compare **correlations** from different studies

hard ridge: jet trigger

soft ridge: untriggered
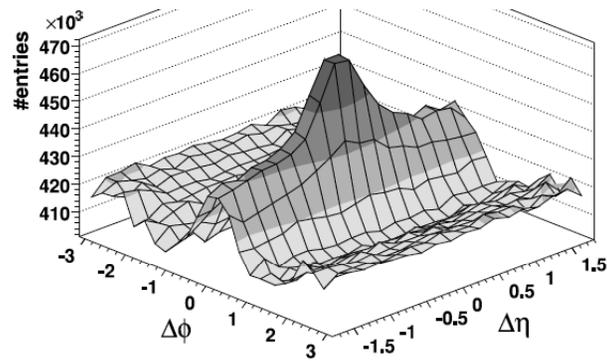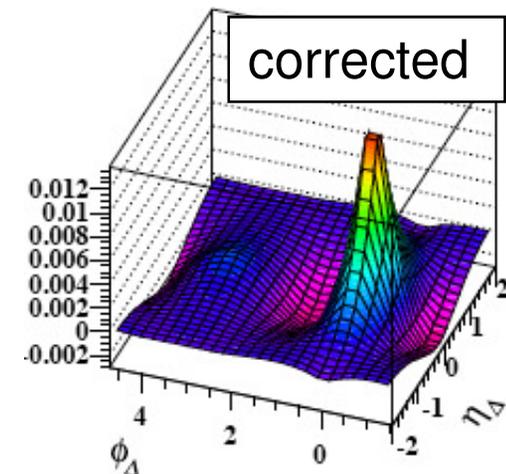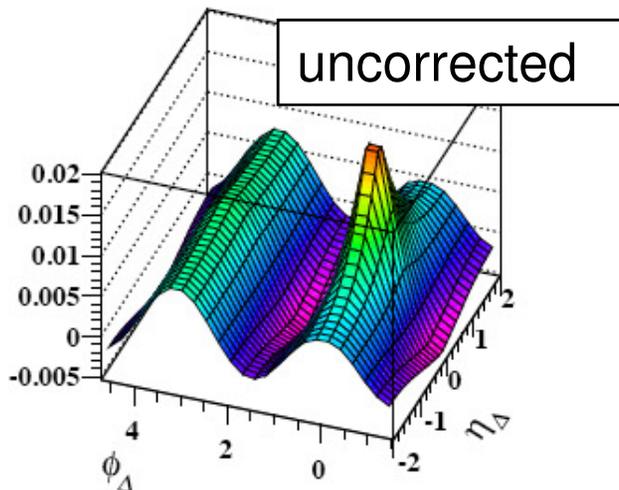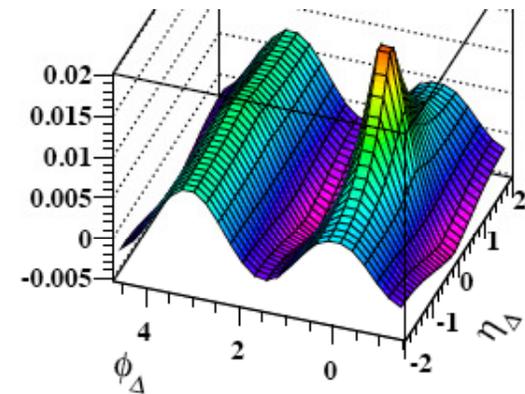
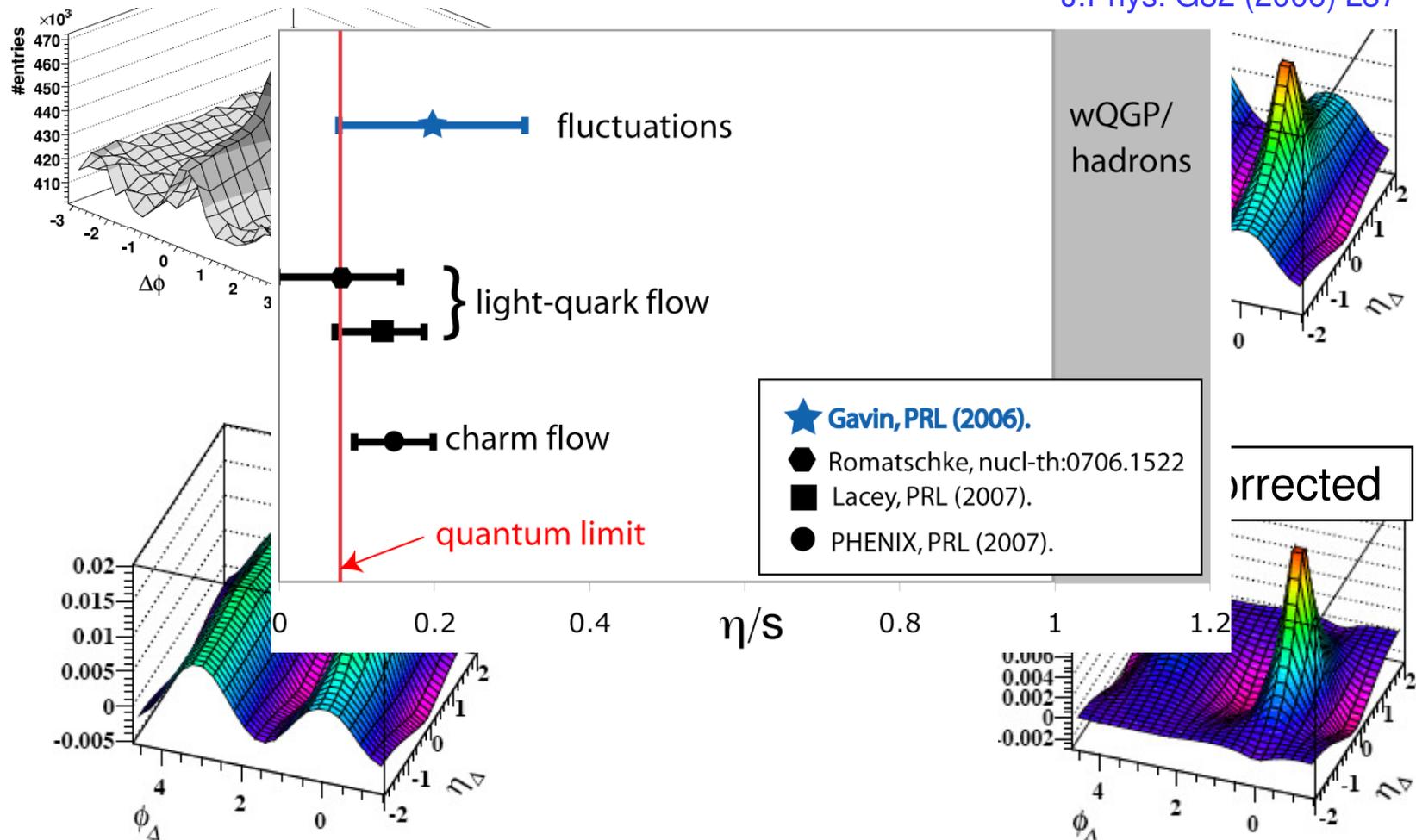uncorrected

corrected

compare **correlations** from different studies

hard ridge: jet trigger

STAR, J.Phys. G34:S679-684,2007

soft ridge: untriggered

STAR, PRC 66 (2006) 044904
J.Phys. G32 (2006) L37

fluctuations

wQGP/
hadrons

light-quark flow

charm flow

quantum limit

corrected

⭐ Gavin, PRL (2006).
⬡ Romatschke, nucl-th:0706.1522
⬛ Lacey, PRL (2007).
● PHENIX, PRL (2007).

η/s

Standard Data Framework

Experimental studies search for particular signal can have **general import**
Ask: How can we repurpose such data for general global studies

- targeted groups of experimental postdocs and grad students from relevant experiments
- leader aware of theory needs

Goals:
- establish common language
- serve as points of contact for theory working groups
- long term: standard observables and correction techniques
- provide supplemental info to
  - translate from one observable to others
  - remove "corrections"

Needed for Fluctuations and Correlations

Fluctuations

Uses of fluctuations:

Observing Phase-Transition/Critical Phenomena

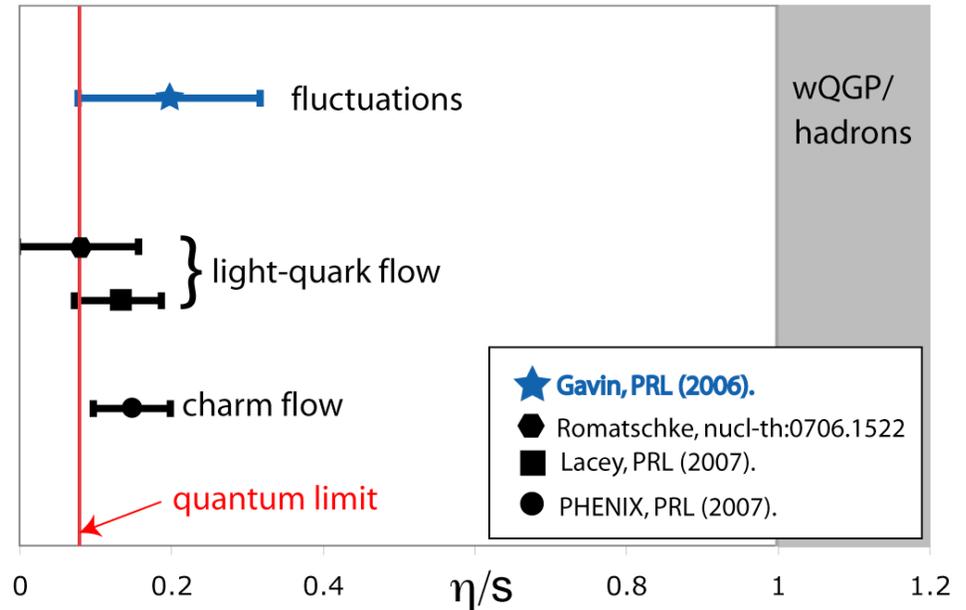$$\langle N^2 \rangle - \langle N \rangle^2 = T \frac{\partial N}{\partial \mu} \propto \text{ susceptibility}$$

Probing Hydro/Collective/Jet behavior of the system in detail

$$R = \frac{1}{\langle N \rangle^2} \left[\langle N(N-1) \rangle - \langle N \rangle^2 \right] = \frac{1}{\langle N \rangle^2} \int \left[\rho_2(p_1, p_2) - \rho_1(p_1)\rho_1(p_2) \right]$$

- relation to correlation functions
- part of a consistent global model -- must describe correlations

η/s measurements

fluctuation measurement: large uncertainty in due to observable used

measured:

$$\Delta\sigma_{pt:n}^{2} \equiv \frac{1}{\langle N \rangle}\left\langle\left(P_t - N\langle p_t\rangle\right)^2\right\rangle - \sigma_{\hat{p}_t}^{2} = \frac{1}{\langle N \rangle}\left\langle\sum_{i \neq j}^{N}\left(p_{ti} - \langle p_t\rangle\right)\left(p_{tj} - \langle p_t\rangle\right)\right\rangle$$

needed:

$$C = \frac{1}{\langle N \rangle^2}\left\langle\sum_{i \neq j}^{N}p_{ti}p_{tj}\right\rangle - \langle p_t\rangle^2 \quad \approx \langle N \rangle^{-1}\Delta\sigma_{pt:n}^{2} + \langle p_t\rangle^2 R$$

multiplicity
fluctuations needed

$$R = \frac{1}{\langle N \rangle^2}\left[\langle N(N-1)\rangle - \langle N\rangle^2\right]$$