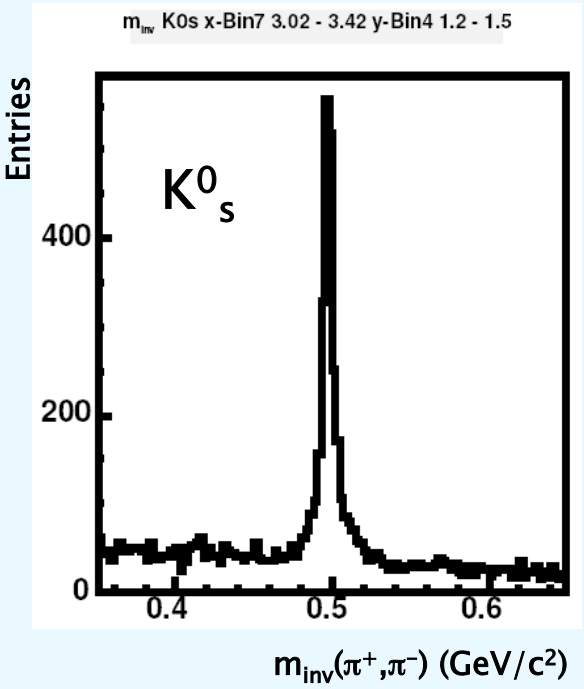
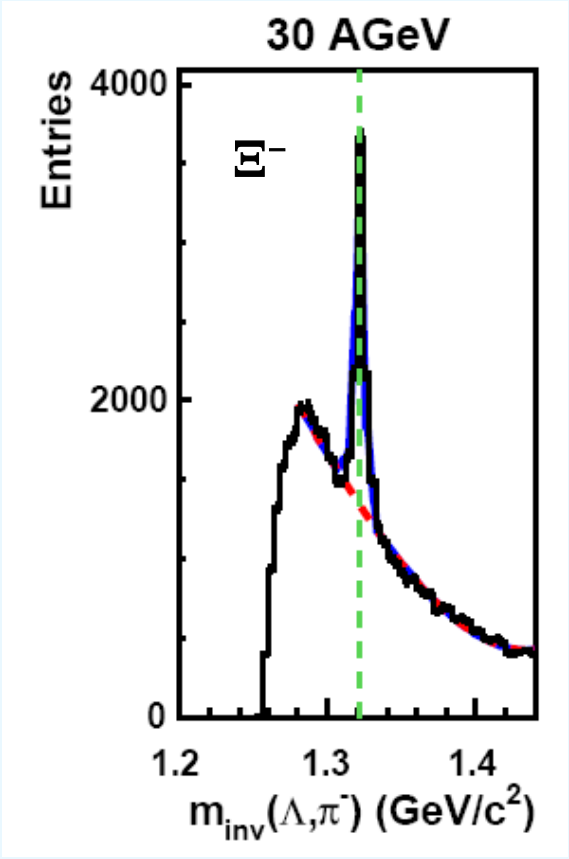
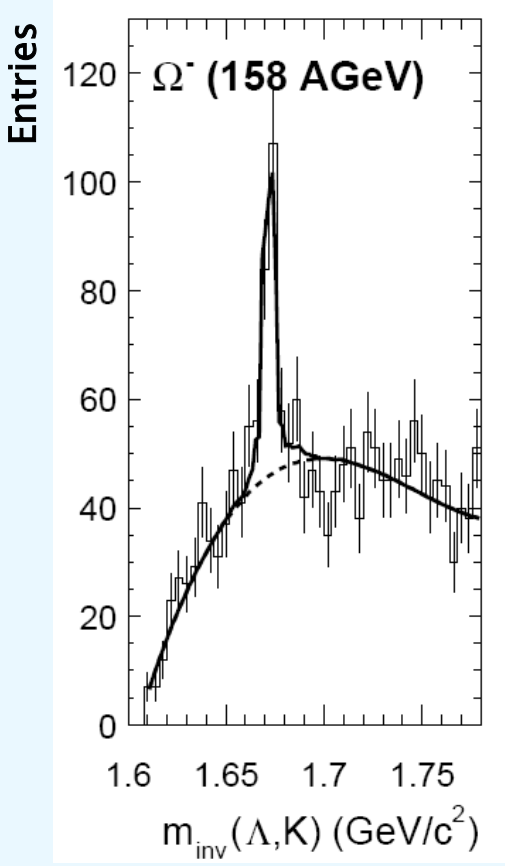
Strangeness Production

. Koch, B. Müller, J. Rafelski (1986). "Strangeness in relativistic heavy ion collisions". Physics Reports 142 (4): 167. Bibcode: 1986PhR...142..167K. doi:10.1016/0370-1573(86)90096-7.

Invariant mass reconstruction (K^0_s, Ξ^-, Ω^-)





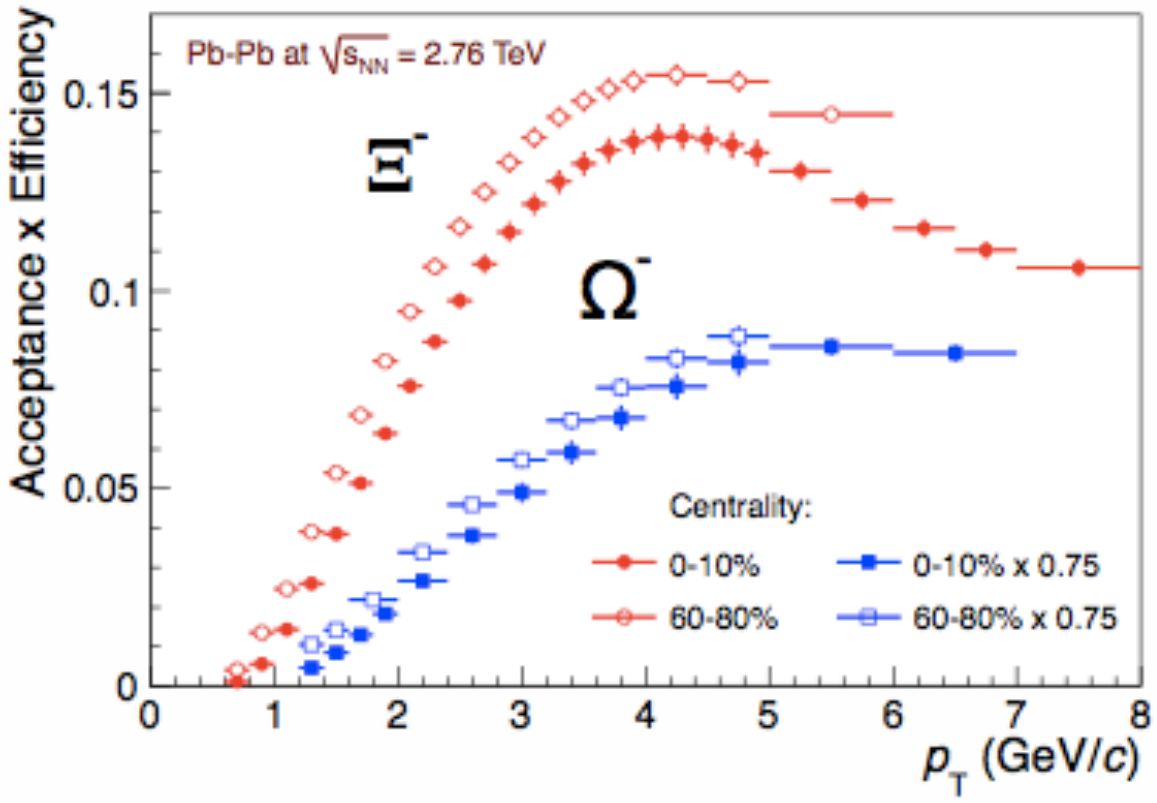


NA49

Corrections

Raw yield in y and pt range → corrected yield ?

Acceptance and efficiency



Corrections

Raw_yield in y and pt range → corrected_yield ?

Acceptance+efficiency (track cuts):
Simulation: found /all = c_acc

PID cuts = c_pid

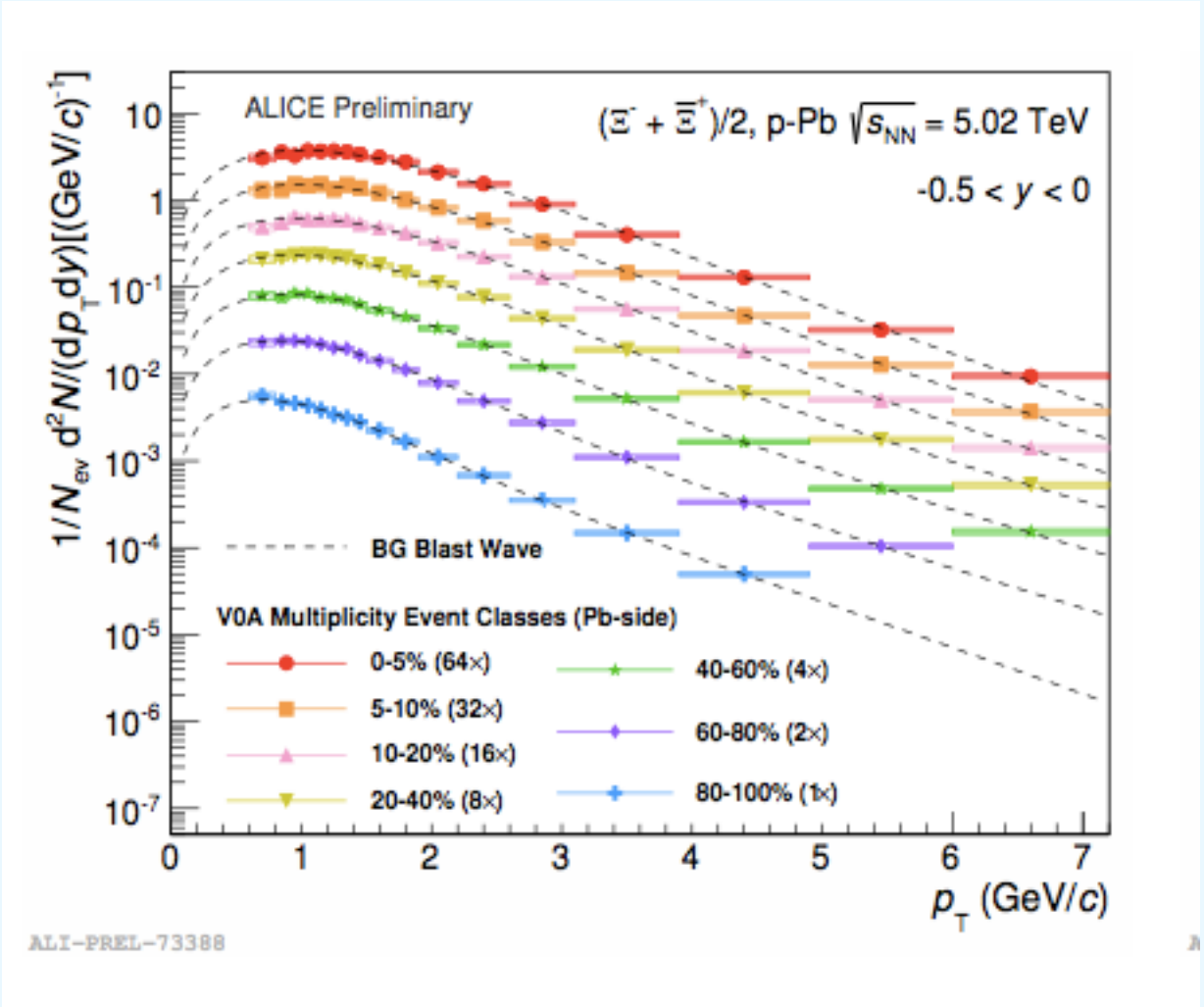
Branching ratio: c_BR

Normalize to number of events = 1/Nevents

corrected_yield in pt bin:

corrected_yield= Raw_yield * 1/acc * 1/c_pid * 1/c_BR* 1/ Nevents

Particle spectra Ξ^- in ALICE experiment (LHC)



Corrections – pt extrapolation (low and high)

Spectra = dN/dy dn/dpt

Integrate spectra

→ dN/dy (yield in given rapidity range)

Yield of strangeness baryons measured by ALICE

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

CERN-PH-EP-2013-134
July 18, 2013

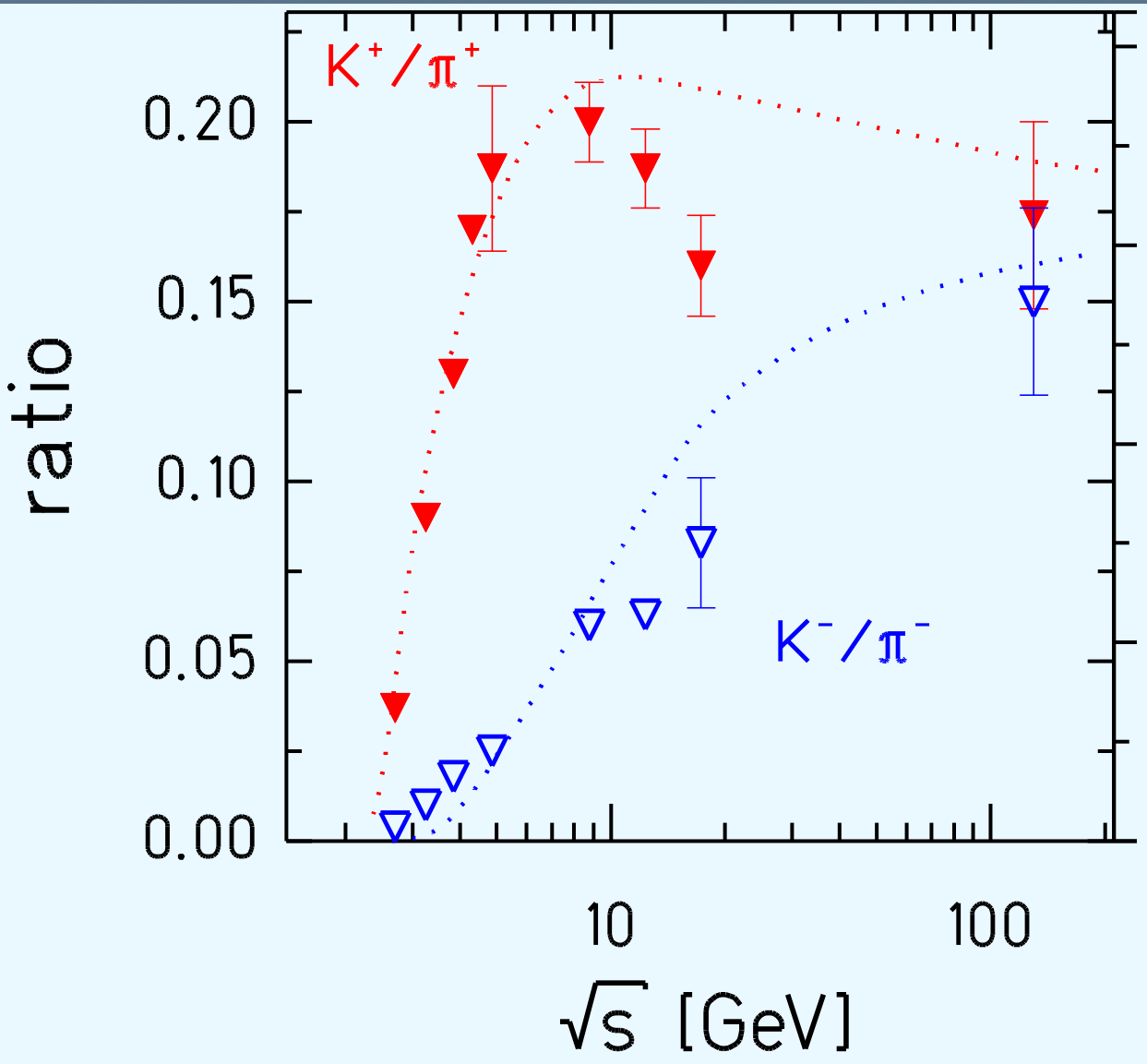
Multi-strange baryon production at mid-rapidity in Pb–Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV

ALICE Collaboration*

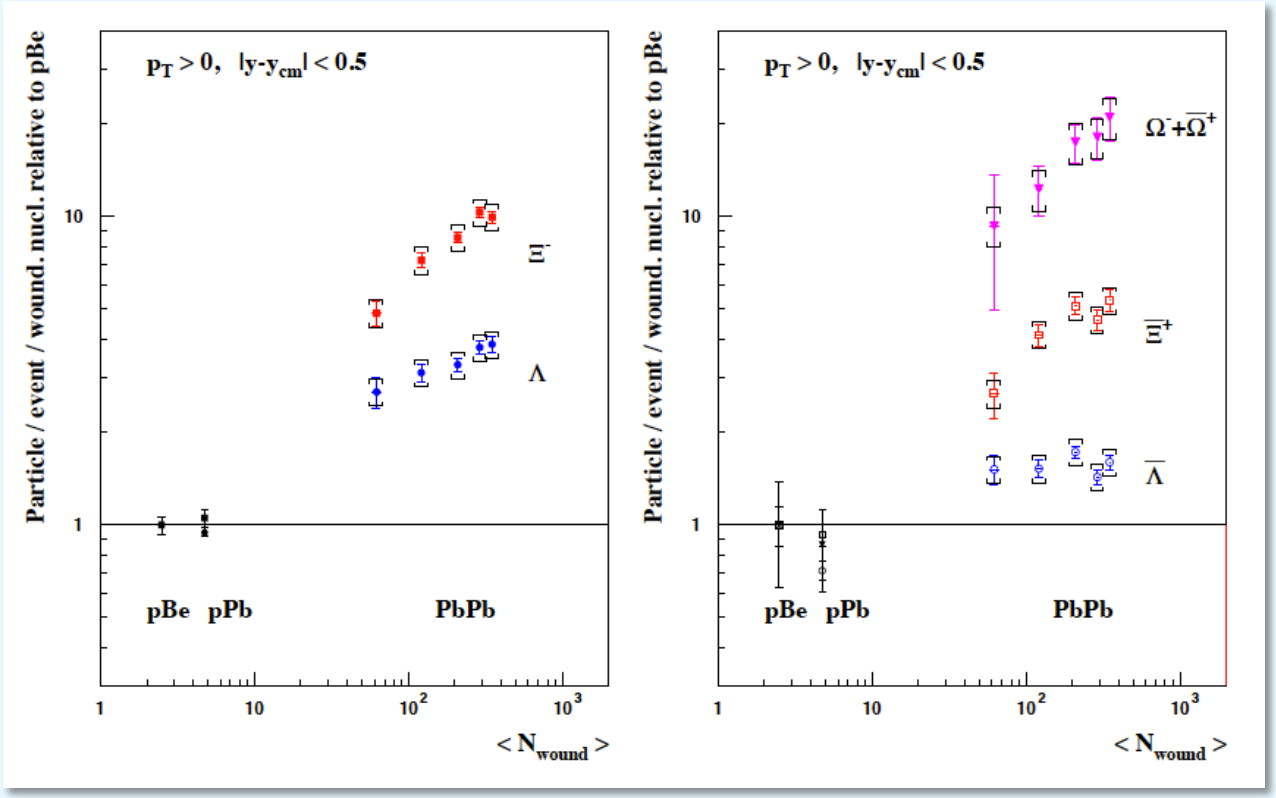
Centrality	0-10%	10-20%	20-40%	40-60%	60-80%
$\langle N_{part} \rangle$	356.1 ± 3.6	260.1 ± 3.9	157.2 ± 3.1	68.6 ± 2.0	22.5 ± 0.8
Ξ^-	$3.34 \pm 0.06 \pm 0.24$	$2.53 \pm 0.04 \pm 0.18$	$1.49 \pm 0.02 \pm 0.11$	$0.53 \pm 0.01 \pm 0.04$	$0.124 \pm 0.003 \pm 0.009$
$\overline{\Xi}^+$	$3.28 \pm 0.06 \pm 0.23$	$2.51 \pm 0.05 \pm 0.18$	$1.53 \pm 0.02 \pm 0.11$	$0.54 \pm 0.01 \pm 0.04$	$0.120 \pm 0.003 \pm 0.008$
$\Xi^- + \overline{\Xi}^+$	$6.67 \pm 0.08 \pm 0.47$	$5.14 \pm 0.06 \pm 0.36$	$3.03 \pm 0.03 \pm 0.22$	$1.07 \pm 0.01 \pm 0.08$	$0.240 \pm 0.006 \pm 0.019$
Ω^-	$0.58 \pm 0.04 \pm 0.09$	$0.37 \pm 0.03 \pm 0.06$	$0.23 \pm 0.01 \pm 0.03$	$0.087 \pm 0.005 \pm 0.014$	$0.015 \pm 0.002 \pm 0.003$
$\overline{\Omega}^+$	$0.60 \pm 0.05 \pm 0.09$	$0.40 \pm 0.03 \pm 0.06$	$0.25 \pm 0.01 \pm 0.03$	$0.082 \pm 0.005 \pm 0.013$	$0.017 \pm 0.002 \pm 0.003$
$\Omega^- + \overline{\Omega}^+$	$1.19 \pm 0.06 \pm 0.19$	$0.78 \pm 0.04 \pm 0.15$	$0.48 \pm 0.02 \pm 0.08$	$0.170 \pm 0.007 \pm 0.029$	$0.032 \pm 0.003 \pm 0.005$

http://arxiv.org/pdf/1307.5543.pdf

Strangeness over nonstrangess (multiple energies)



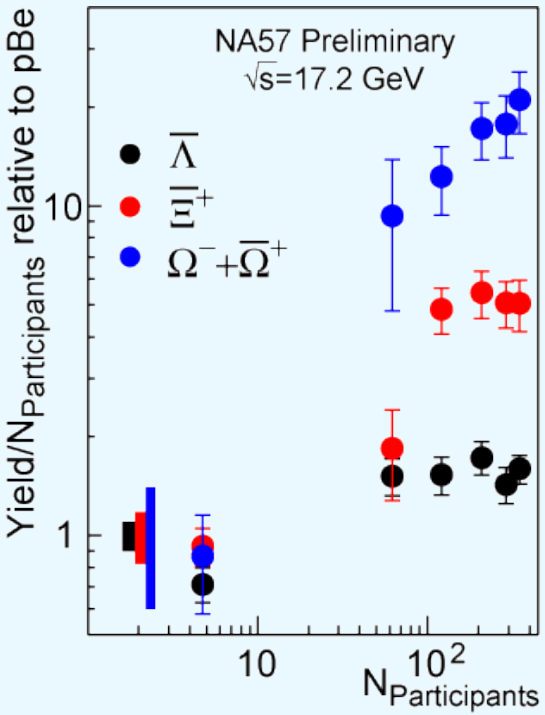
Strangeness Enhancement (SPS)
→ Volume effect

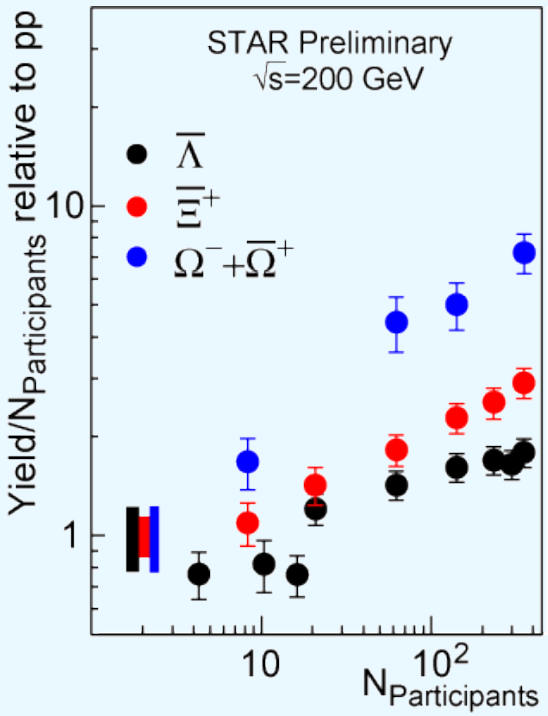


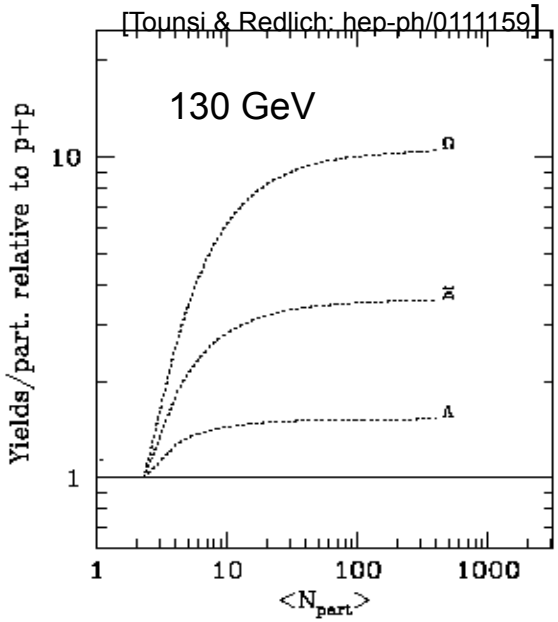
$$E_S = \left(\frac{1}{N_{part}} \frac{dN(A+A)}{dy}\bigg|_{y=0} \right) \Big/ \left(\frac{1}{2} \frac{dN(p+p(Be))}{dy}\bigg|_{y=0} \right)$$

NA57: JPG32, 427 (2006)

Grand canonical applicable at RHIC?







- See drop in “enhancement” at higher energy
- Enhancement values as ~predicted by model
- Correlation volume not well modeled by N_{part}

System is in G.C. state for most central data