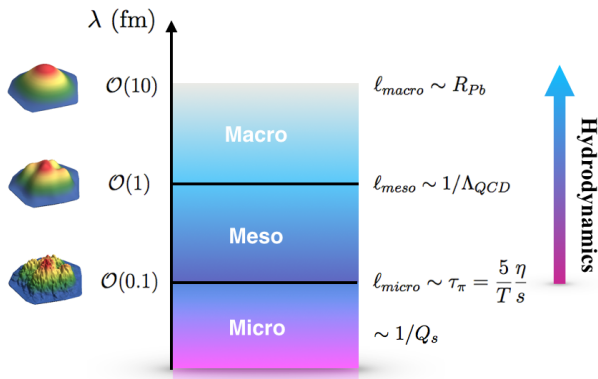




Sensitivity of flow harmonics to sub-nucleonic scale fluctuations- J. Noronha-Hostler

JNH, Noronha, Gyulassy, arXiv:1508.02455

λ = scale of the energy density fluctuations



Calculated in v-USPhydro: Lagrangian, event-by-event, shear+bulk viscosity

JNH et al, PRC90(2014)3,034907;PRC88(2013)044916

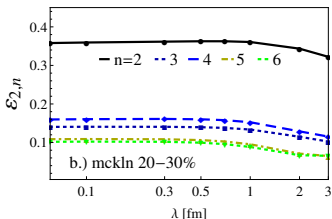


Robustness of energy fluctuations

JNH, Noronha, Gyulassy, arXiv:1508.02455

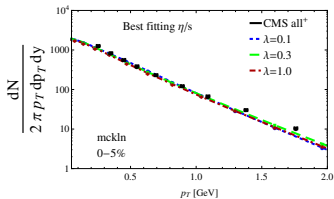
Initial conditions

- Spiky (IP-glasma/cgc) vs. Smooth (Glauber/NEXUS/UrQMD/EKRT)
- Different $\varepsilon_{m,n}$ and energy scales (λ) -
Keep $\varepsilon_{m,n} = \text{const}$, vary only λ
- Strong mapping between $\varepsilon_{m,n} \rightarrow v_n$'s
PRC91(2015)3,034902; PRC85(2012)024908



$$\sqrt{s_{NN}} = 2.76 \text{ TeV PbPb}$$

- microscale: $\tau_{\pi}^{\text{min}} \sim 0.25 \text{ fm}$ for $\sqrt{s_{NN}} = 2.76 \text{ TeV PbPb}$
- $\lambda = 0.1 < \tau_{\pi}^{\text{min}} \rightarrow$
No clear separation of scales
 $K_{n\theta} = I_{\text{micro}}/L_{\text{macro}}$
- Spectra insensitive to scale



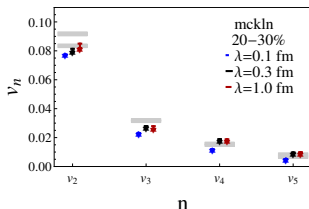
- Short time scales resolve fluctuations



Observables sensitive to energy fluctuations

JNH, Noronha, Gyulassy, arXiv:1508.02455

- v_2 greater change than higher v_n 's
- $\eta/s \uparrow$ as $\lambda \uparrow$
- For $\lambda < \tau_\pi$, v_n 's suppressed



Possible Sensitive Observables

- SC(2,3) Correlations Talk Y. Zhou
- Longitudinal fluctuations? Talk L. Pang
- Energy loss event-by-event
Poster B. Betz

Small Systems

- pPb on the cusp of applicability of hydrodynamics
- Fluctuations must be correctly incorporated in pPb
- Scale of energy density fluctuations in pp?

