E-BY-E FLUCTUATIONS IN MODELS: ARXIV:1711.07789V1 [NUCL-TH]

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INTRO

- Preprint motivated by recent intriguing measurements by Andrey (multiplicity fluctuations)

- Collaboration of EPOS, (P)HSD and UrQMD model-builders - unique paper! 😄

- Simulations for impact parameter b=0 - in contradiction to experimental measurements ⛔

- Strongly intensive observables including strangeness!

The following measures of particle number fluctuations are studied in the present work:

$$\omega\left[X\right] = \frac{\left\langle X^2\right\rangle - \left\langle X\right\rangle^2}{\left\langle X\right\rangle}\,, \tag{1}$$

$$\Delta[A,B] = \frac{1}{C_\Delta}\Big[\langle B\rangle\,\omega[A] - \langle A\rangle\,\omega[B]\Big]\,, \tag{2}$$

$$\Sigma[A,B] = \frac{1}{C_\Sigma}\Big[\langle B\rangle\,\omega[A] + \langle A\rangle\,\omega[B] - 2\left(\langle AB\rangle - \langle A\rangle\langle B\rangle\right)\Big]\,, \tag{3}$$

$$C_\Delta = \langle A\rangle - \langle B\rangle\,,\quad C_\Sigma = \langle A\rangle + \langle B\rangle\,,$$

where X, A, and B denote the particle yields, and

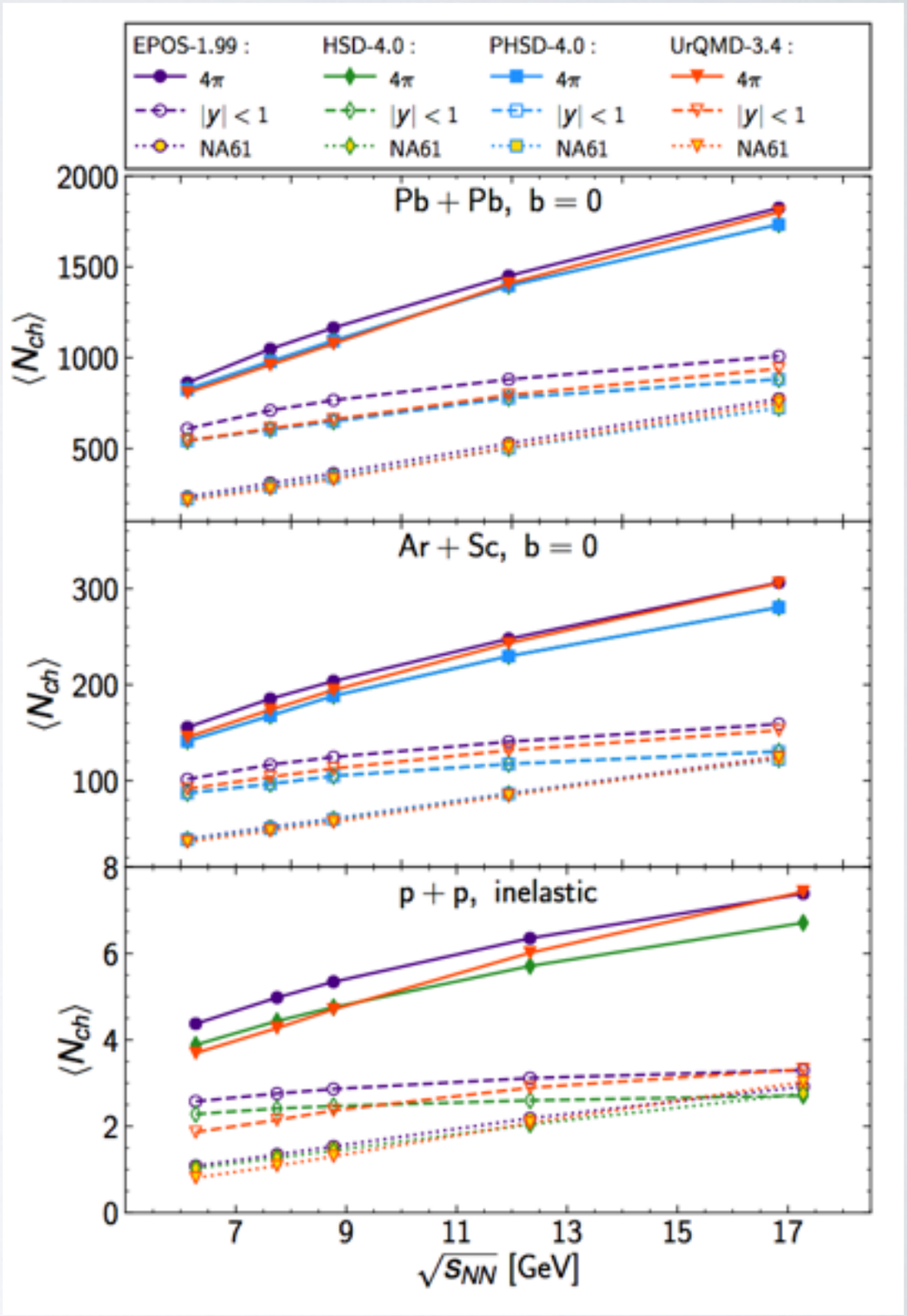
$$\langle X\rangle = \frac{1}{N_{\rm ev}}\sum_{i=1}^{N_{\rm ev}} X_i \tag{4}$$

MEAN MULTIPLICITIES

- Measurements in 3 acceptances:

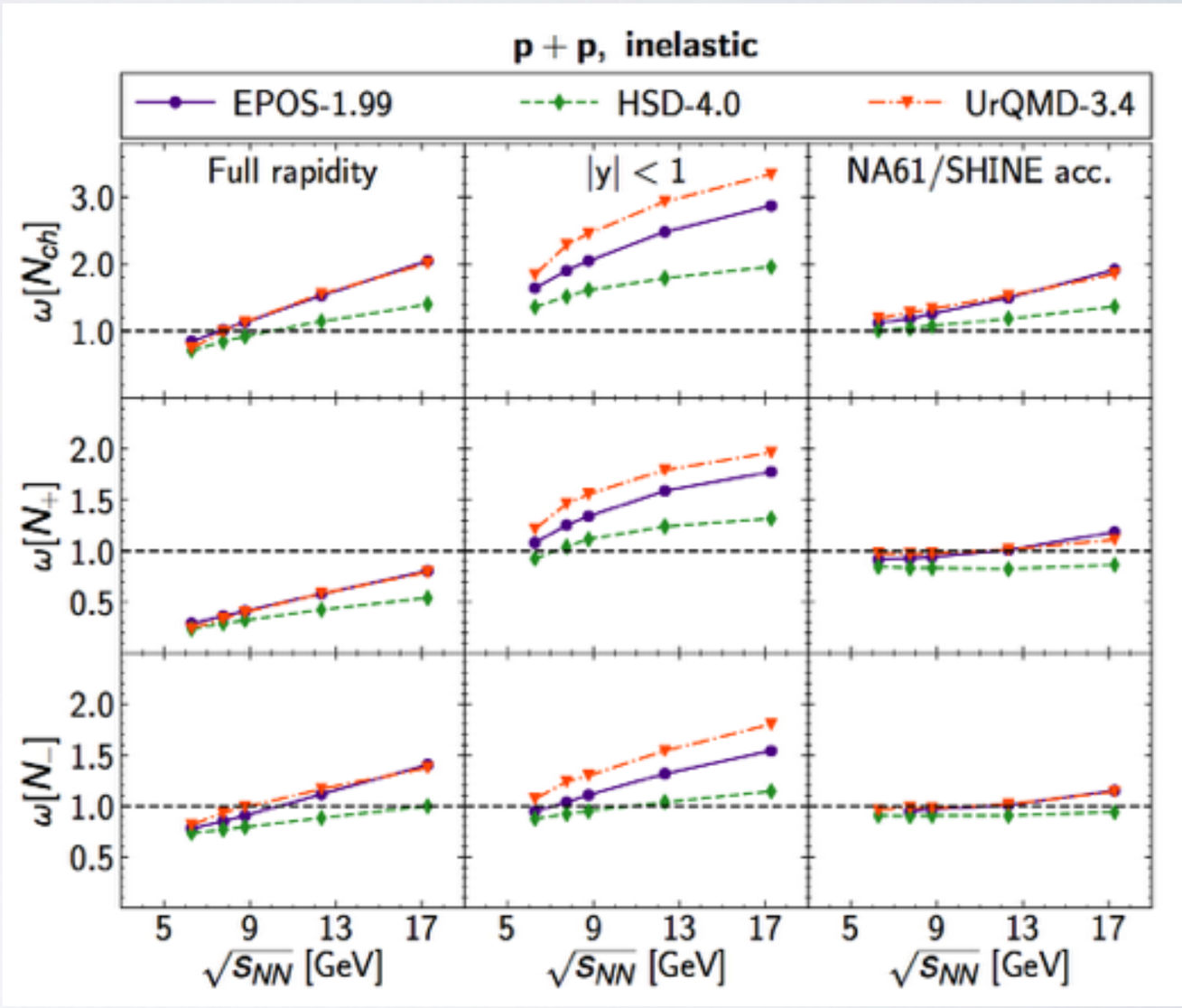
- 4pi, |y|<1, NA61 acceptance

- in NA61 acceptances model predictions coincide with differences in other acceptances



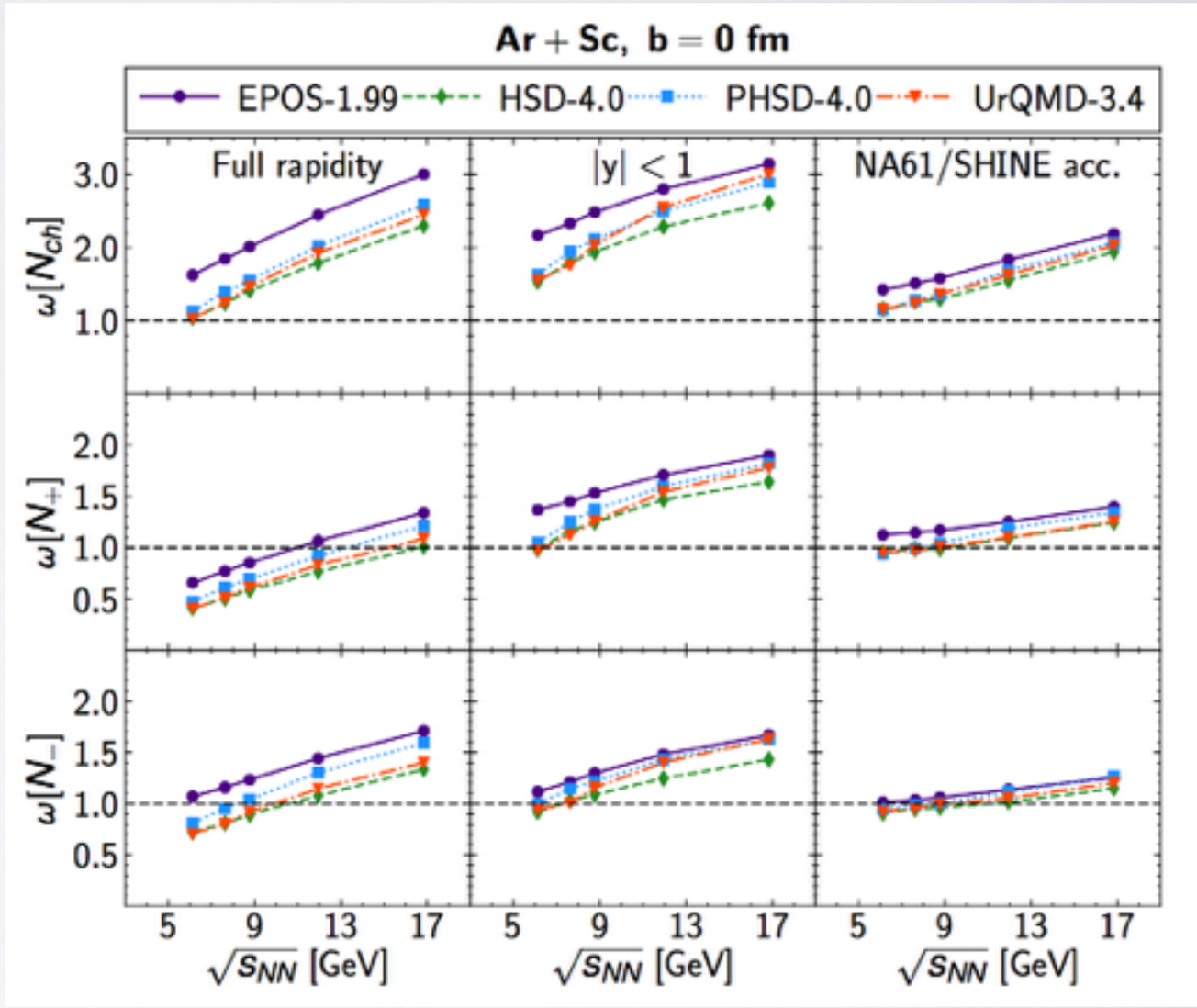
SCALED VARIANCE IN P+P

- UrQMD is close to EPOS
- Sudden increase of omega for |y|<1 acceptance (rise of fluctuations for smaller acceptance!)
- Everything is suppressed to 1 for NA61 acceptance



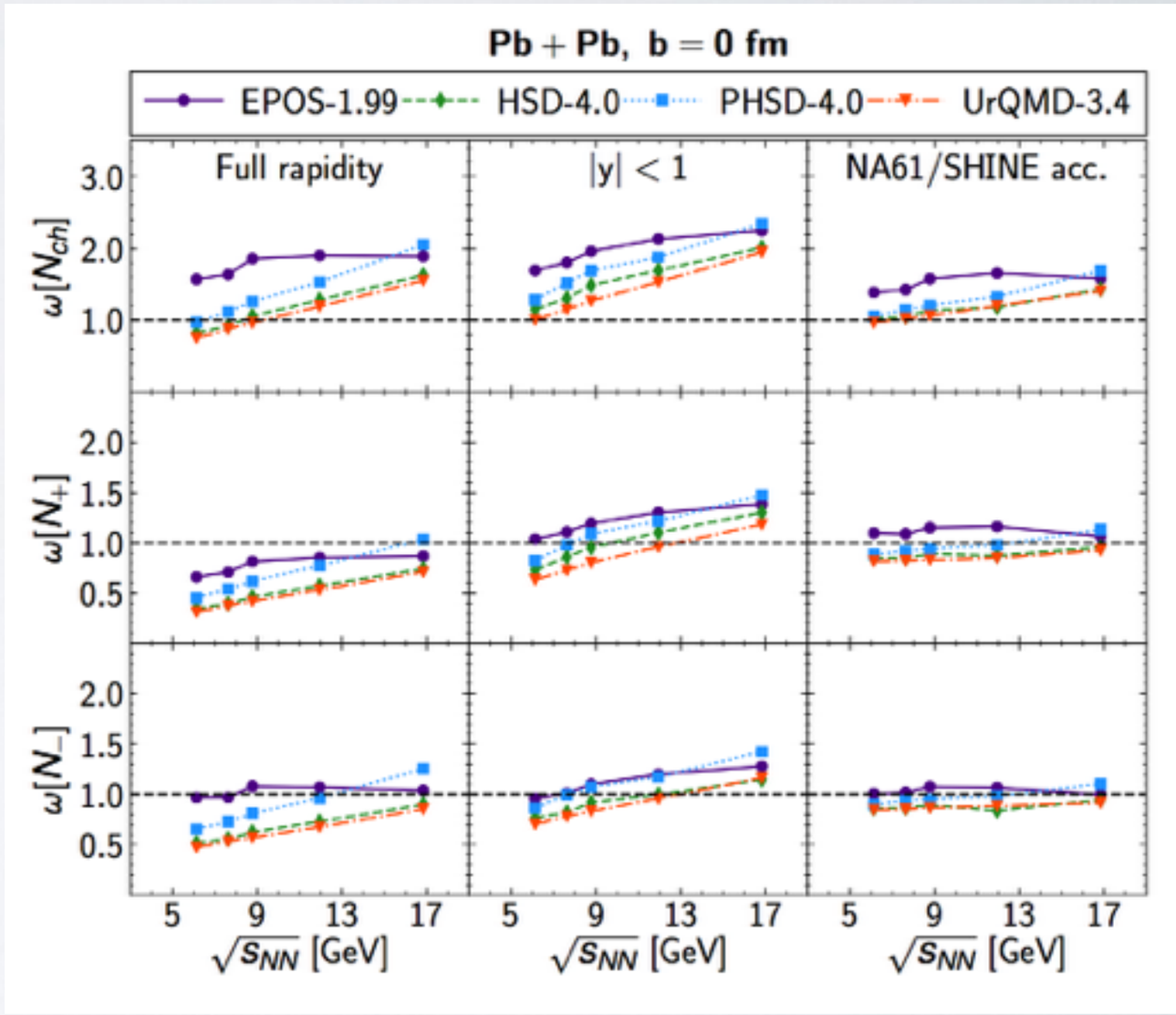
SCALED VARIANCE IN AR+SC

- EPOS is separated from everything
- Values are larger than in p +p case
- Differencies between full acc and |y|<1 cases became smaller



SCALED VARIANCE IN PB+PB

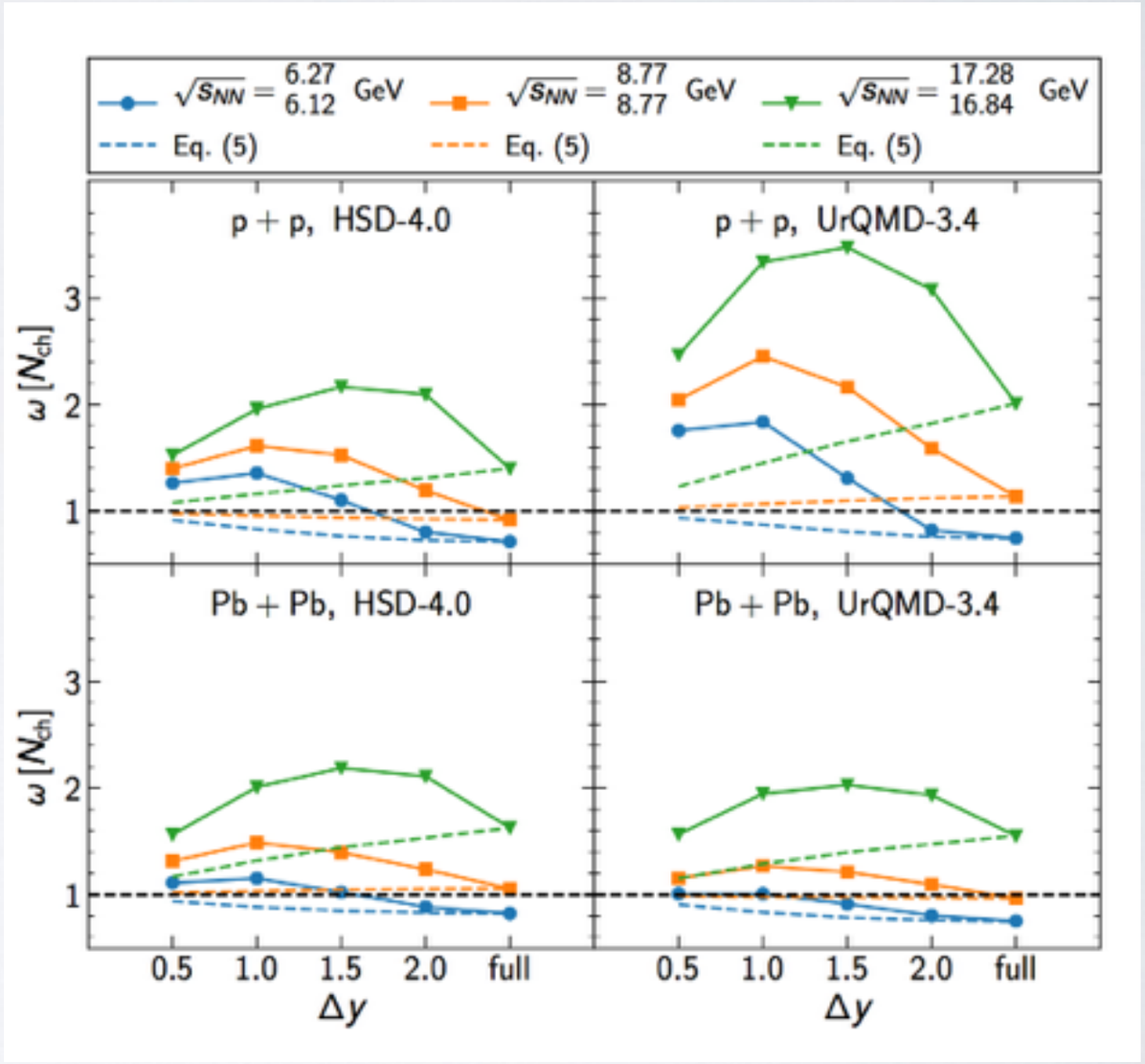
- Energy dependence in EPOS looks strange - plateau? Is it cut to the fact that b=0 correspond to different fluctuations in number of participants at different energies?



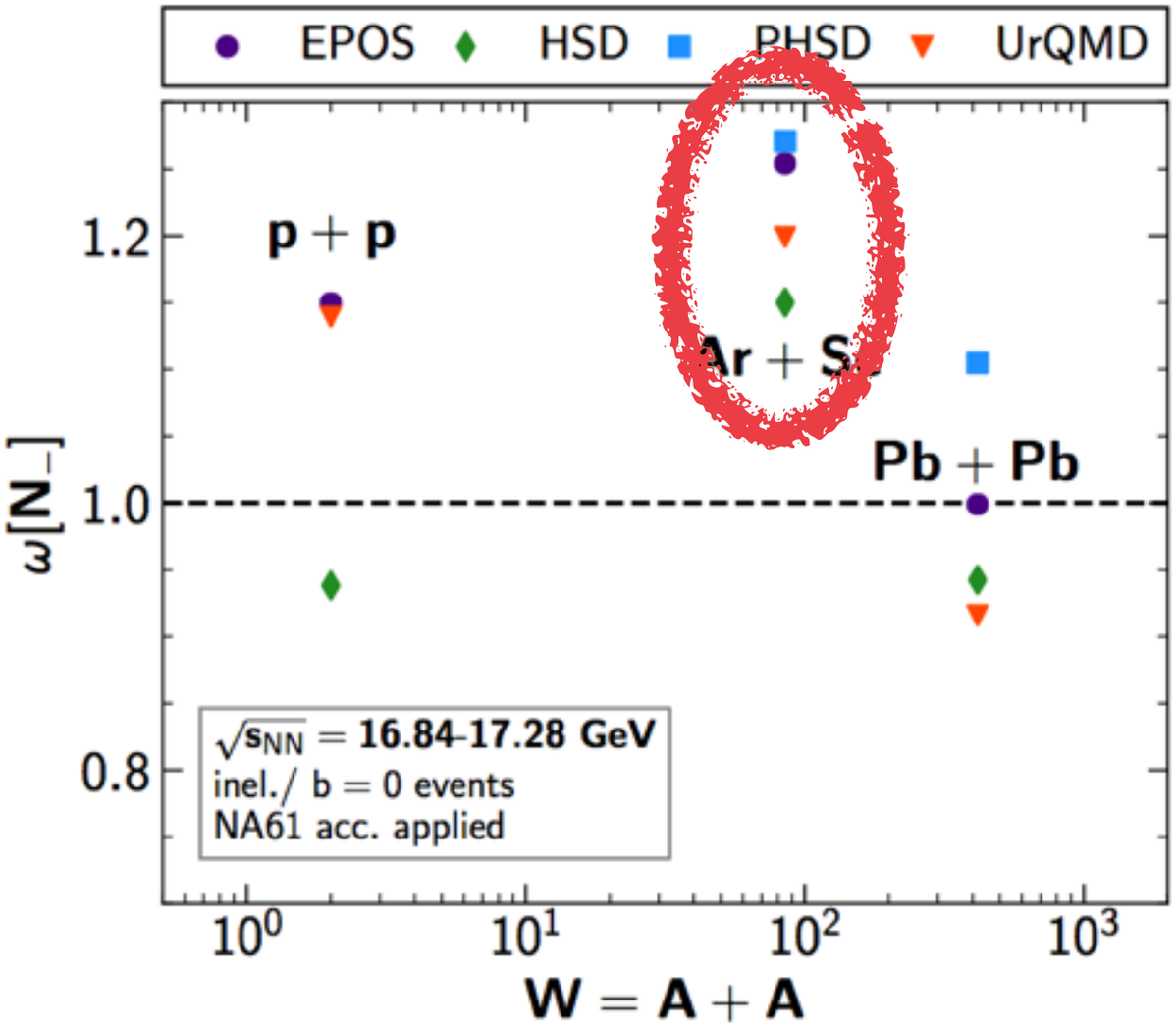
SCALED VARIANCE: RAPIDITY DEPENDENCE

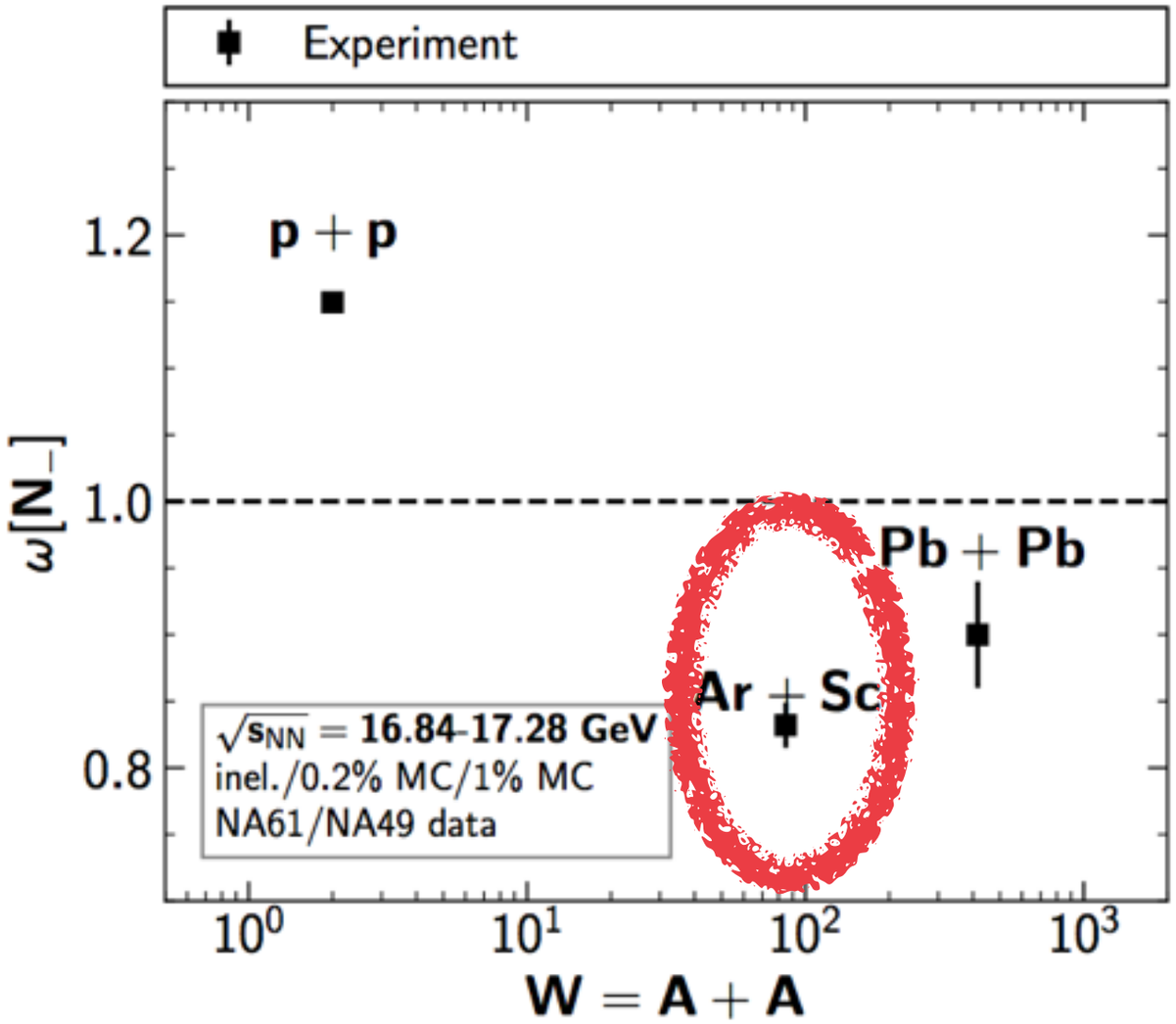
- On previous slides huge difference between full acc and $|y|<1$
- Non-trivial dependence on rapidity!
- In contradiction to trivial expectation:

$$\omega_{\mathrm{acc}}[X] = 1 - q + q\omega[X], \quad 0 < q = \frac{\langle X_{\mathrm{acc}} \rangle}{\langle X \rangle} < 1$$



SCALED VARIANCE: SYSTEM SIZE DEPENDENCE



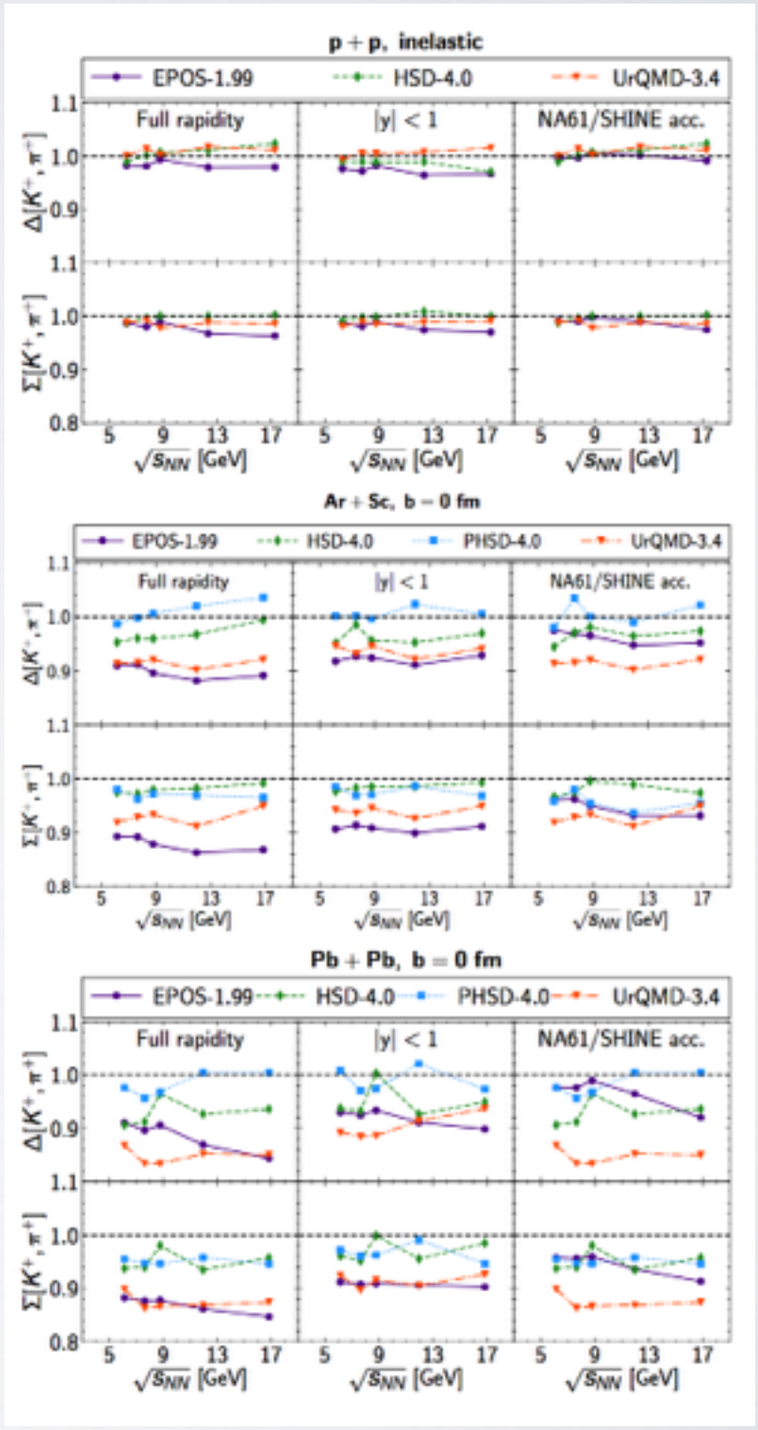


- Ar+Sc is a mystery. 0.2% in data is far from b=0 in MC models

KAONS VS PIONS FLUCTUATIONS

- Huge differences between different models

- NB: PHSD describes Marek's horn in Pb+Pb




That's all Folks!