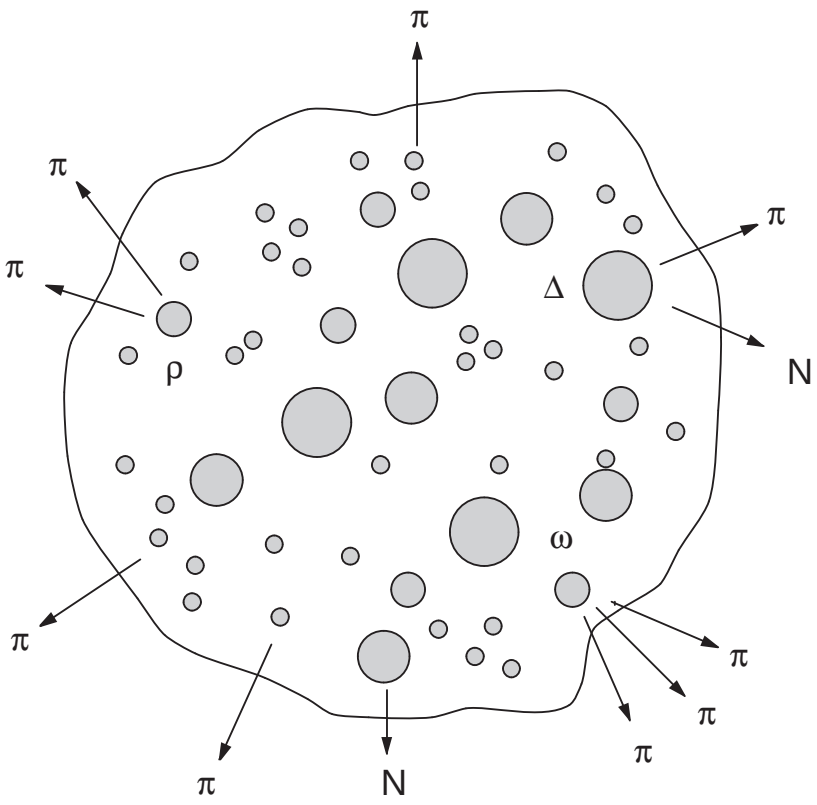
Termalny opis danych z RHIC'a

WB + W. Florkowski + Anna Baran



100 lat, Panie Profesorze!

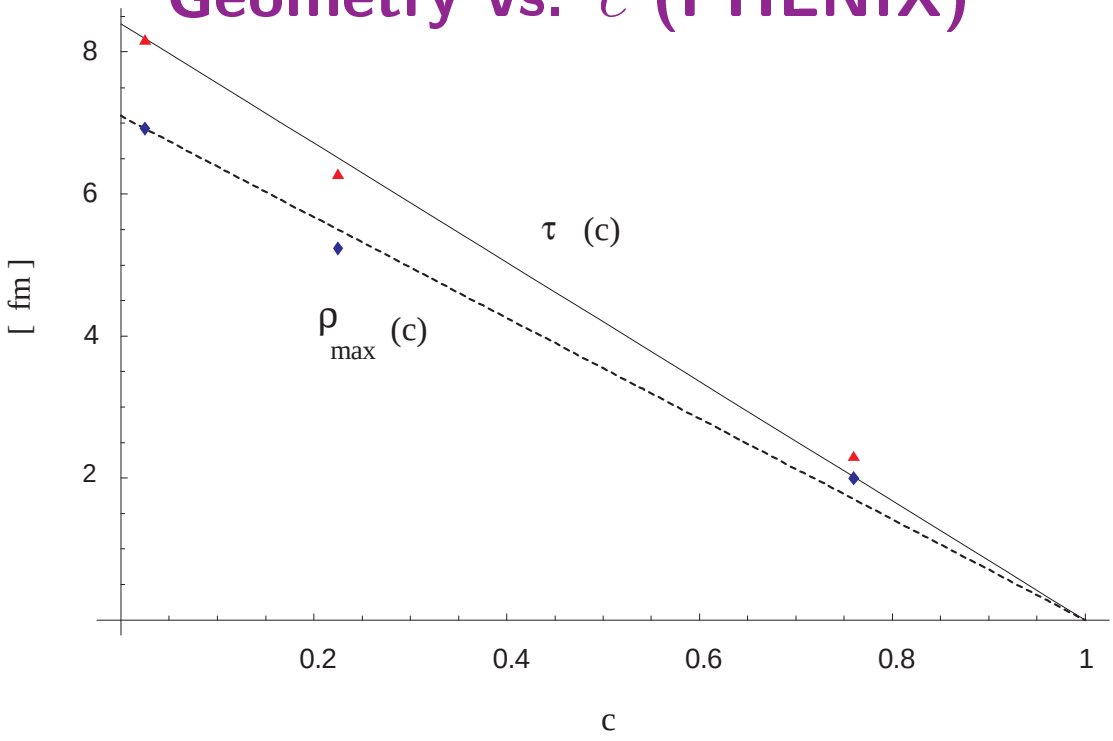
Multiplicity vs. energy

[from A. Budzanowski, *By small steps towards "The Beginning". What have we learned from first results of the PHOBOS detector at RHIC?*, Acta. Phys. Pol. **B 33** (2002) 33]

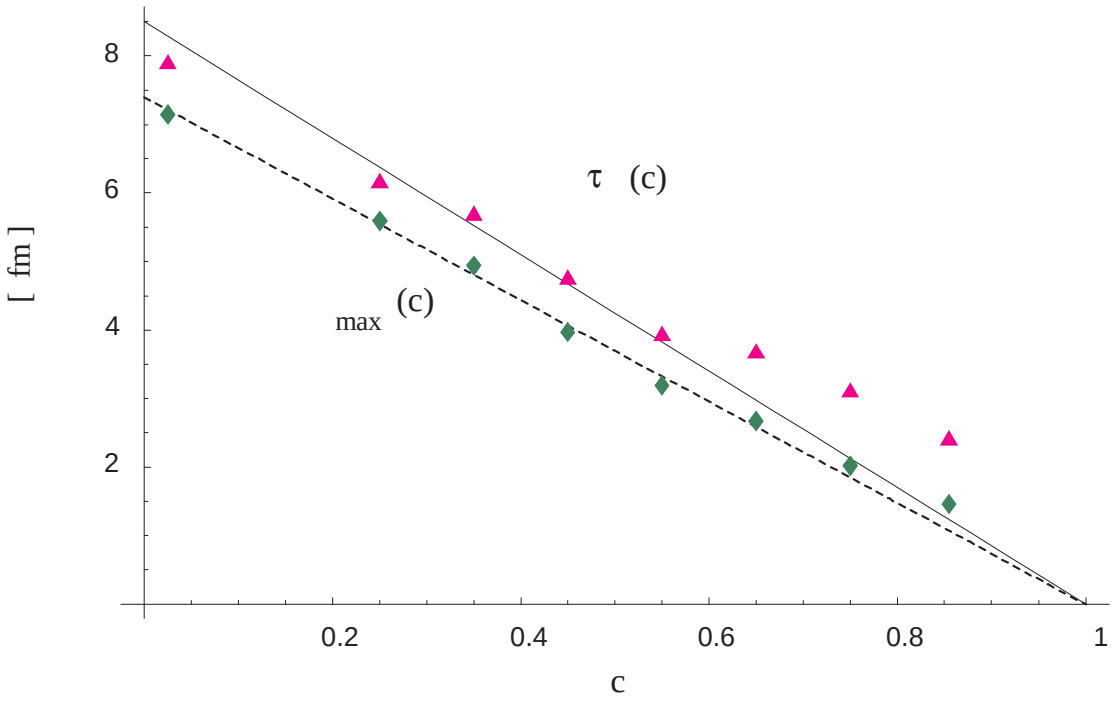
Ratios @ 200 GeV

	Model	Experiment
Fitted thermal parameters		
T [MeV]	160±5	
μ_B [MeV]	26±4	
μ_S [MeV]	5	
μ_I [MeV]	-1	
χ^2/n	1.5	
Ratios used in the thermal analysis		
π^-/π^+	1.015	$1.025 \pm 0.006 \pm 0.018$ (0-12%) $1.02 \pm 0.02 \pm 0.10$ (0-5%)
K^-/K^+	0.95	$0.95 \pm 0.03 \pm 0.03$ (0-12%) $0.92 \pm 0.03 \pm 0.10$ (0-5%)
$\overline{p}/p$	0.74	$0.73 \pm 0.02 \pm 0.03$ (0-12%) $0.70 \pm 0.04 \pm 0.10$ (0-5%) 0.78 ± 0.05 (0-5%)
$\overline{p}/\pi^-$	0.089	0.083 ± 0.015 (0-5%)
K^-/π^-	0.174	0.156 ± 0.020 (0-5%)
$\Omega/h^- \times 10^3$	0.841	$0.887 \pm 0.111 \pm 0.133$ (0-10%)
$\overline{\Omega}/h^- \times 10^3$	0.740	$0.935 \pm 0.105 \pm 0.140$ (0-10%)
$K^*(892)/\pi^-$	0.055	$0.030 \pm 0.004 \pm 0.007$ (0-20%)
$K^*(892)/K^-$	0.32	$0.19 \pm 0.02 \pm 0.05$ (0-20%)
$\phi/K^*(892)$	0.44	$0.63 \pm 0.10 \pm 0.16$ (0-20%)
Preliminary STAR data on ρ and f_0		
ρ^0/π^-	0.12	$0.20 \pm 0.03 \pm 0.06$ (40-80%)
$f_0(980)/\pi^-$	0.01	$0.05 \pm 0.03 \pm 0.03$ (40-80%)

Geometry vs. c (PHENIX)



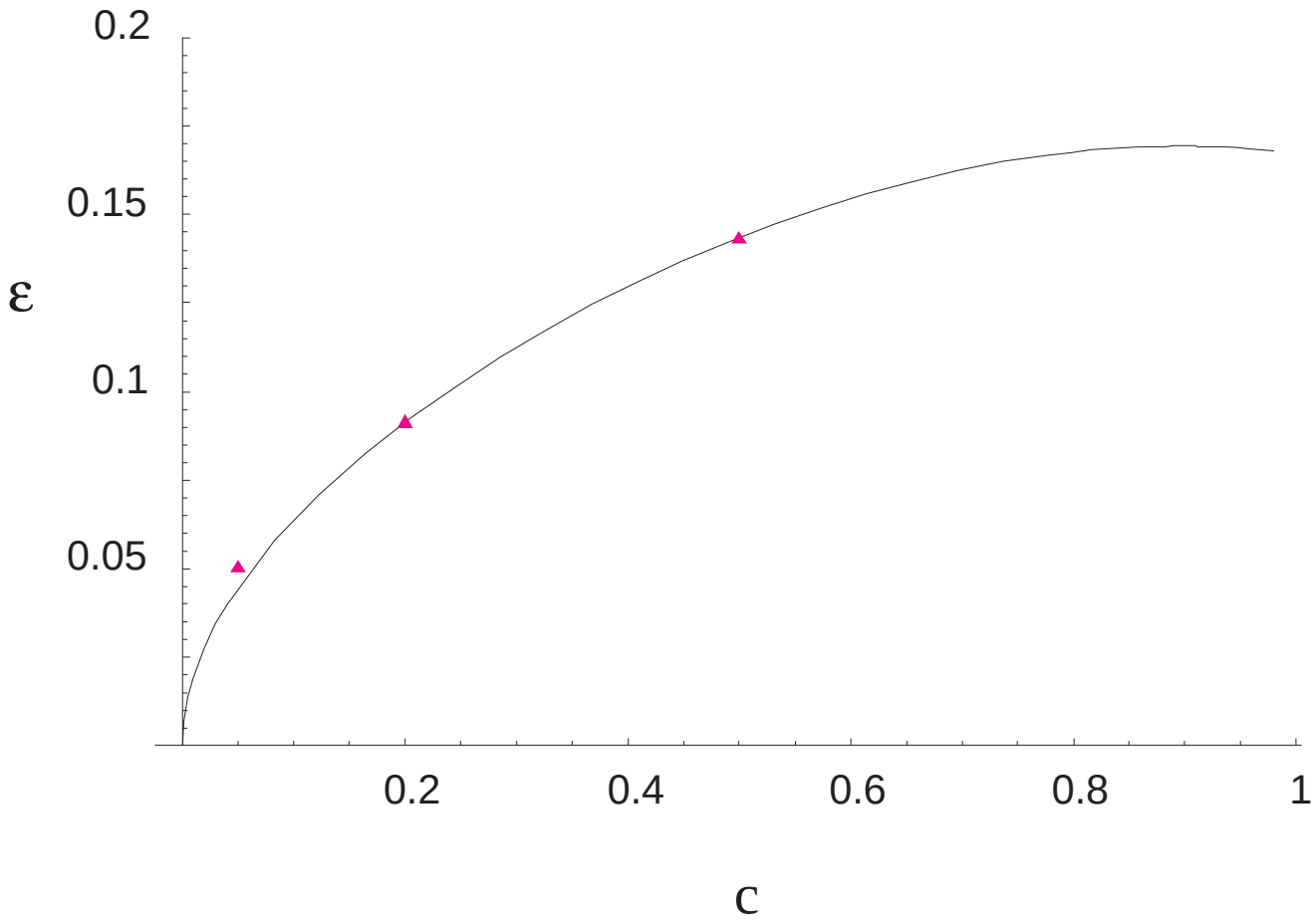
@ 130 GeV, $T = 165$ MeV and $\mu_B = 41$ MeV



@ 200 GeV, $T = 165$ MeV and $\mu_B = 26$ MeV

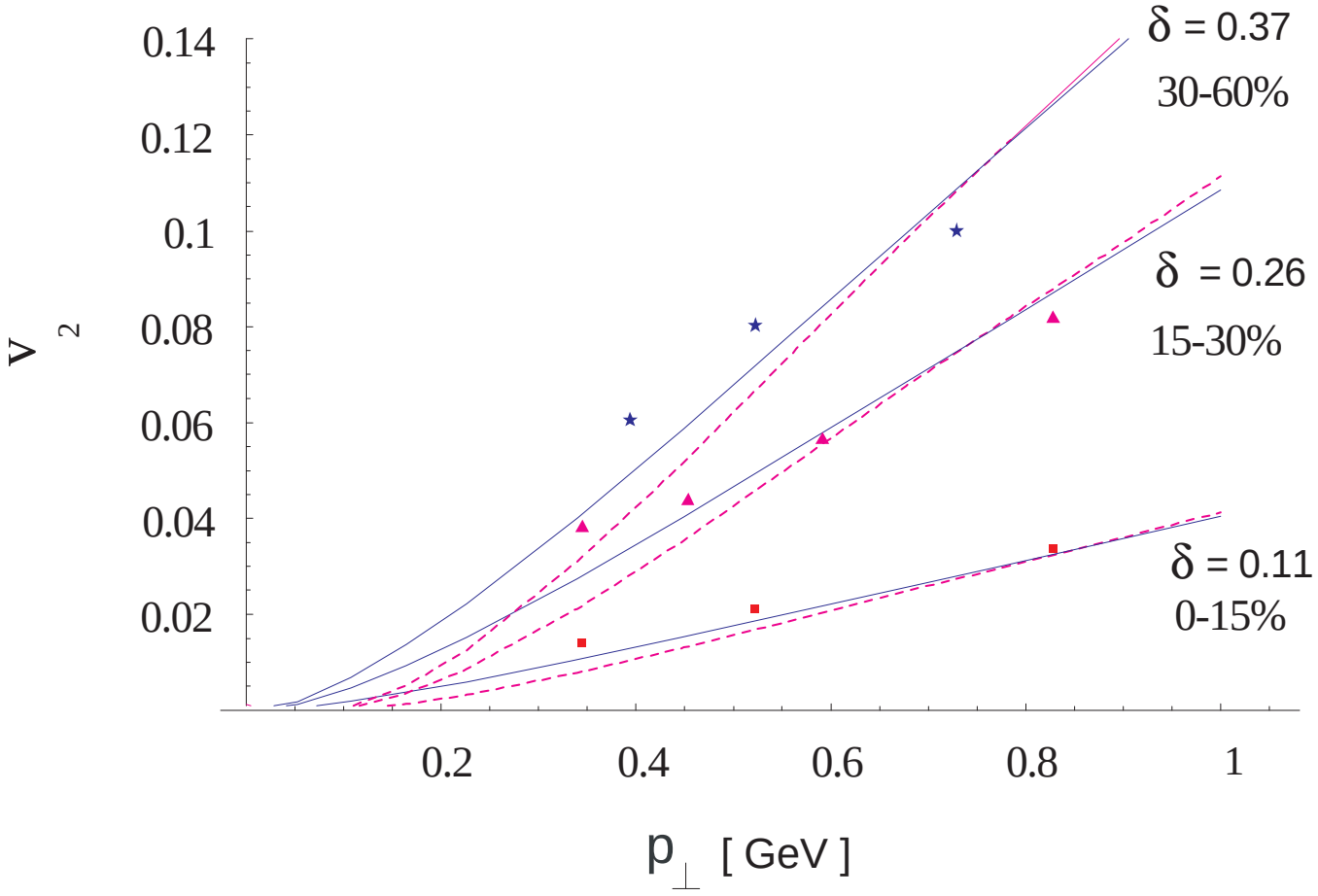
Deformation vs. c

$$\varepsilon = \frac{R_y^2 - R_x^2}{R_y^2 + R_x^2}$$

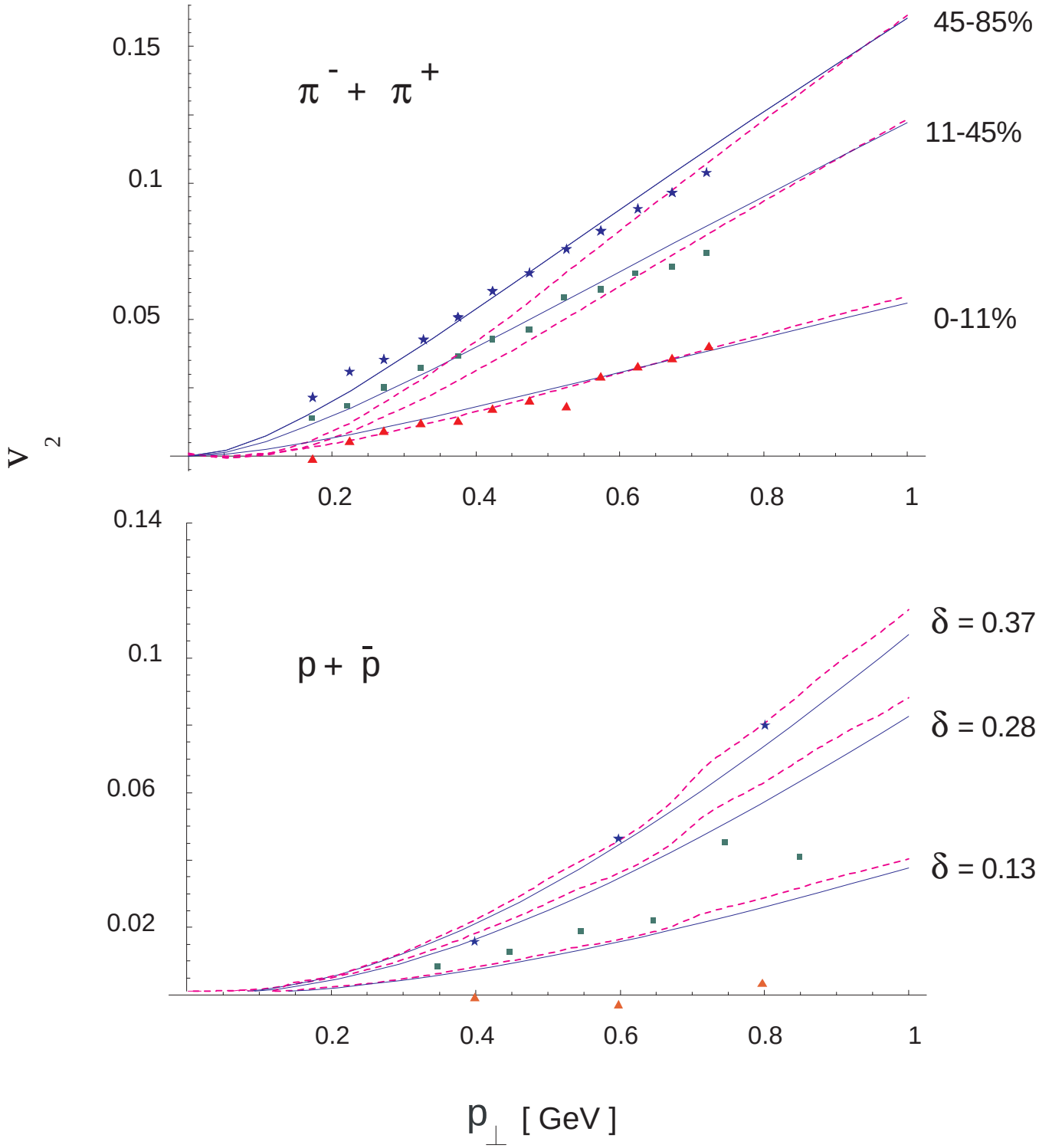


[data from STAR, M. Lisa, nucl-ex/0301005]

v_2, PHENIX @ 130 GeV



v_2, STAR @ 130 GeV



Questions to the model and beyond

1. Why should the simple $e^{-(E-\mu)/T}$ work? There is very little time to achieve thermal equilibrium in the gas of hadrons (early freeze-out)

2. Is this the property of hadronization ? (*e.g. fluctuating string tension,* A. Białas, Phys. Lett. B466 (1999) 301)

3. Significance of fluctuations; *data closer to hadron gas or constituent quark gas than to QGP* (A. Budzanowski, "The significance of M. Smoluchowski's work in subatomic physics", Acta Phys. Pol., in print)

4. Questions to prehistoric (*i.e.* pre-freeze-out) times: *Was there quark-gluon plasma?* If yes, why the transverse size does not grow with the collision energy?

5. How to construct a (microscopic) model for early stages such that the conditions at freeze-out which we use are reached?