

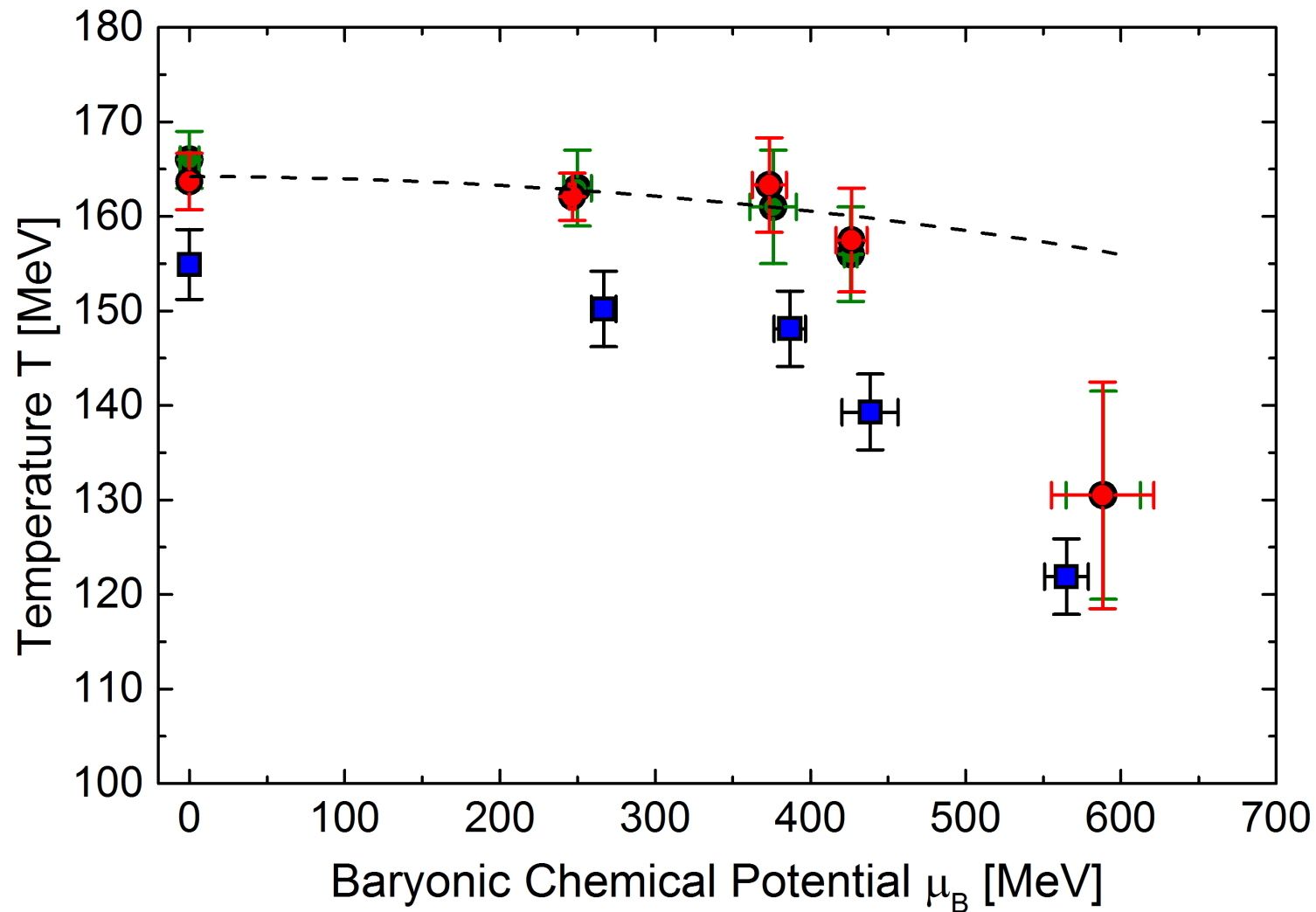
SQM 2016 Berkeley

# The QCD Parton-Hadron Phase Boundary

Reinhard Stock



# The Phase Boundary from Statistical Model Analysis

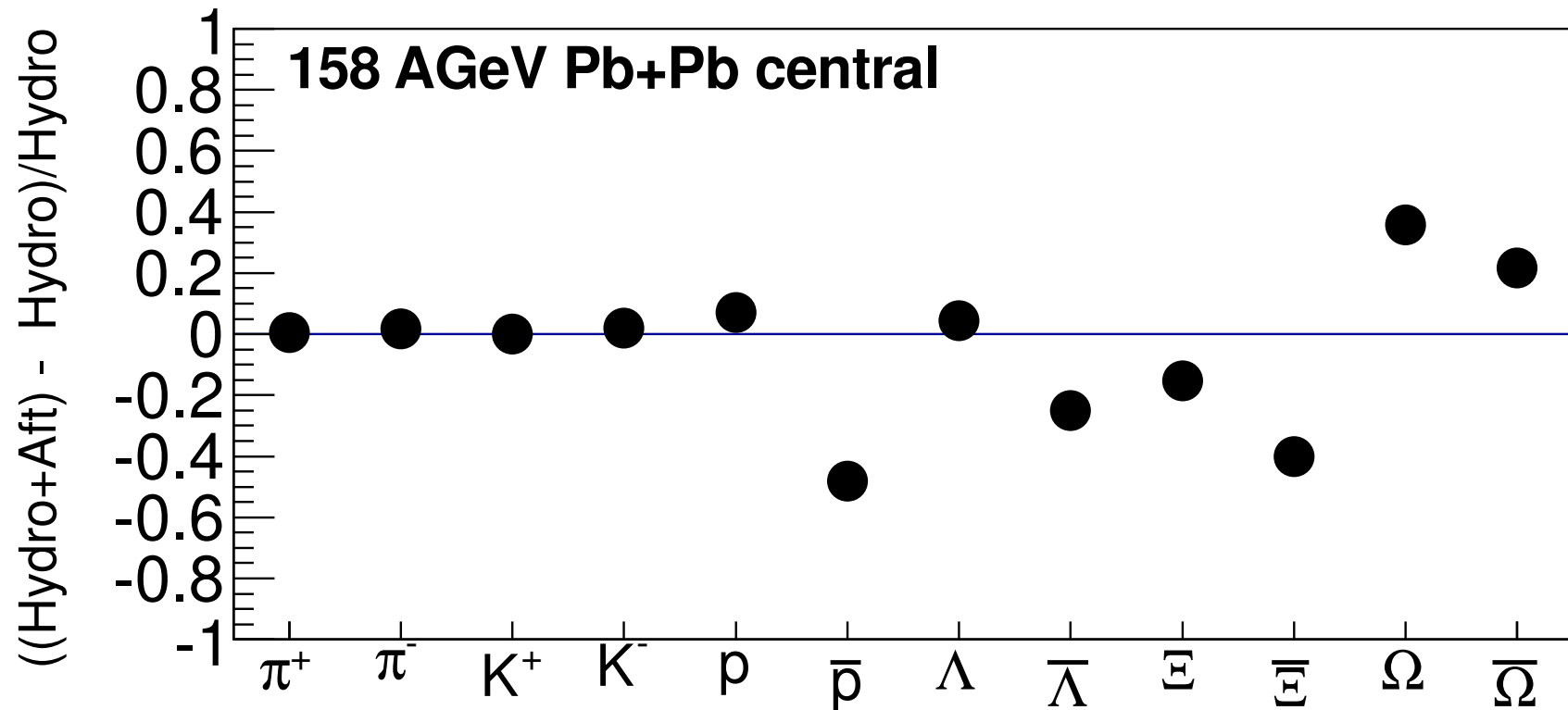


State of the art.

F. Becattini et al. arXiv: 1605.09694

# Second order Corrections to SHM

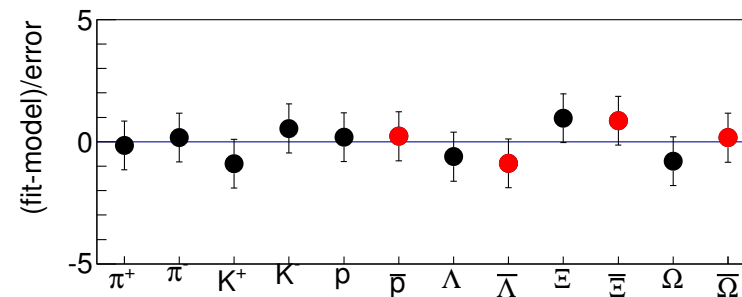
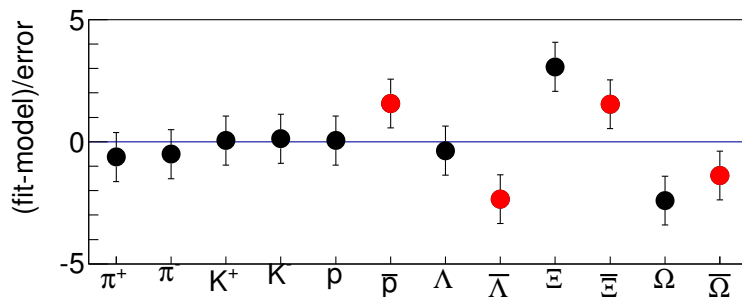
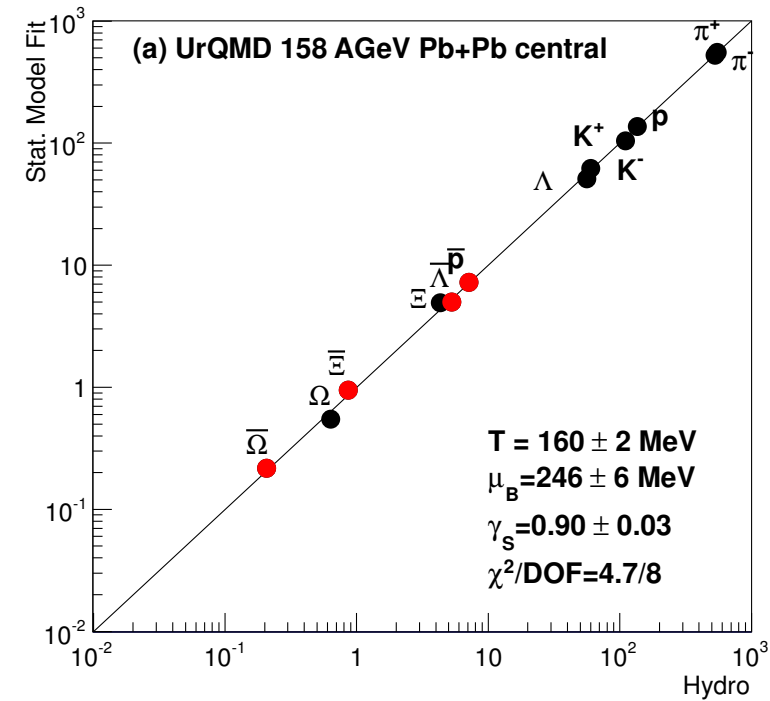
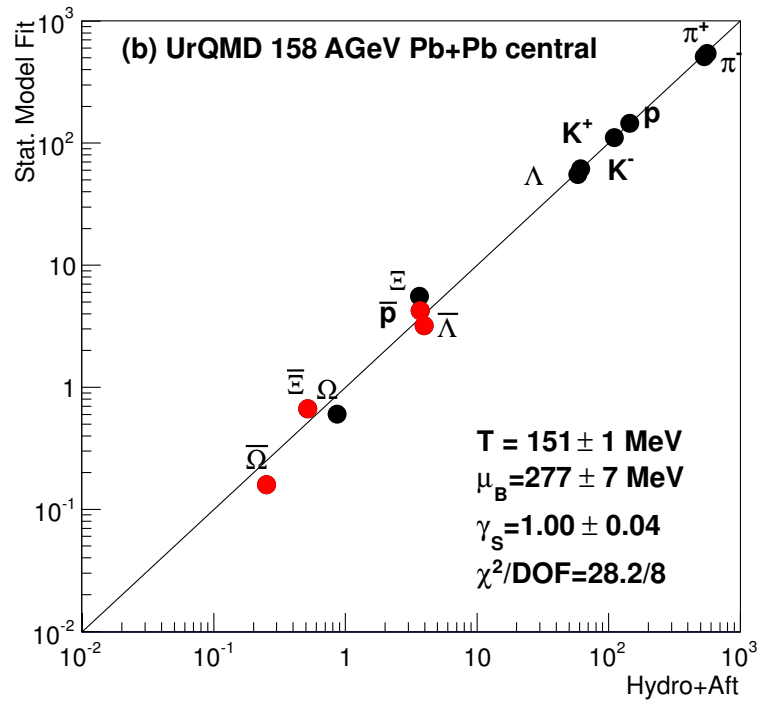
Revisit the hadronic-expansions stage:  
UrQMD study of afterburner effects



Modification factors for hadronic Multiplicities  
Baryon-Antibaryon annihilation effects

# UrQMD plus SHM

- drastic  $\chi^2/\text{dof}$  improvement
- T rises above traditional SHM

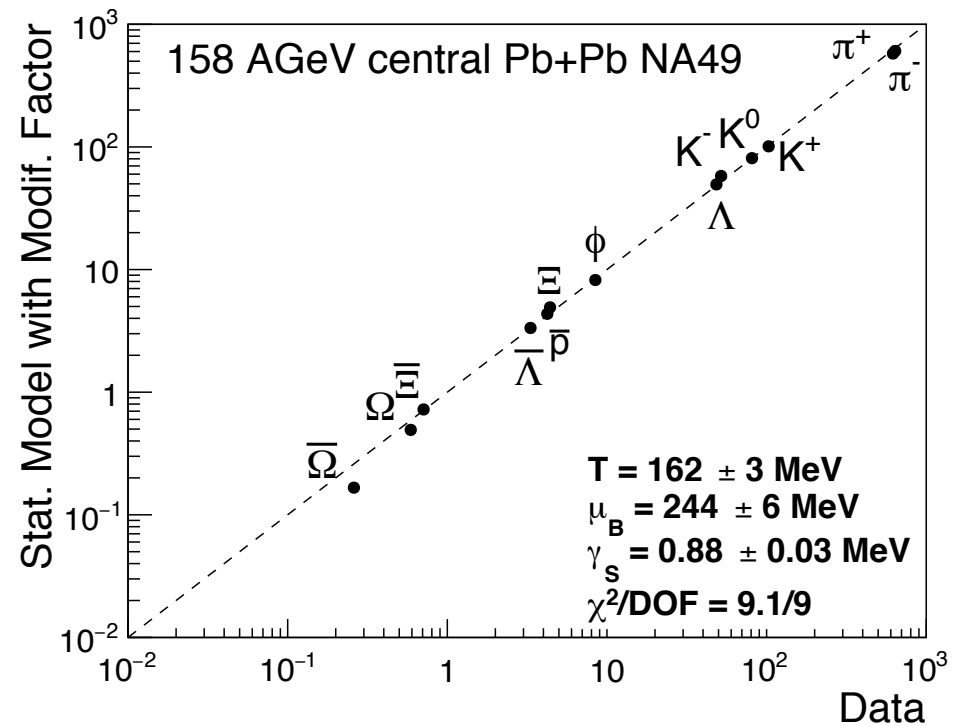
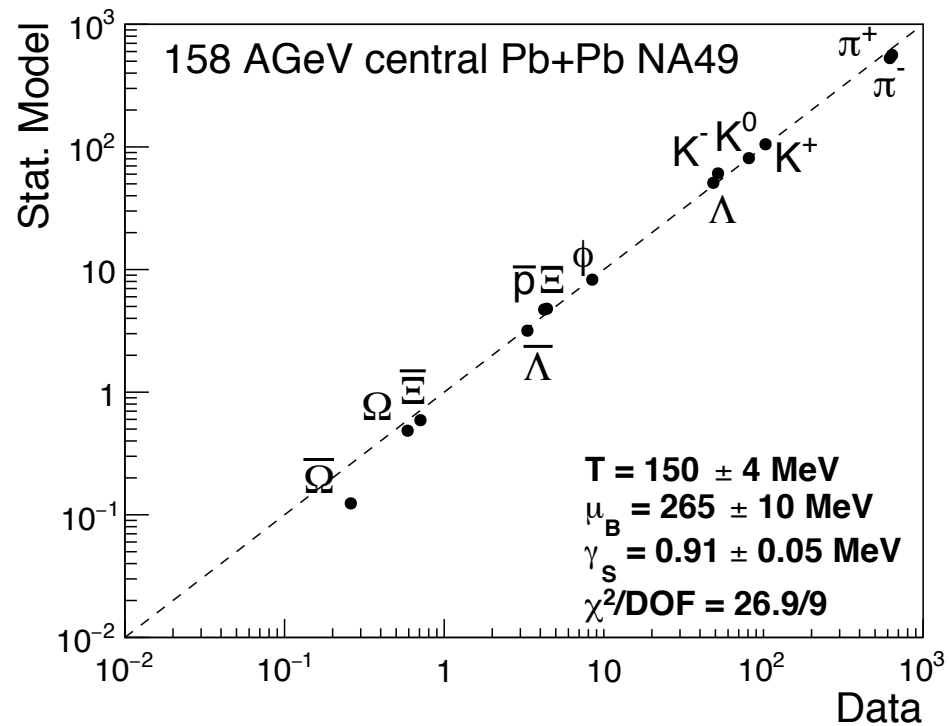


# Data Analysis with UrQMD Modification

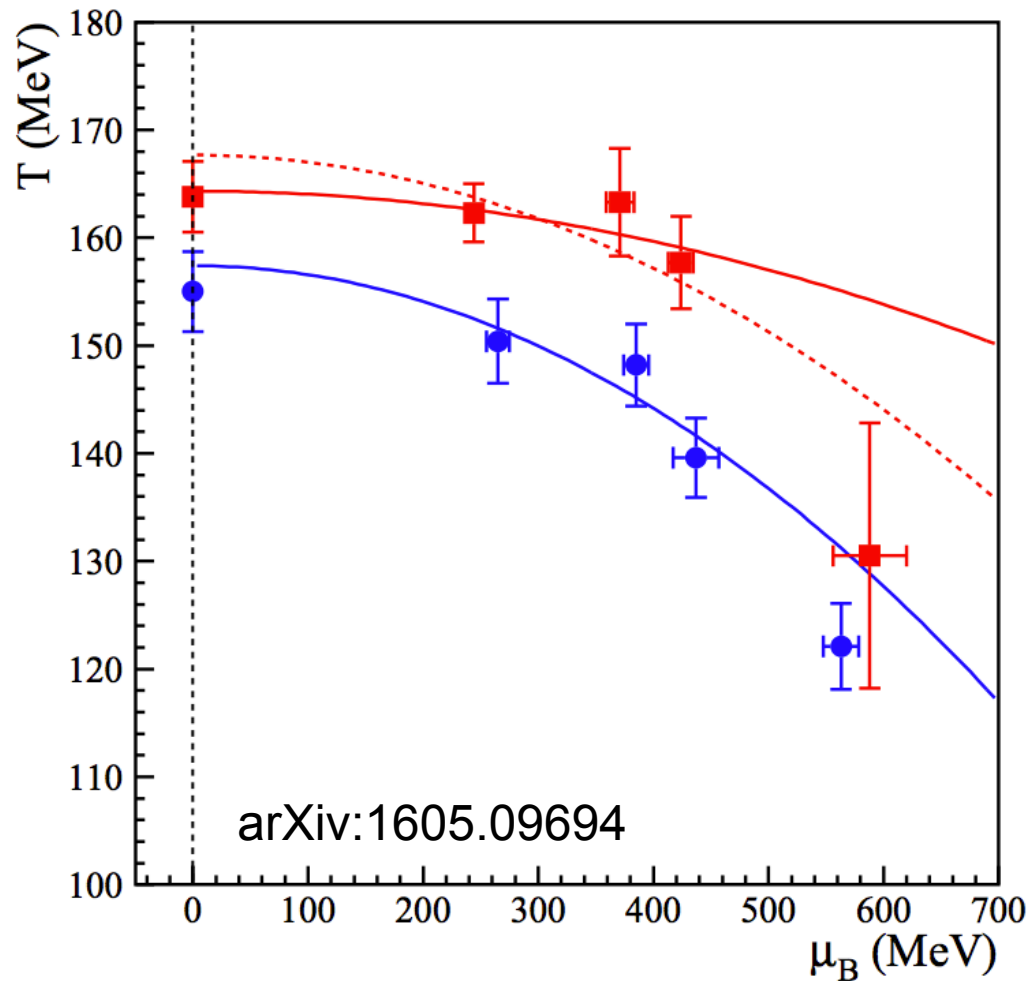
Example: Pb+Pb central NA49 at SPS

T increases by 12 MeV

chi<sup>2</sup>/dof decreases



# The result: AGS, SPS, LHC



- low curvature up to  $\mu(B)= 400\text{MeV}$
- in agreement with lattice predictions

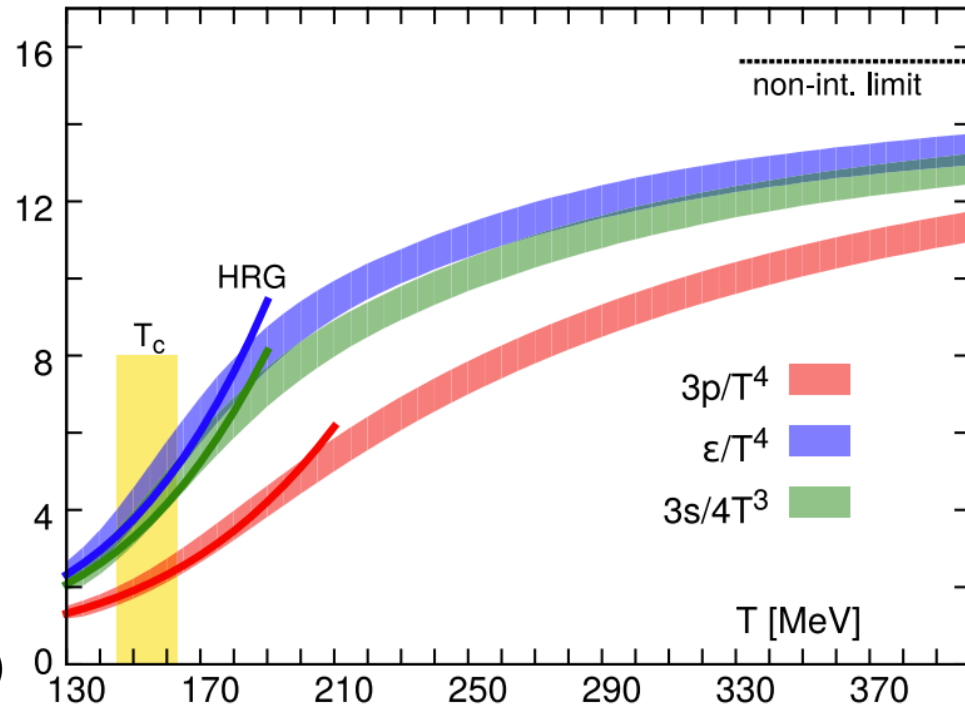
O. Kaczmarek et al. , PRD 83 (2011)  
P. Hedge et al. , arXiv: 1511.03378  
G. Enrodi et al. , JHEP 1104 (2011)

Abrupt drop-off beyond  $\mu(B)=400\text{MeV}$   
see also A.Andronic et al. , Nucl. Phys. A772 (2006)

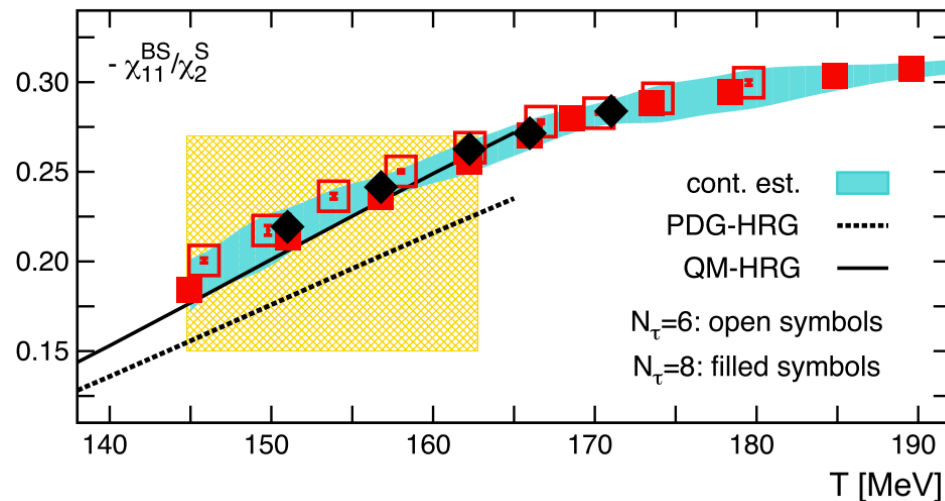
# Tensions concerning $T_c$

- We report  $T(c)=163\text{MeV}$ , similar to  $e+e^- \rightarrow \text{hadrons}$
- Lattice matching to Hadron Gas (HRG) reports  $T(c)=150\text{MeV}$

A. Bazavov et al. , PRD 90 (2014)



A. Bazavov et al. , PRL 113 (2014)



Open Question!