

Flow

HW#3 (for April 7th)

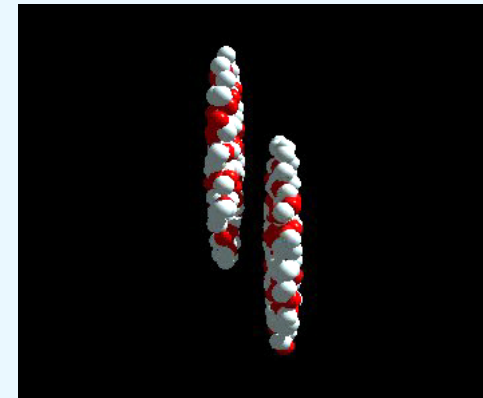
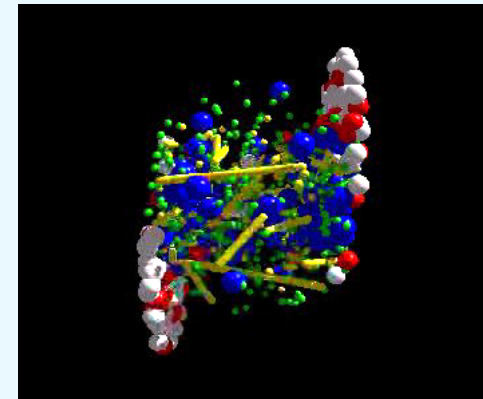
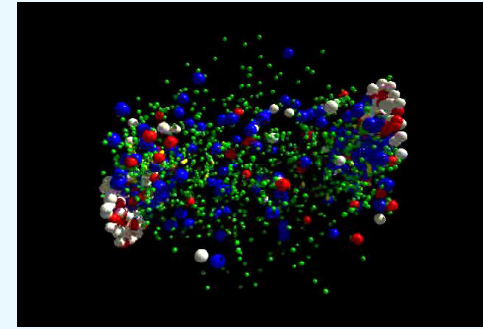
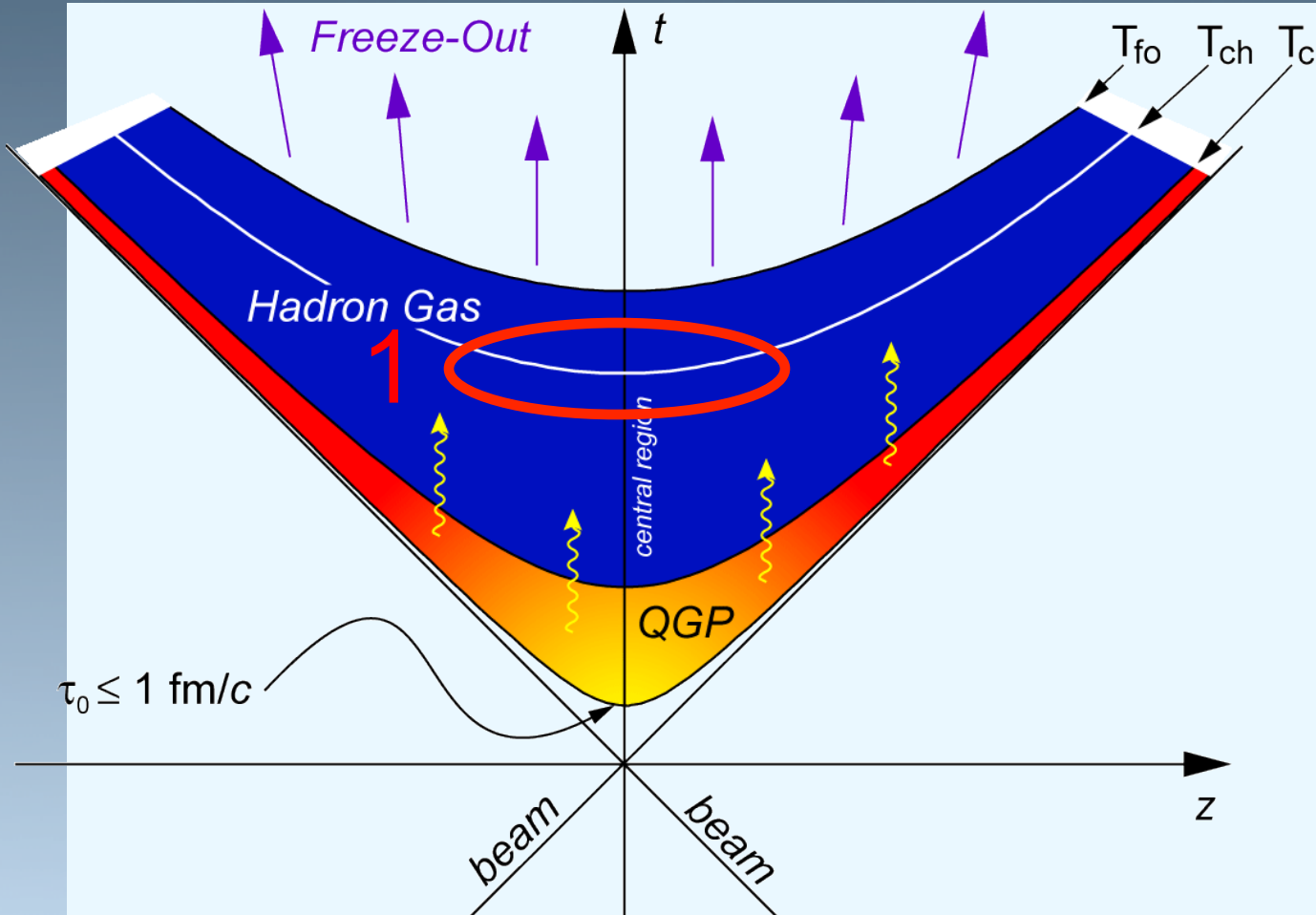
List Hadrons including charm or bottom quark

- 1.) Quark content, mass, charge**
- 2.) Rank them with respect to their abundance**

How do you detect them ?

- 1.) Decay channel, branching ratio**
- 2.) Which detector can detect or select decay particle?**

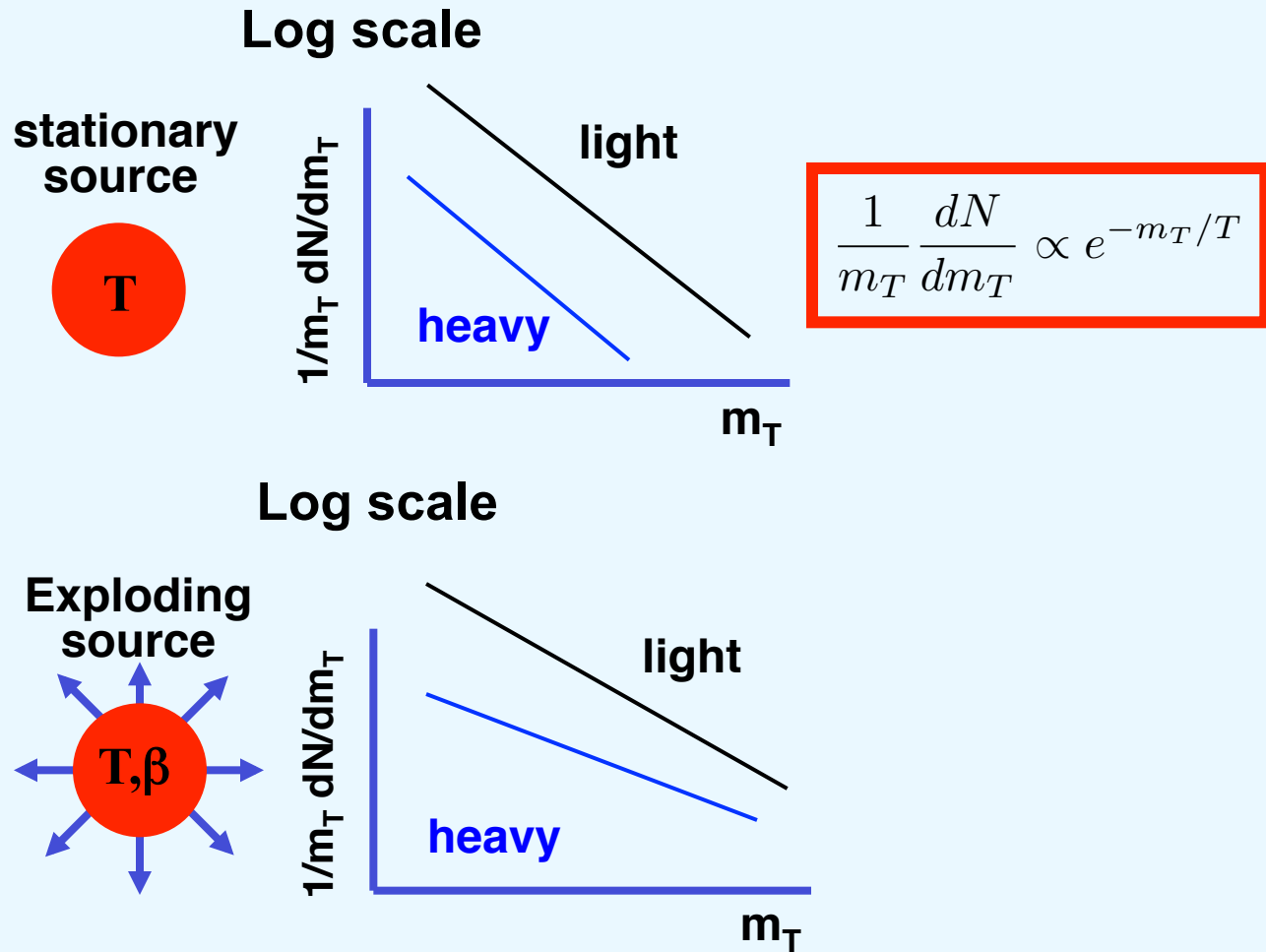
A theoretical view of the collision



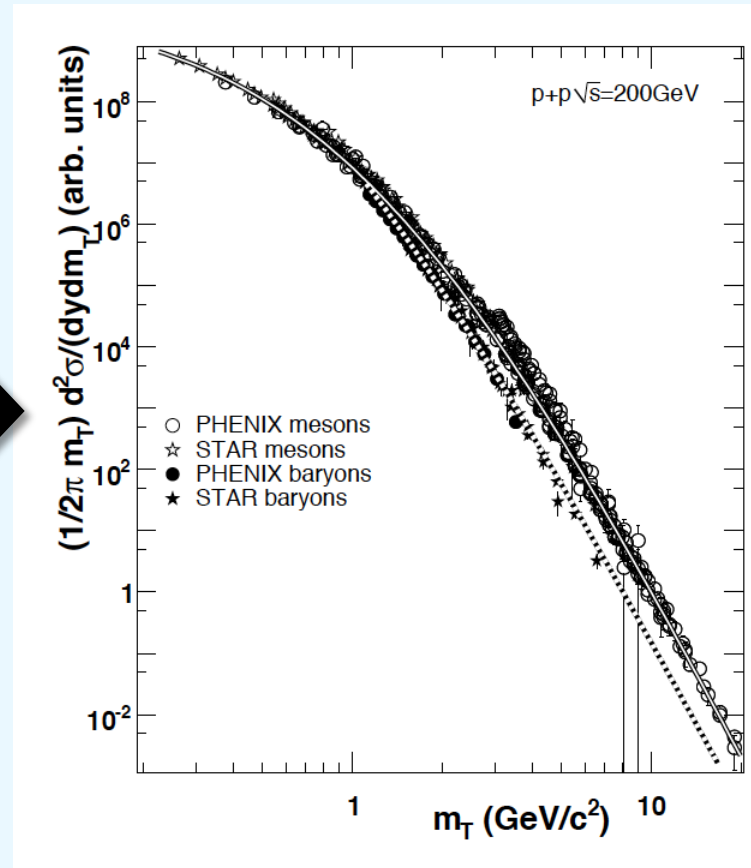
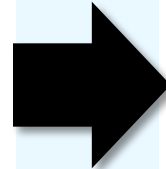
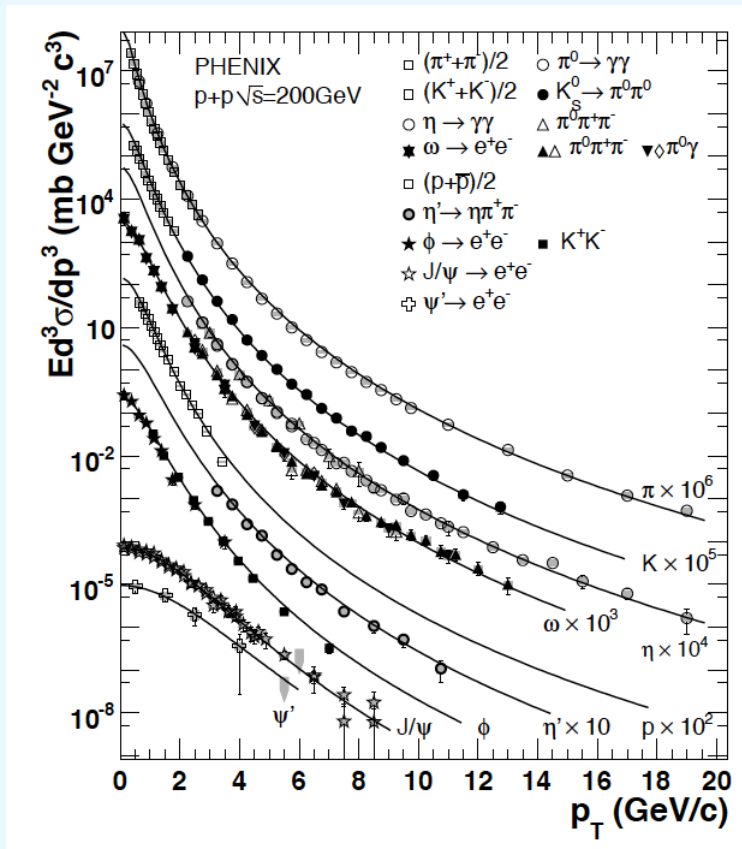
Chemical freezeout ($T_{ch} \leq T_c$) : inelastic scattering stops

Collective Effects (Flow)

Radial Flow: Modification of m_T -Spectrum



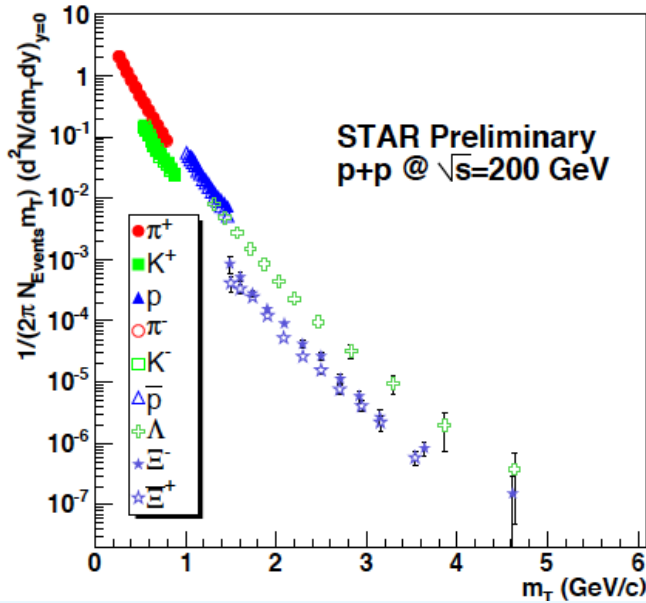
m_T -Scaling in p+p Reactions



$$m_T^2 = m^2 + p_x^2 + p_y^2$$

PHENIX: Phys. Rev. D83, 052004 (2011)

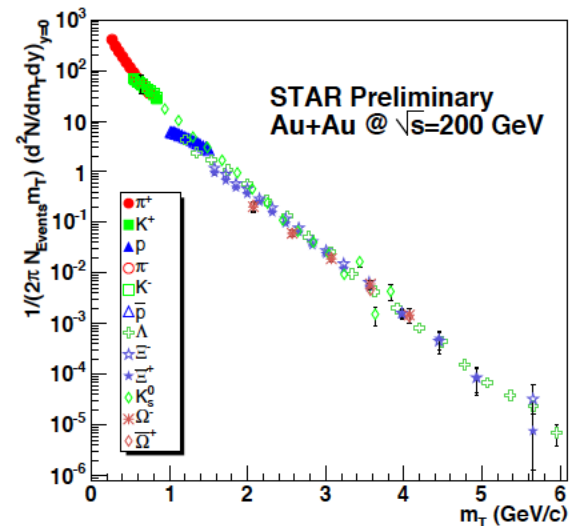
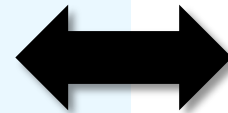
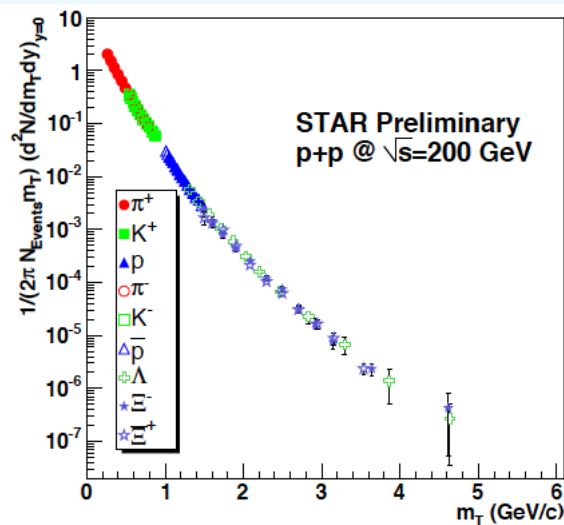
m_T -Scaling: p+p in comparison to Au+Au



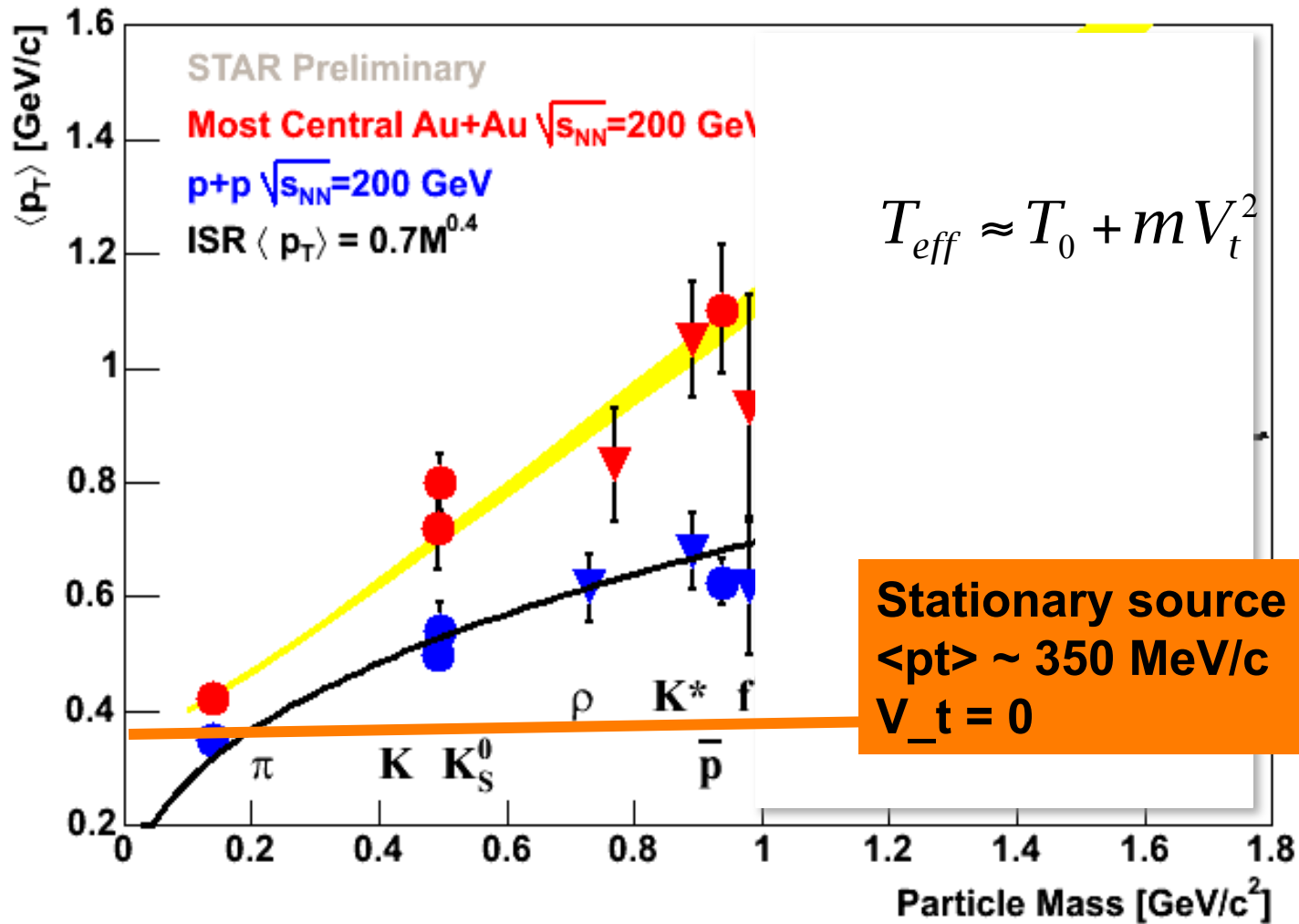
STAR: nucl-ex/0403021

$$m_T^2 = m^2 + p_x^2 + p_y^2$$

$$T_{\text{eff}} \approx T_0 + m V_t^2$$



Mean transverse momentum



Bourquin and Gallara
 Nucl. Phys. B114 (1976)

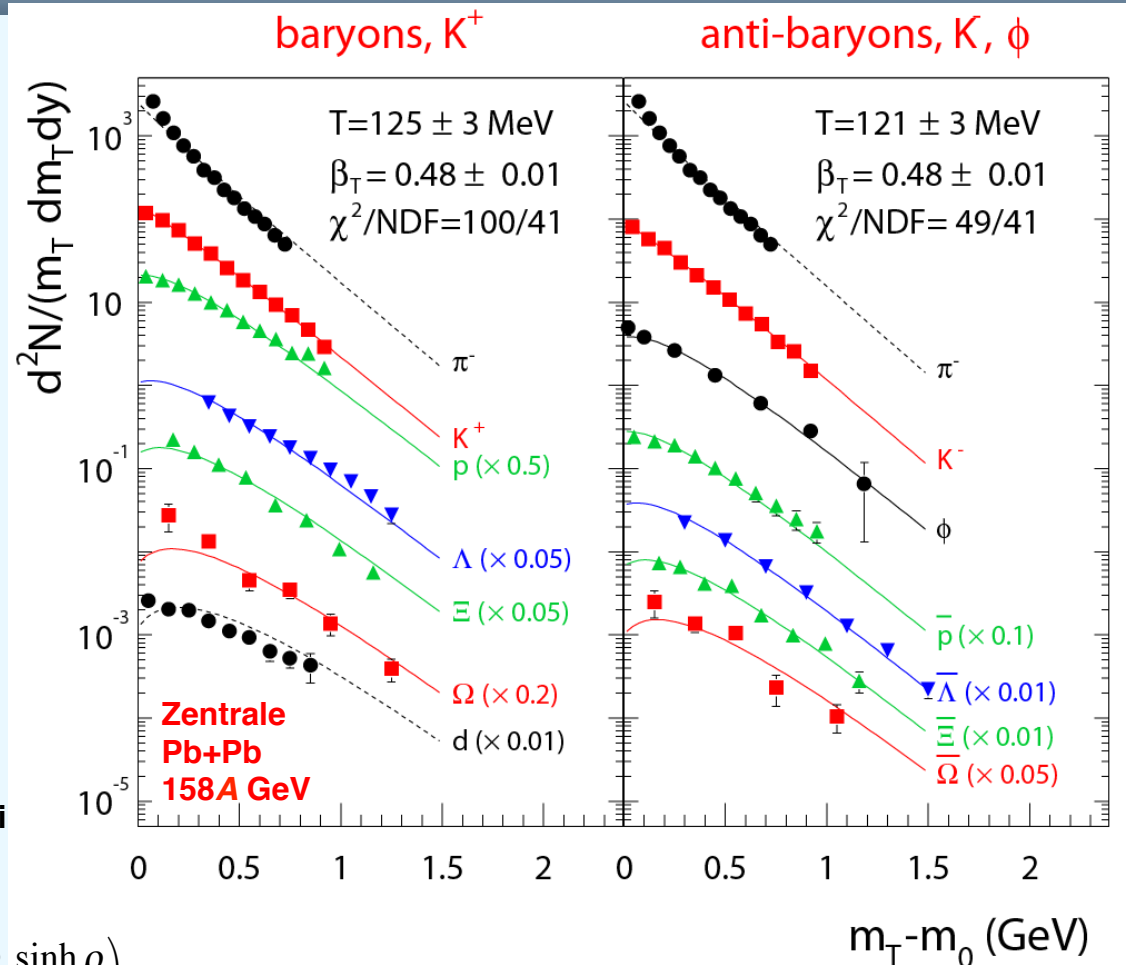
Particle spectra

“Blast-Wave-Model”

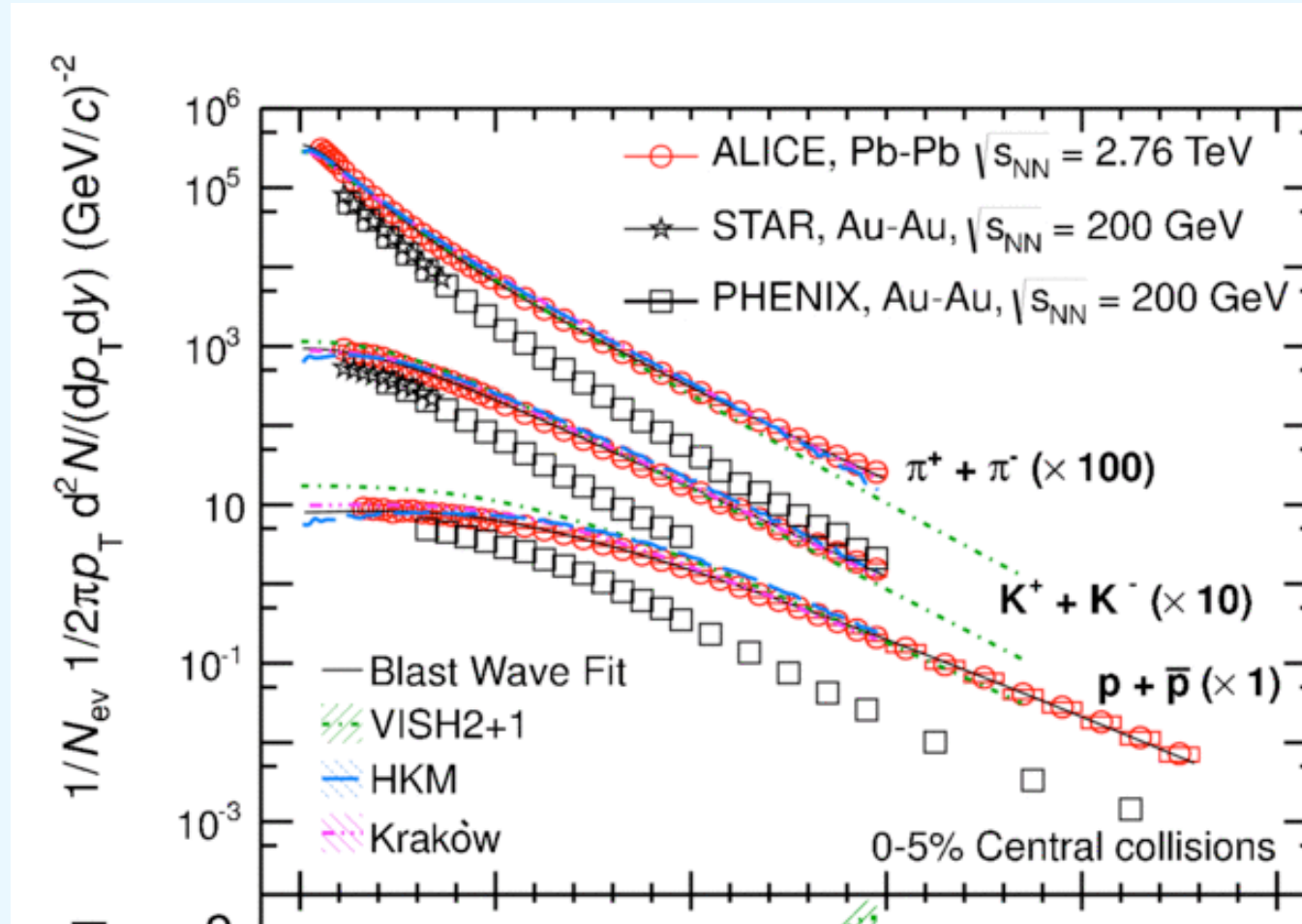
Schnedermann, Sollfrank, and Hei
Phys. Rev. C46

$$\frac{dN}{m_t dm_t dy} \propto m_t K_1 \left(\frac{m_t \cosh \rho}{T} \right) I_0 \left(\frac{p_t \sinh \rho}{T} \right)$$

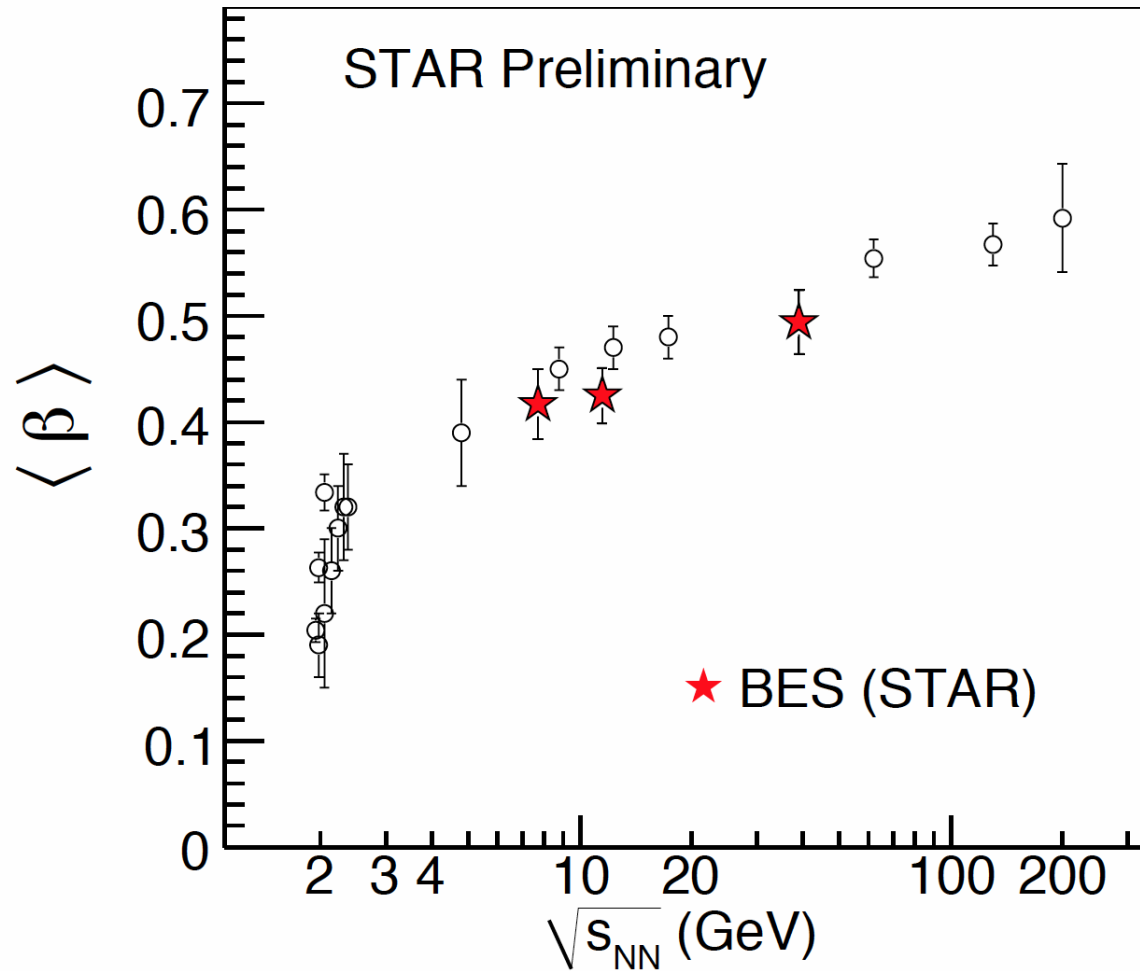
$$\rho = \tanh^{-1} \beta_t$$



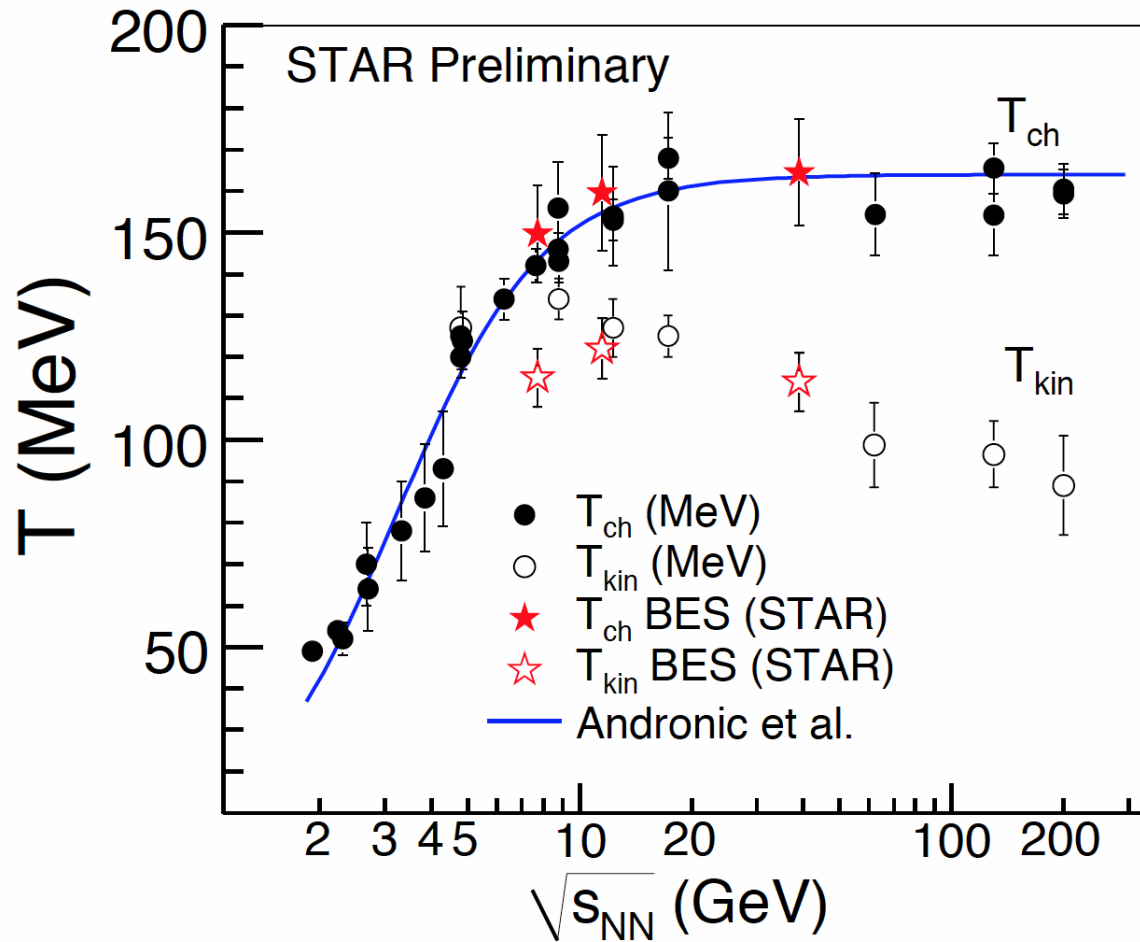
Radial Flow: RHIC and LHC energies



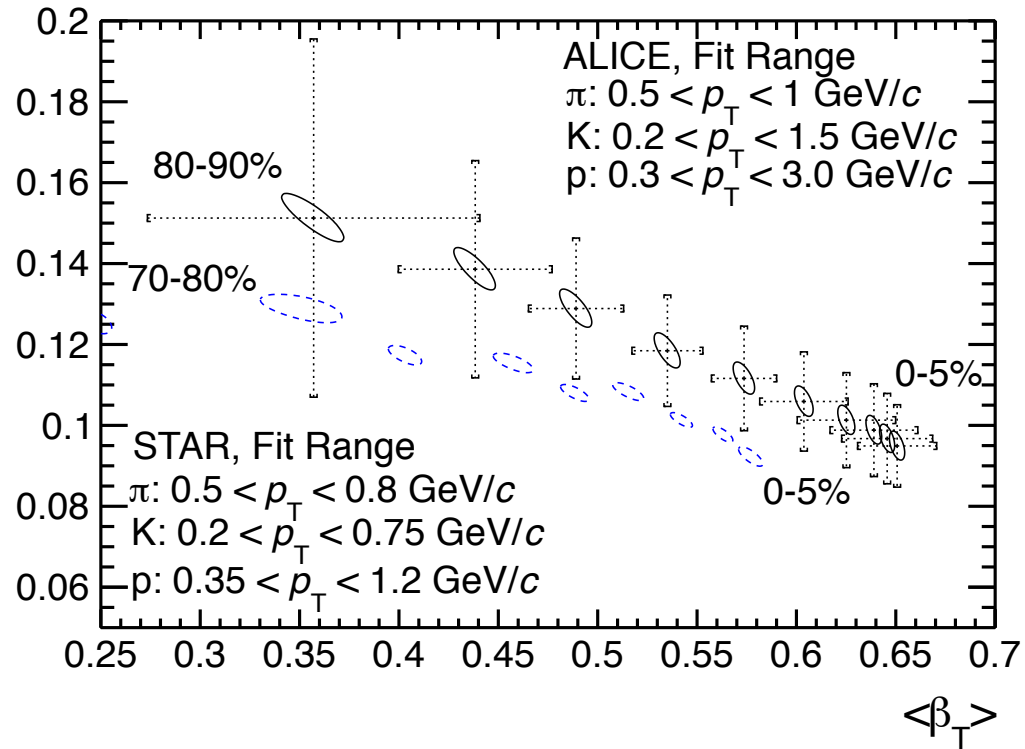
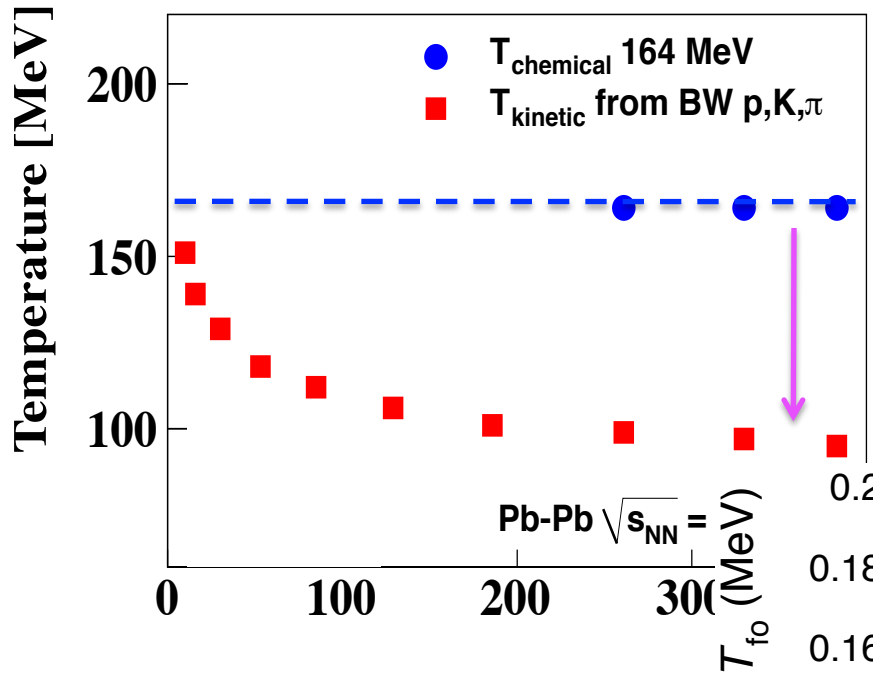
Radial Flow: different collision energies



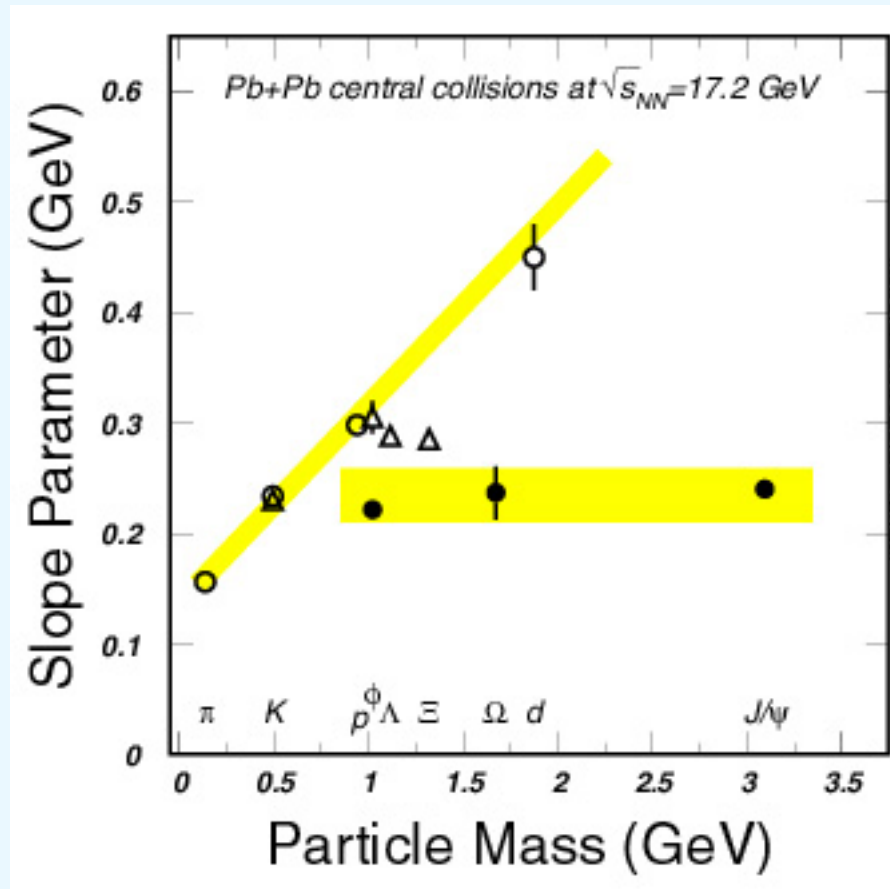
Radial Flow: Energy dependence T_{kin}



Kinetic Freeze-out - Extra



Radial Flow



$$T_{eff} \approx T_0 + mV_t^2$$

Slope parameter = T_{eff}