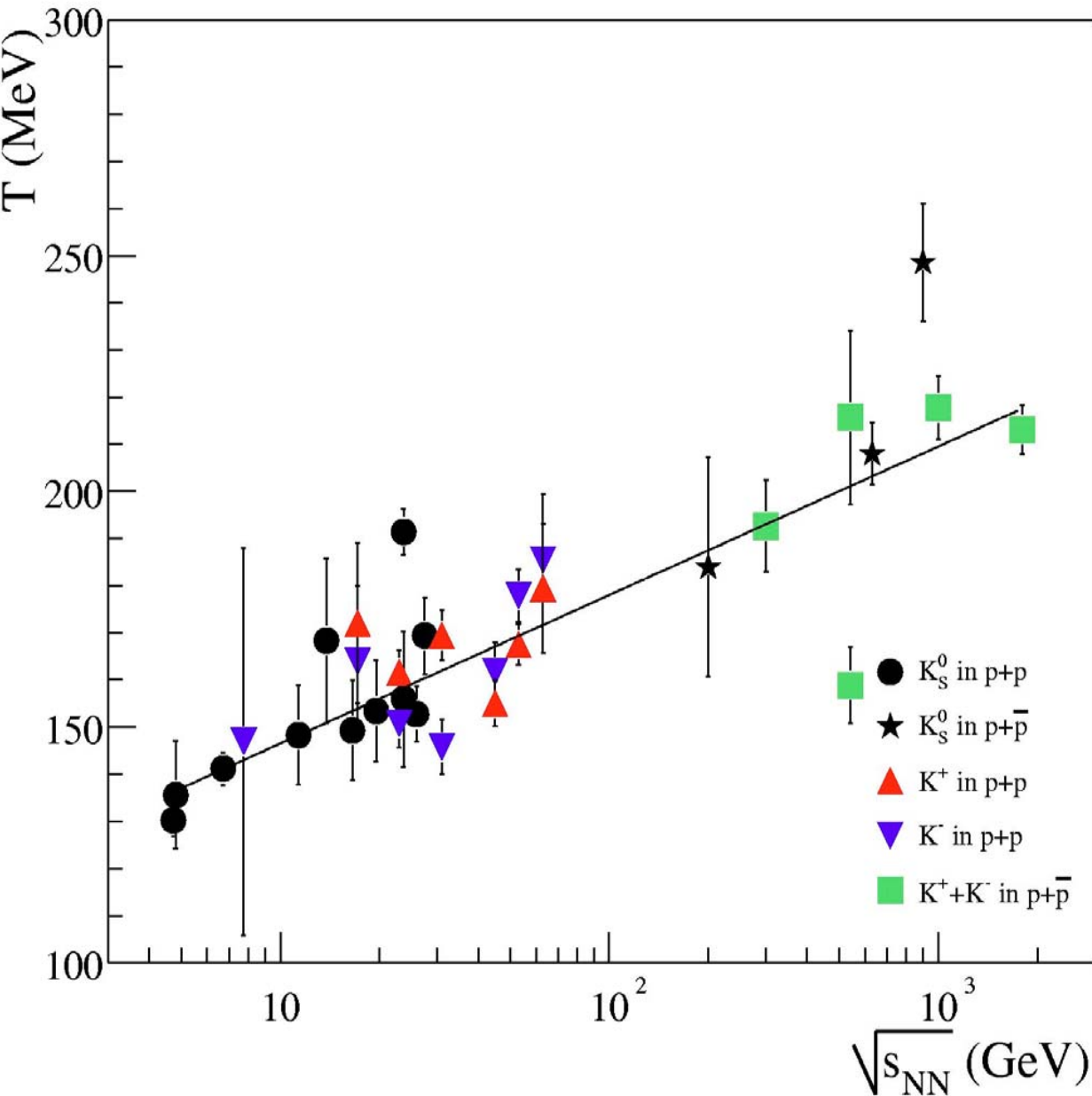
# $dn/(m_T dm_T)$ spectra





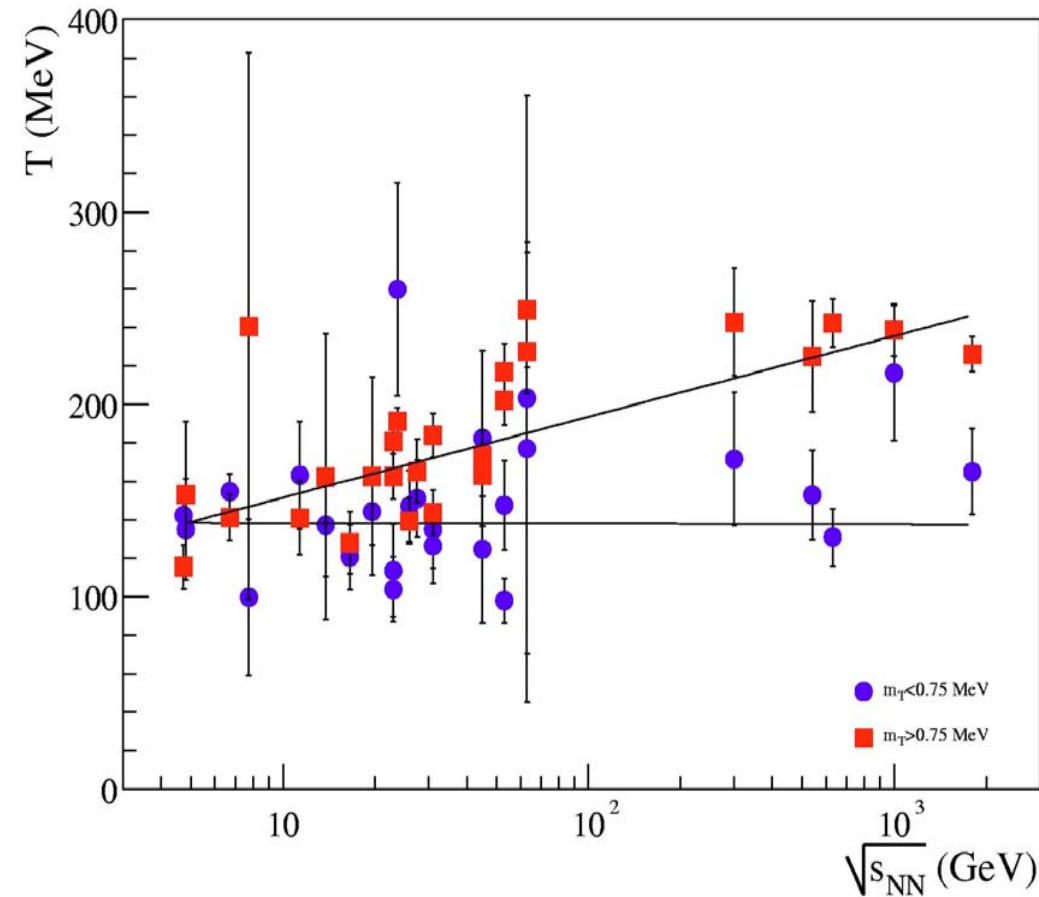
- Exponential function fits the data
- Inverse slope parameter increases with energy

# Fits in full $m_T$ ( $m_T < 1.2$ GeV) region



- No obvious difference between  $K_S^0$ ,  $K^+$  and  $K^-$
- T for p+p and p+p $\bar{p}$  reactions is similar
- Logarithmic increase of T with  $\sqrt{s_{NN}}$
- Few points do not match the fit (possible systematic errors)

# Fits in low and high $m_T$ regions



Is the T parameter the same when we fit different  $m_T$  regions ?

In the low  $m_T$  region ( $m_T < 0.75$ ) T seems to be energy independent

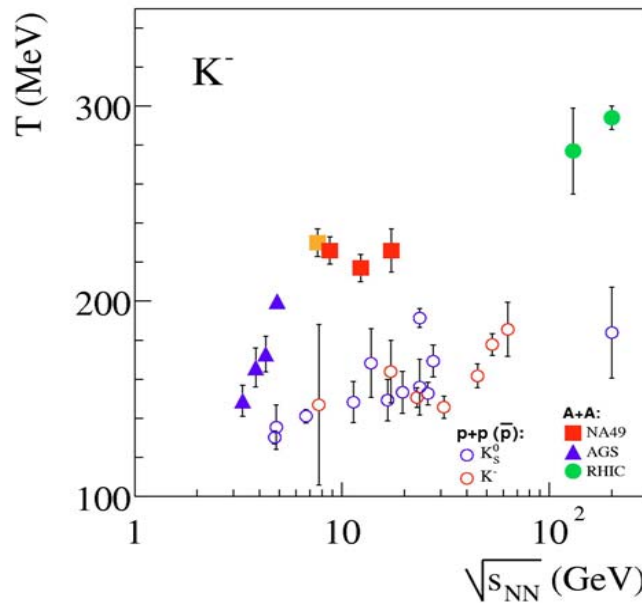
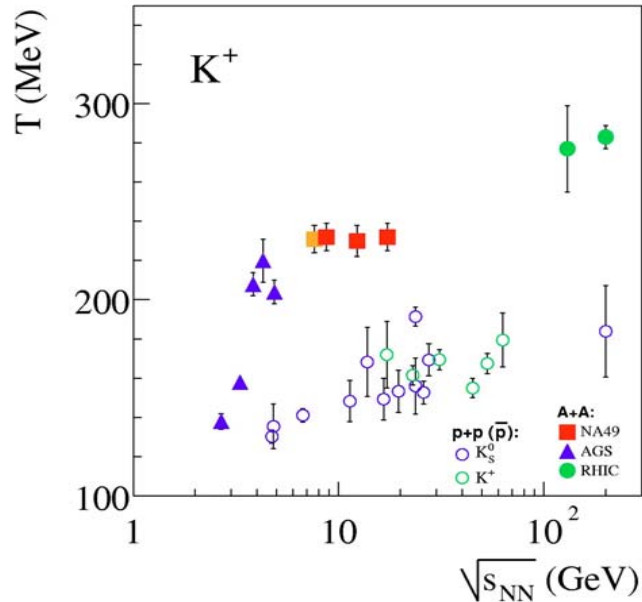
In the high  $m_T$  region ( $m_T > 0.75$  GeV/ $c^2$ ) it shows logarithmic increase (beginning of the power law ?)

Possible large systematic errors when using different  $m_T$  intervals for a comparison

For a comparison with A+A data a similar  $m_T$  range was used



# Comparison p+p to Pb+Pb



- " No significant difference between  $K^+$  and  $K^-$  dependences for both p+p and Pb+Pb collisions
- "  $T(p+p) < T(Pb+Pb)$  at all energies
- " No significant  $\square$  transition like  $\square$  structure in  $T(p+p)$
- " Quality of the world p+p data is poor  $\rightarrow$  new measurements are needed

