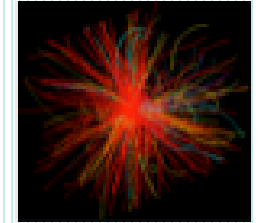
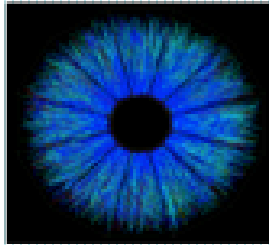


# Workshop on QCD Thermodynamics in High-Energy Collisions



July 27 - 31, 2015

College of Physical Science and Technology  
Central China Normal University, Wuhan, China

	Monday July 27	Tuesday July 28	Wednesday July 29	Thursday July 30	Friday July 31
9:30 – 11:00		<b>JS (I)</b>	<b>PBM (II)</b>	<b>KR(II)</b>	<b>PFZ(II)</b>
11:00 – 11:20	Tea Break				
11:20 – 12:50	<i>Gul ZhiTing</i> <i>Chair Professor</i>	<b>KR (I)</b>	<b>PFZ (I)</b>	<b>JS(II)</b>	<b>Discussions</b>
12:30 – 14:30	Lunch Break				
14:30 – 16:00	<b>PBM (I)</b>	<b>Discussions</b>	<b>Discussions</b>	<b>Discussions</b>	
16:00 – 17:00	<b>Discussions</b>				
17:30 – 20:00	Reception			Workshop dinner	

Prof. Dr. Peter Braun-Munzinger

Prof. Dr. Krzysztof Redlich

Prof. Dr. Johanna Stachel

Prof. Pengfei Zhuang

(EMMI, GSI)

(University of Wroclaw)

(Heidelberg University)

(Tsinghua University)

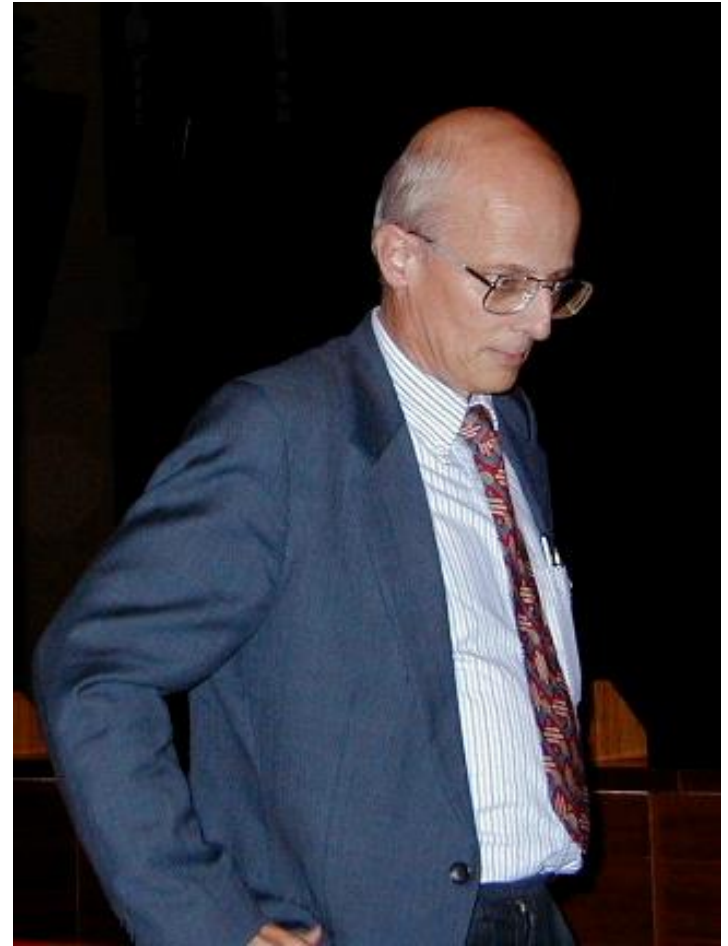
# Relativistic Heavy Ion Collision Physics

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April, 1999



# 桂质廷讲座教授



**Congratulations to Prof. Dr. Peter Braun-Munzinger for the **GIU ZHITING CHAIR PROFESSORSHIP** at the Central China Normal University!**

**1) Please silent your cell phone**

**2) Please ask questions:**

**There is no stupid question**

**学而不问，非礼也！**

[nxu@lbl.gov](mailto:nxu@lbl.gov)

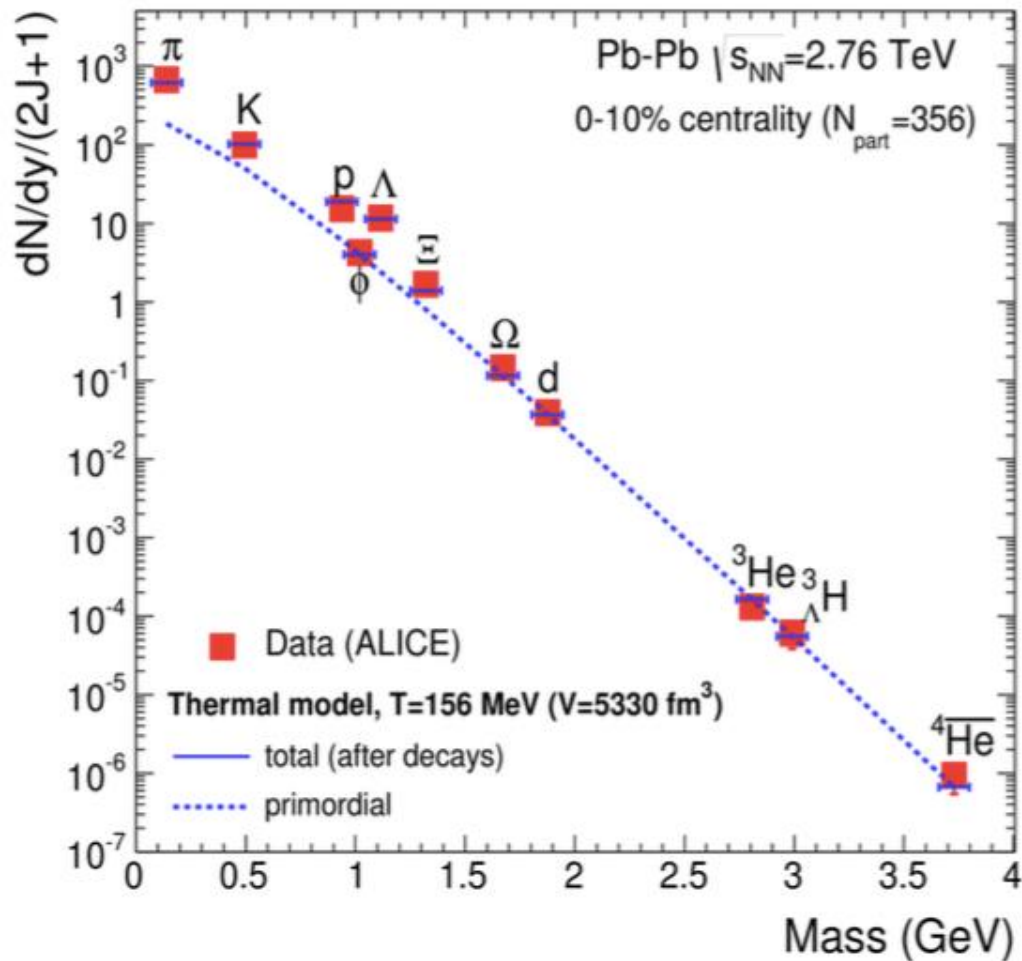
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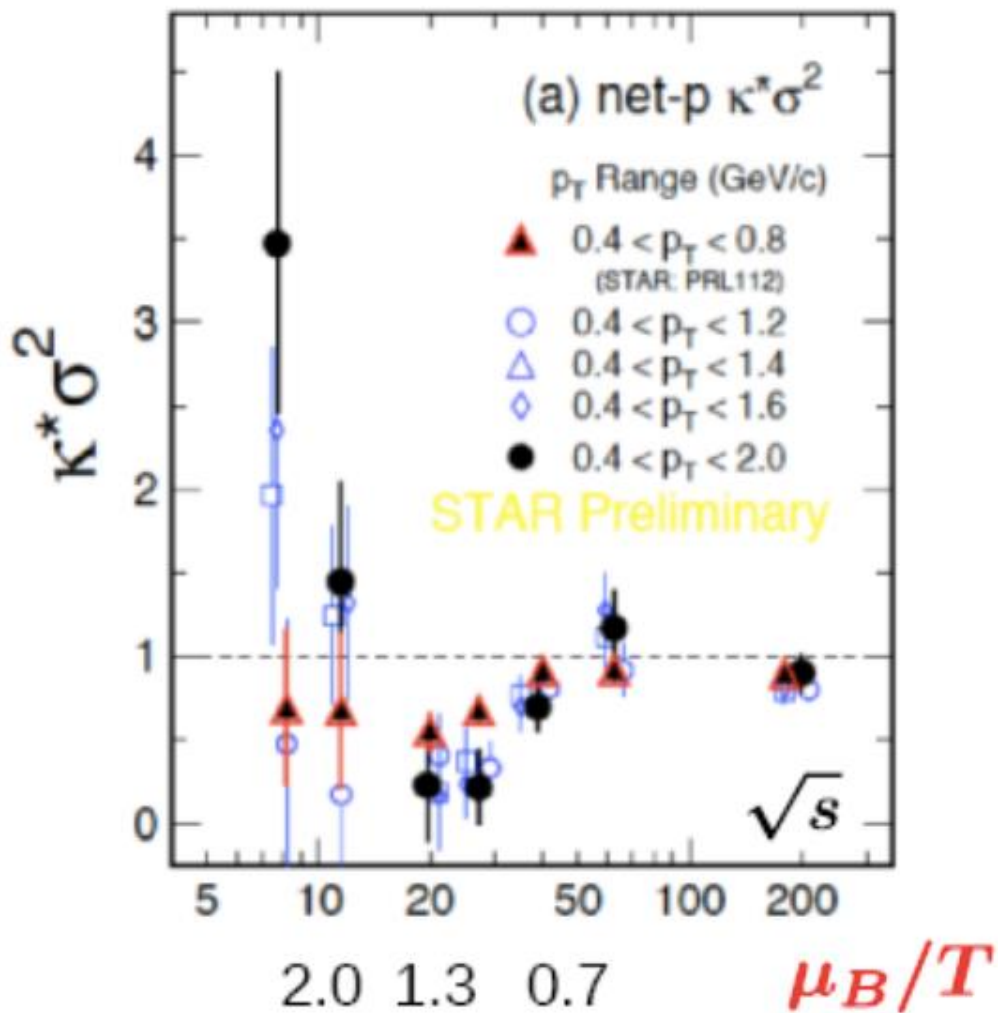
# Selected Questions

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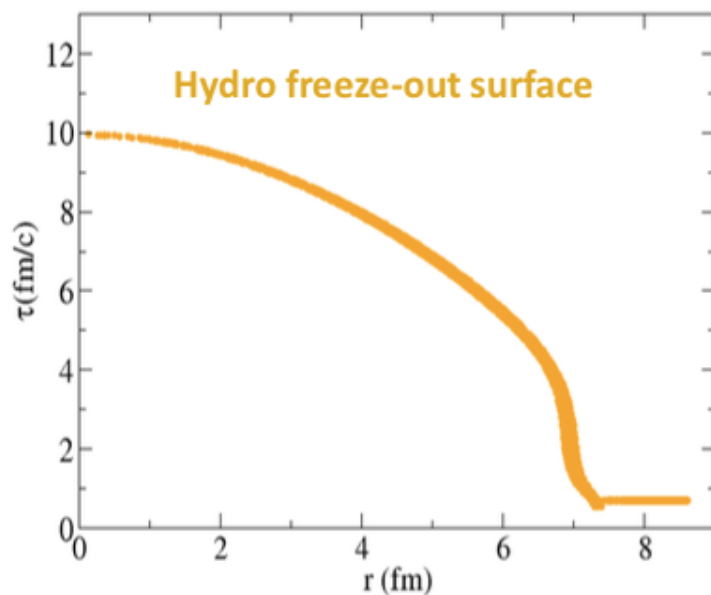
- 1) Applicable window of (p)NJL & PQM models
- 2) Hydrodynamic + criticality calculations
- 3) (chemical, kinetic) freeze out Temperature v.s. crossover Temperature
- 4) Fluctuations near CEP
- 5) UA(1) symmetry: possibility to detect eta prime mass reduction in the HIC experiment



J. Stachel



## Particle emissions near $T_c$ with external field



Jiang, Li & Song in preparation

Particle emissions in traditional hydro

$$E \frac{dN}{d^3p} = \int_{\Sigma} \frac{p_{\mu} d\sigma^{\mu}}{2\pi^3} f(x, p)$$

Particle emissions with external field

$$M \rightarrow g(\bar{\sigma} + \sigma(x))$$

$$\begin{aligned} f(x, p) &= f_0(x, p) [1 - g\sigma(x) / (\gamma T)] \\ &= f_0 + \delta f \end{aligned}$$

$$\langle \delta f_1 \delta f_2 \rangle_{\sigma} = f_{01} f_{02} f_{03} \left( \frac{g^2}{\gamma_1 \gamma_2} \frac{1}{T^3} \right) \langle \sigma_1 \sigma_2 \rangle_c,$$

$$\langle \delta f_1 \delta f_2 \delta f_3 \rangle_{\sigma} = f_{01} f_{02} f_{03} \left( -\frac{g^3}{\gamma_1 \gamma_2 \gamma_3} \frac{1}{T^3} \right) \langle \sigma_1 \sigma_2 \sigma_3 \rangle_c,$$

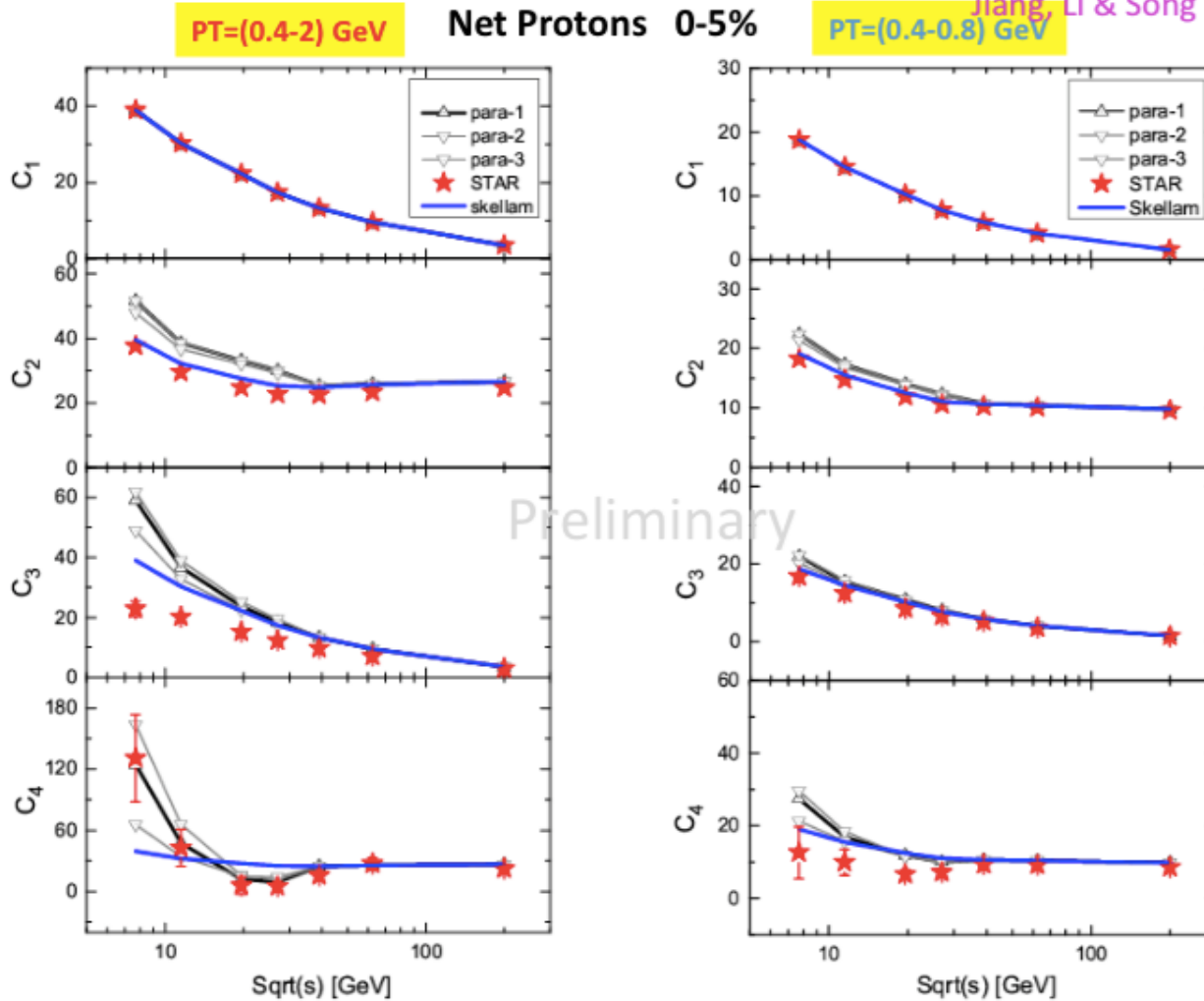
$$\langle \delta f_1 \delta f_2 \delta f_3 \delta f_4 \rangle_{\sigma} = f_{01} f_{02} f_{03} f_{04} \left( \frac{g^4}{\gamma_1 \gamma_2 \gamma_3 \gamma_4} \frac{1}{T^4} \right) \langle \sigma_1 \sigma_2 \sigma_3 \sigma_4 \rangle_c.$$

12



# C1 C2 C3 C4 ( Model + Poisson baseline)

Jiang, Li & Song in preparation



Preliminary

Critical fluctuations give positive contribution to  $C_2$ ,  $C_3$ ; well above the poisson baselines, can NOT explain/describe the  $C_2$ ,  $C_3$  data

# Workshop QCD Thermodynamics



**Thank you all for participating in  
the workshop!**

Have a safe trip home

