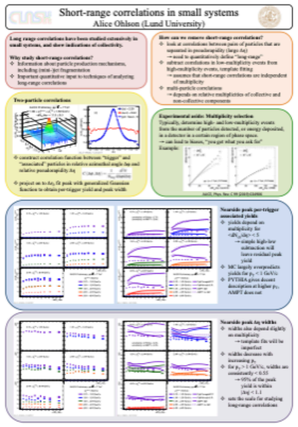
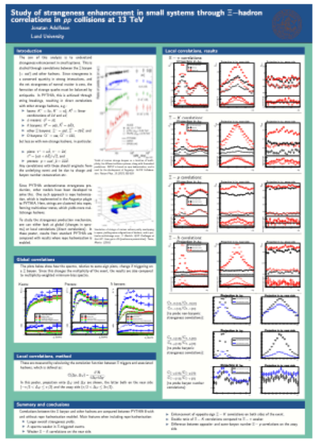
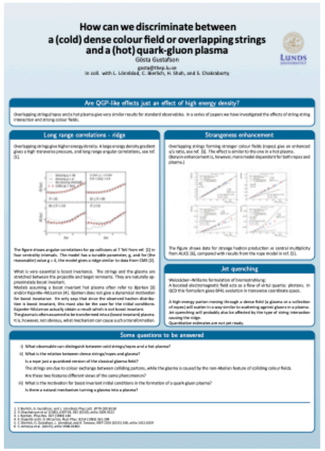
Topic 2: In what way are QGP-like effects in small systems related?

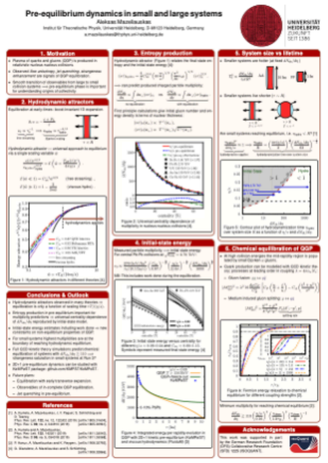
Conveners: Anthony Timmins and Aleksas Mazeliauskas
Secretary: Alice Ohlson

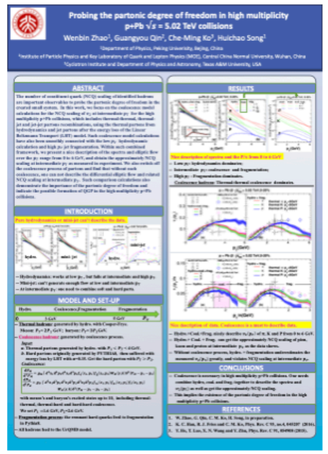
Group members and posters presented

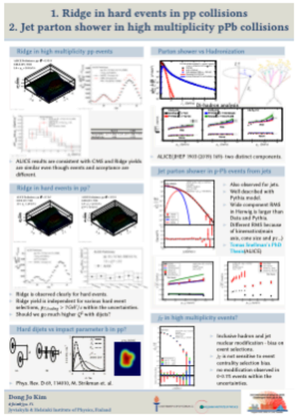


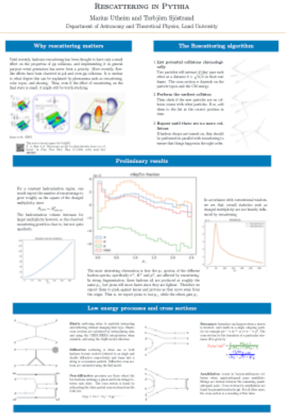


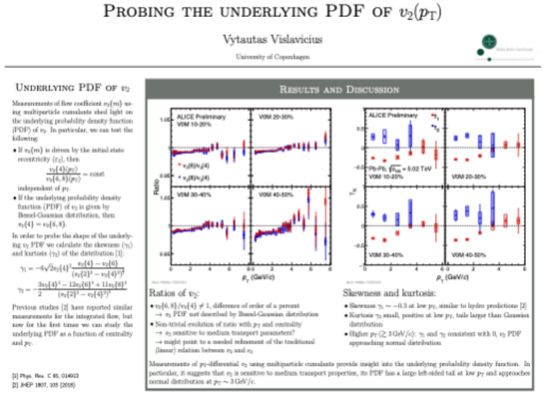


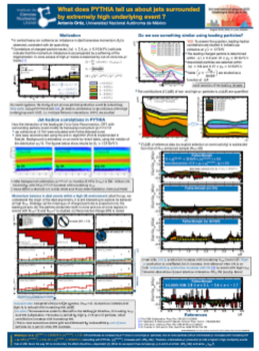






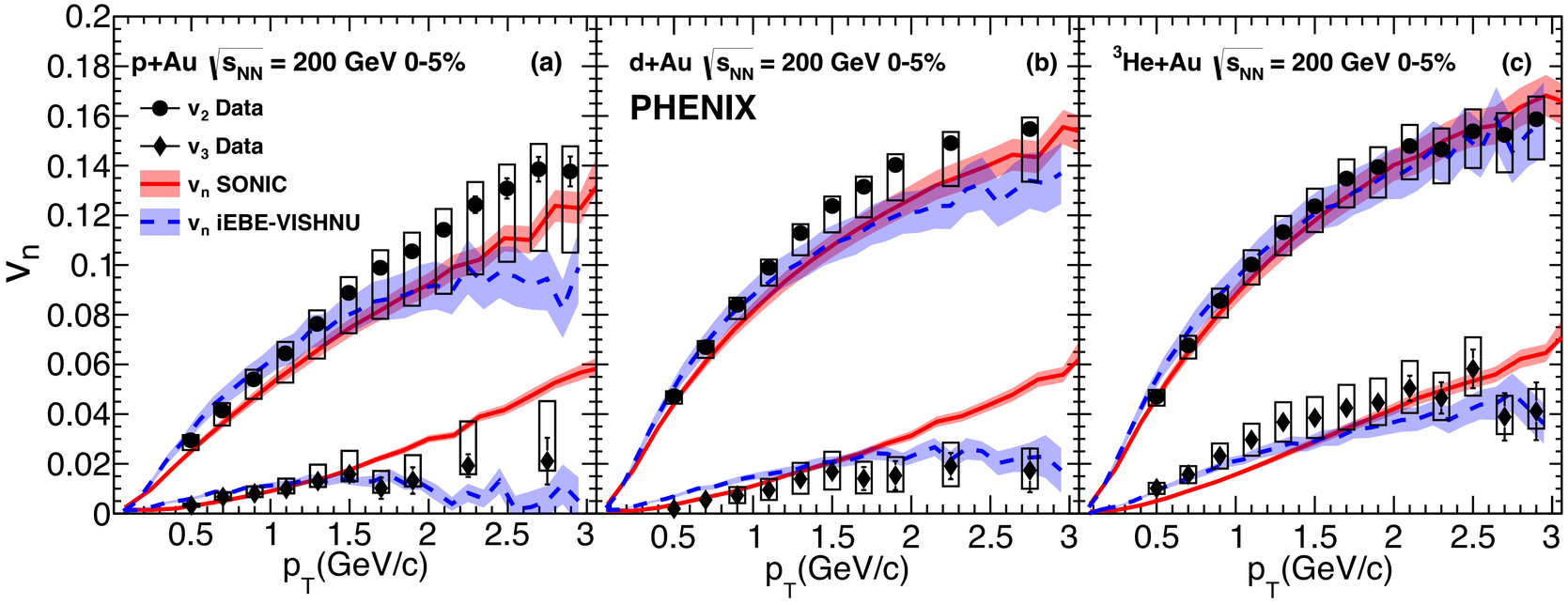


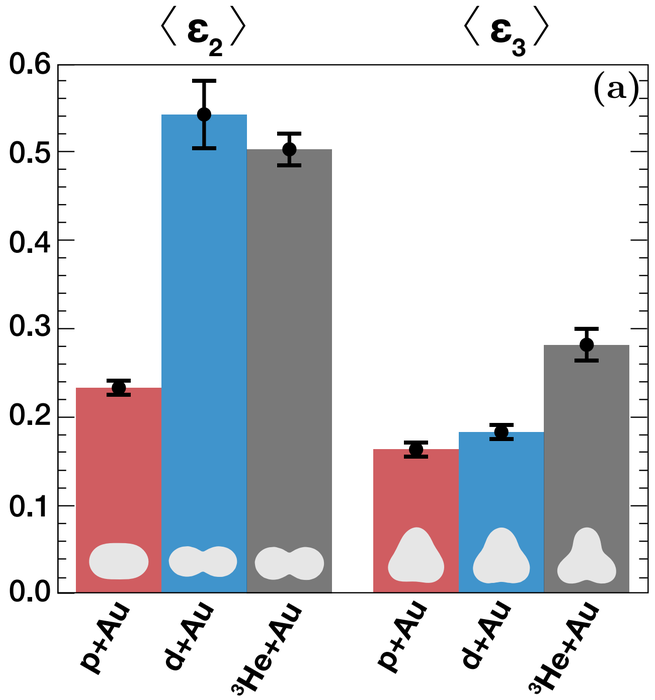




- Thanks Jonatan Adolfsson, Gösta Gustafson, Vytautas Vislavicius, Dong Jo Kim, Marius Utheim, Wenbin Zhao, and Antonio Ortiz for discussions

Anisotropic flow in small systems

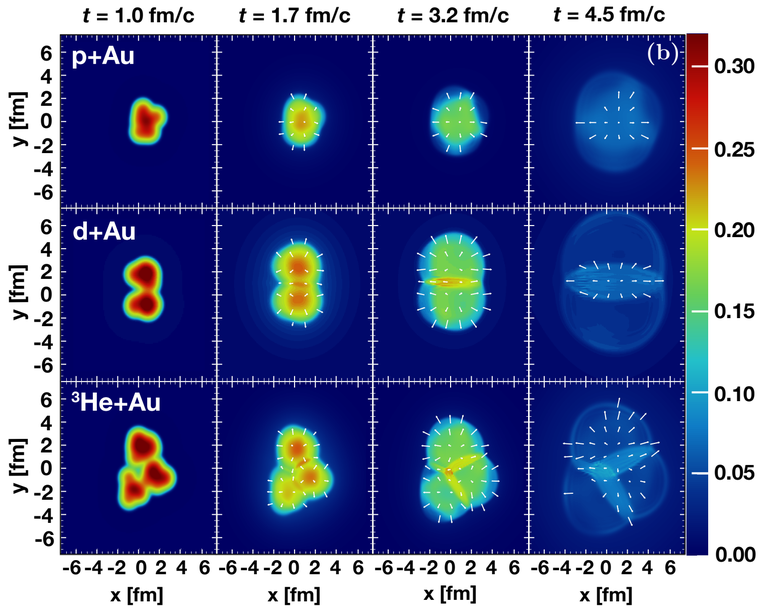




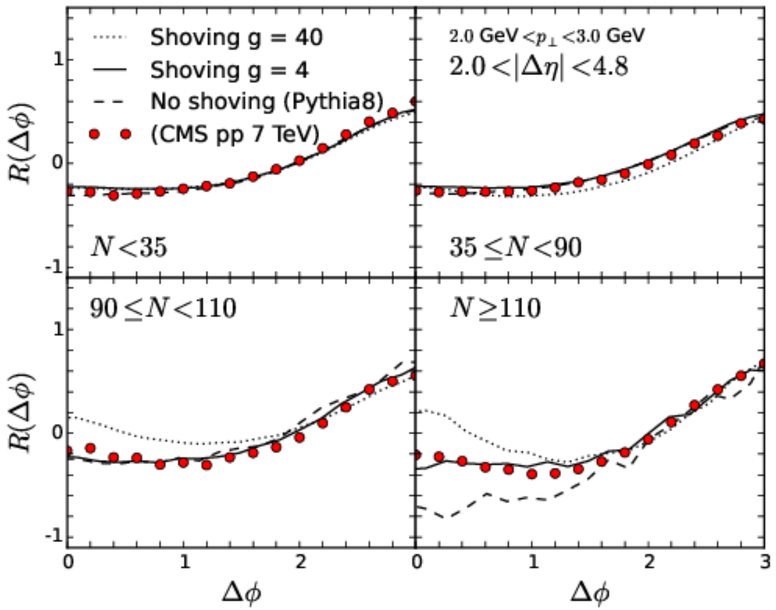
- Compelling evidence that final state anisotropy is driven by initial state geometry
- What is the mechanism of the coordinate-momentum anisotropy transmutation?

Coordinate-momentum anisotropy transmutation possibilities

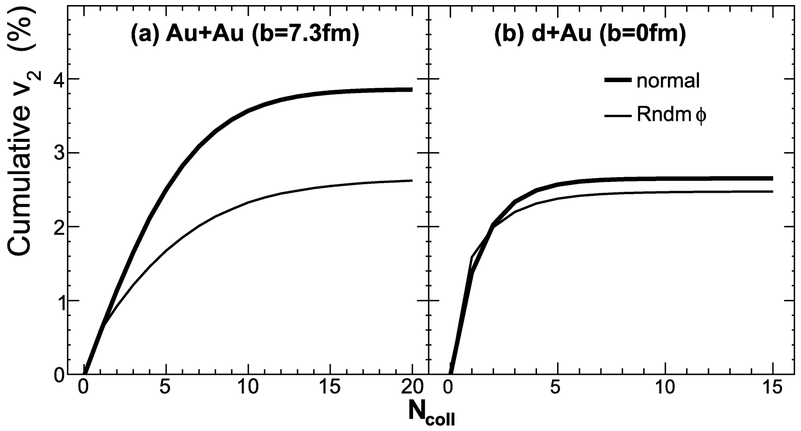
Hydrodynamics



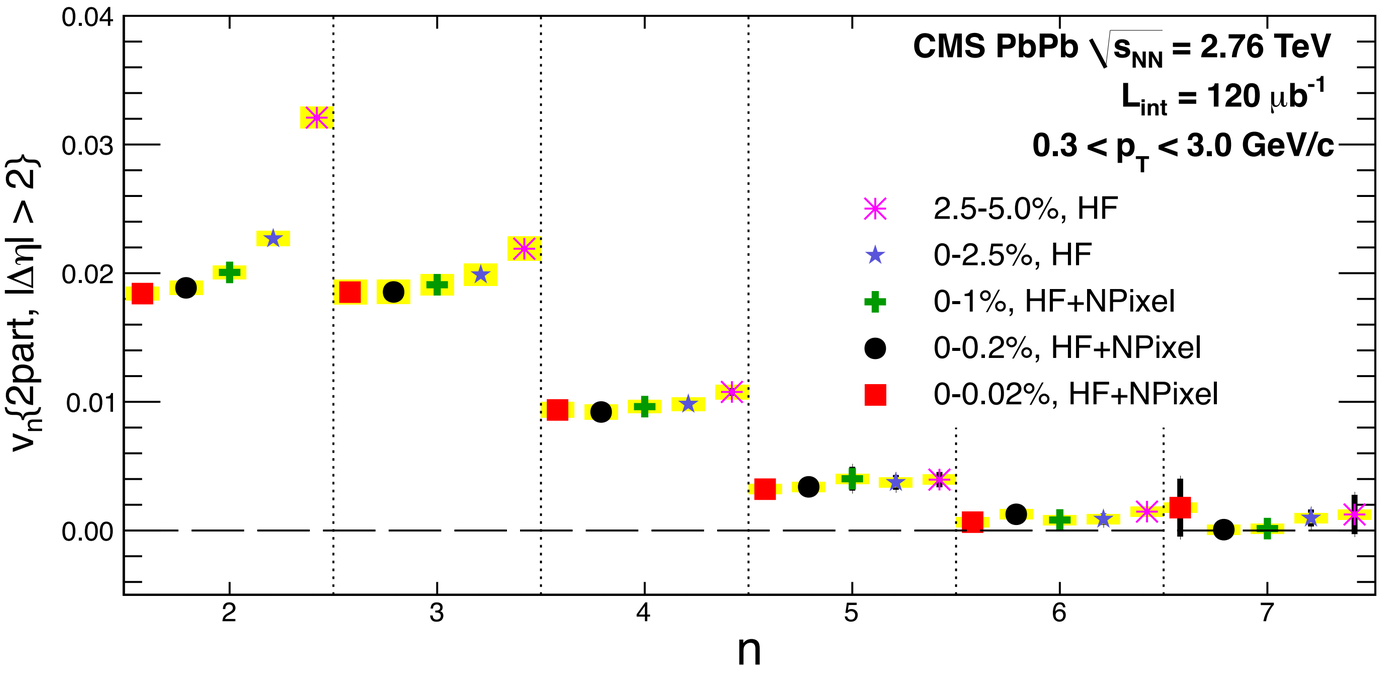
String shoving

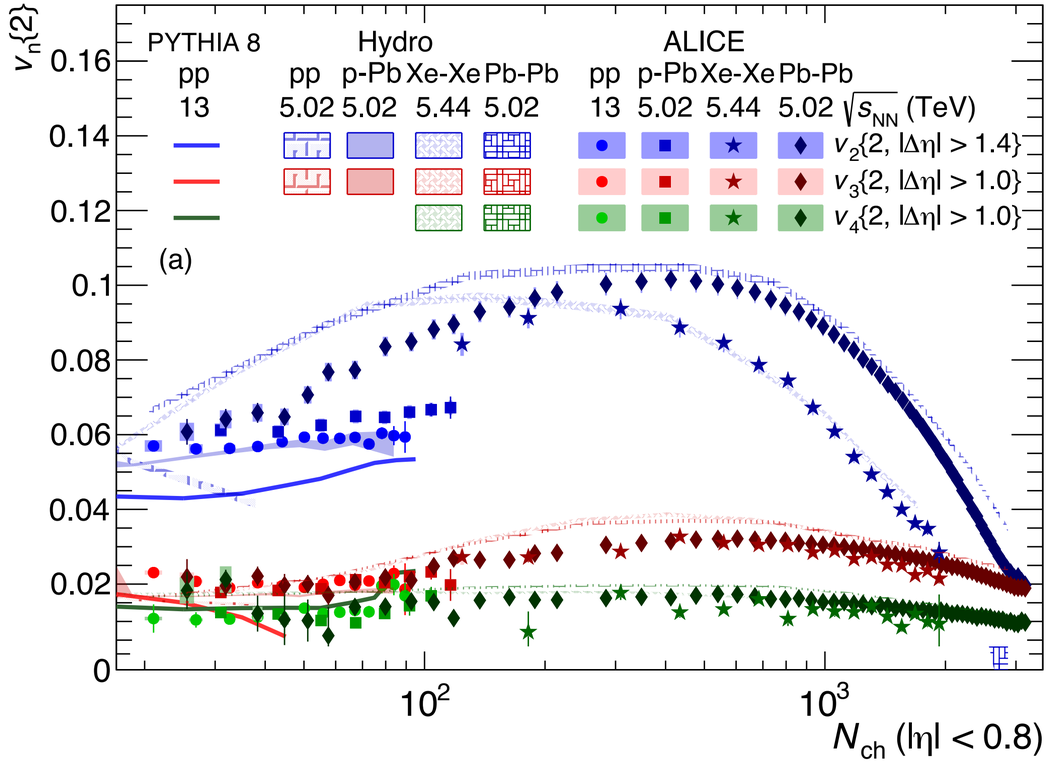


Escape mechanism



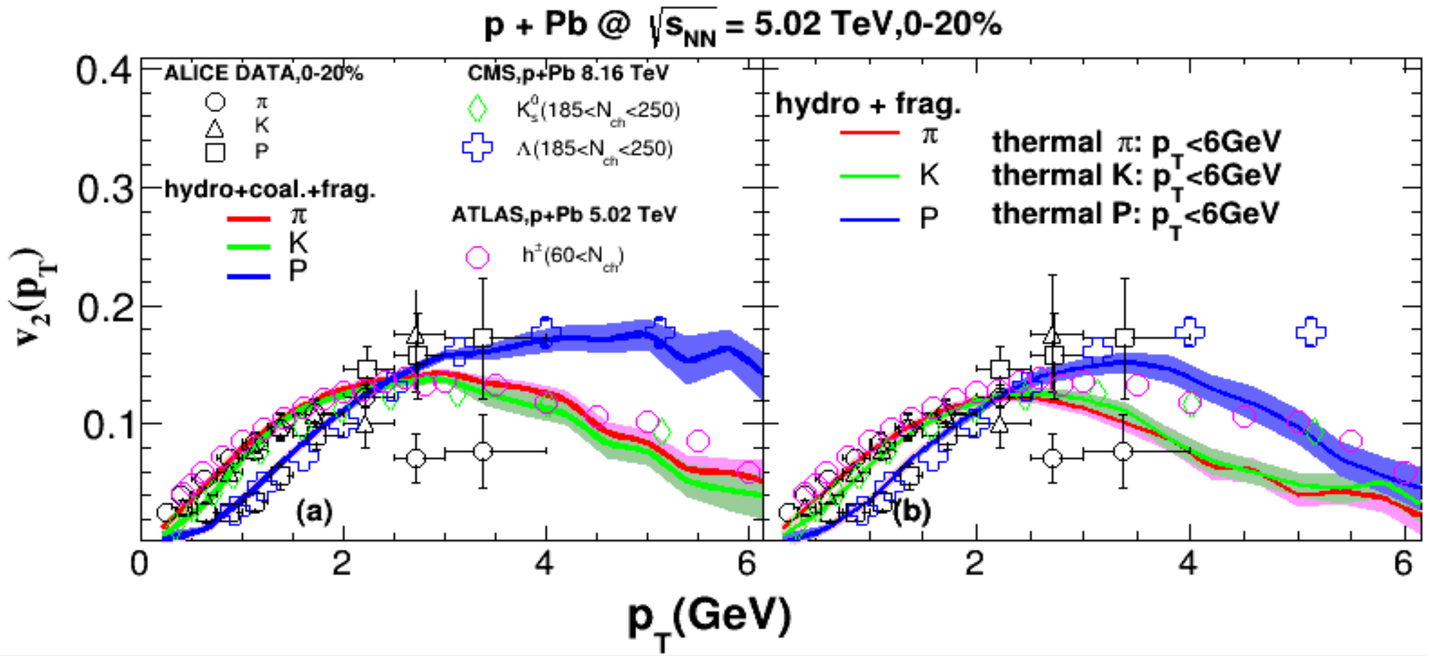
New anisotropic flow measurements and calculations?

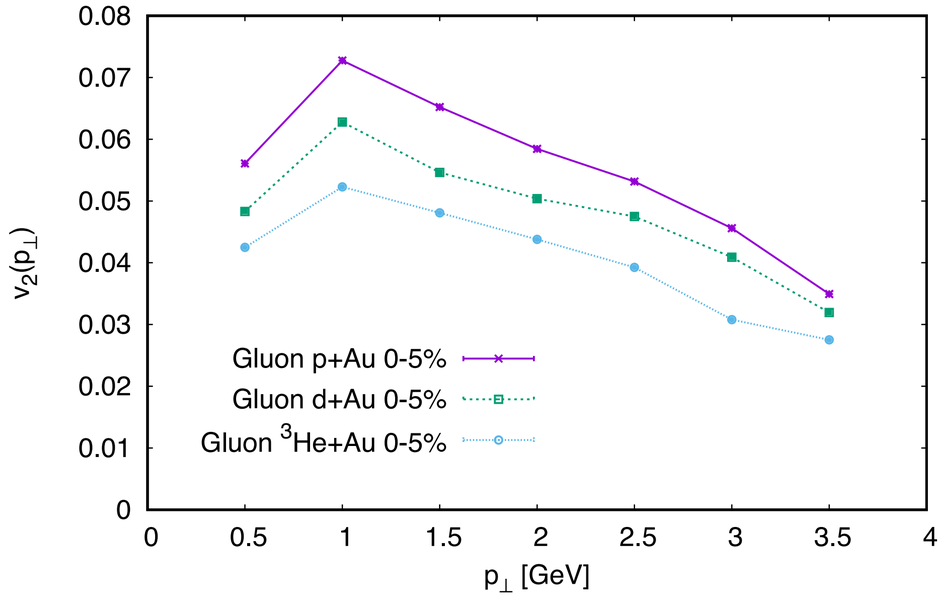




- Measurements of higher order flow harmonics in pp and p-Pb
- Systematic comparison of hydrodynamic and stringy harmonic flow in small systems

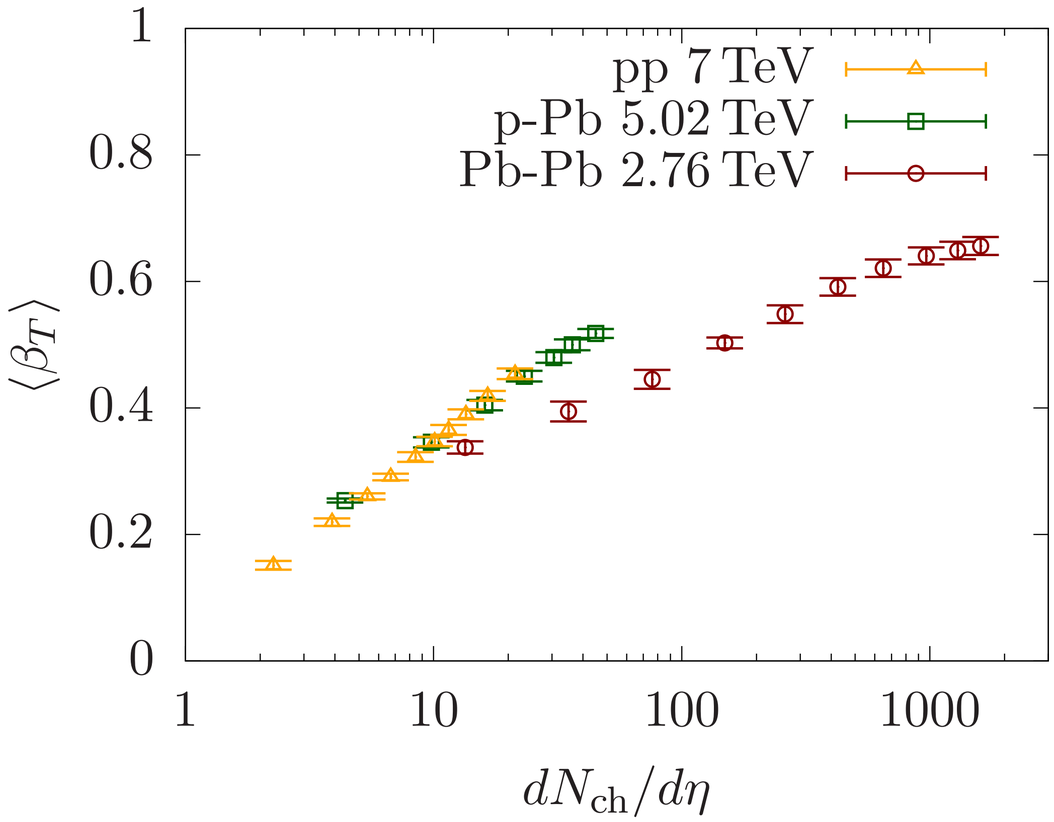
Anisotropic flow at mid p_T

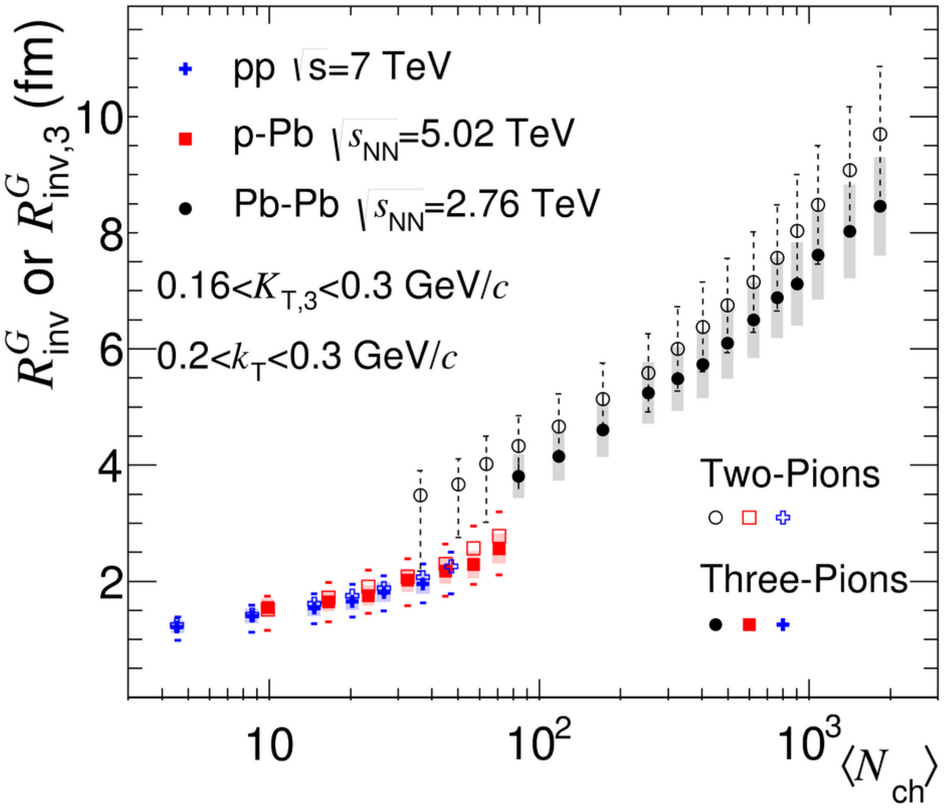




- Coalescence calculations describe baryon and meson v_n and ratios at mid p_T
  - ✓Increasing contribution from jets induces turn over
- What other mechanisms cause v_n to turn over?

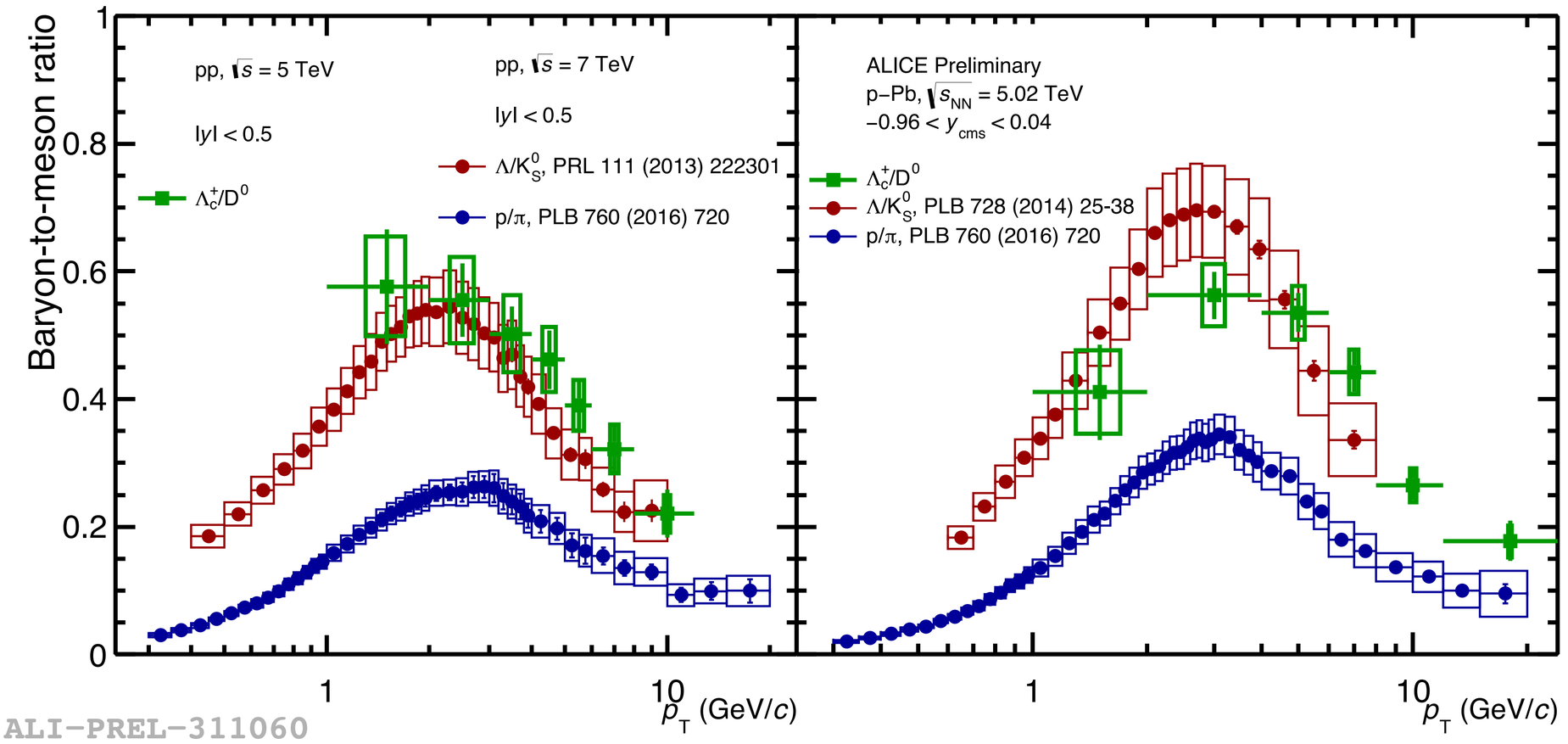
Radial flow in small systems





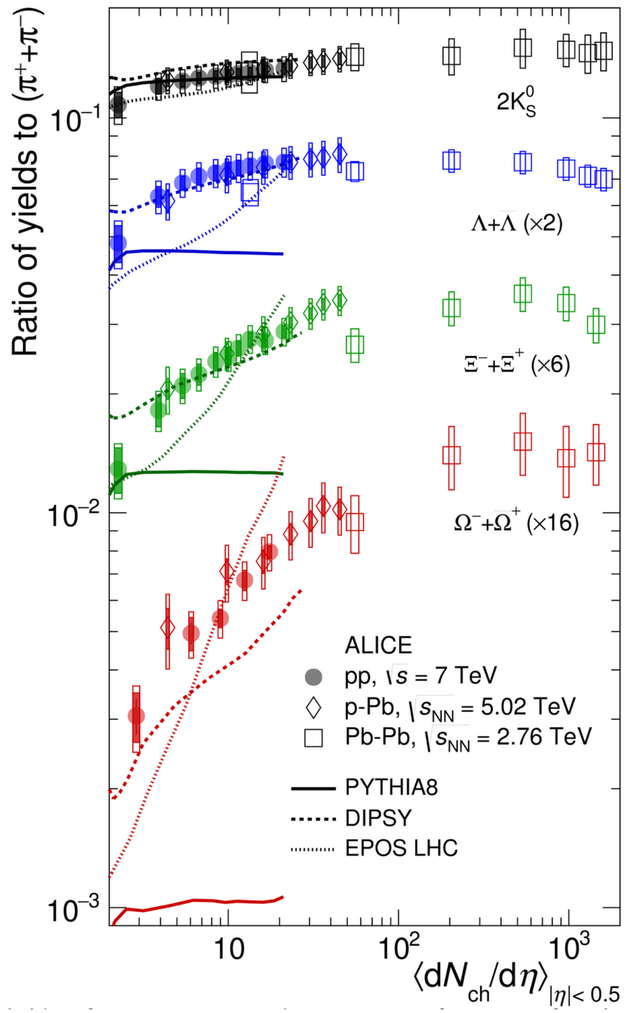
- Strong evidence of faster expansion in pp & p-Pb compared to Pb-Pb
- Leads to smaller systems freezing out with smaller radii

Radial flow in small systems

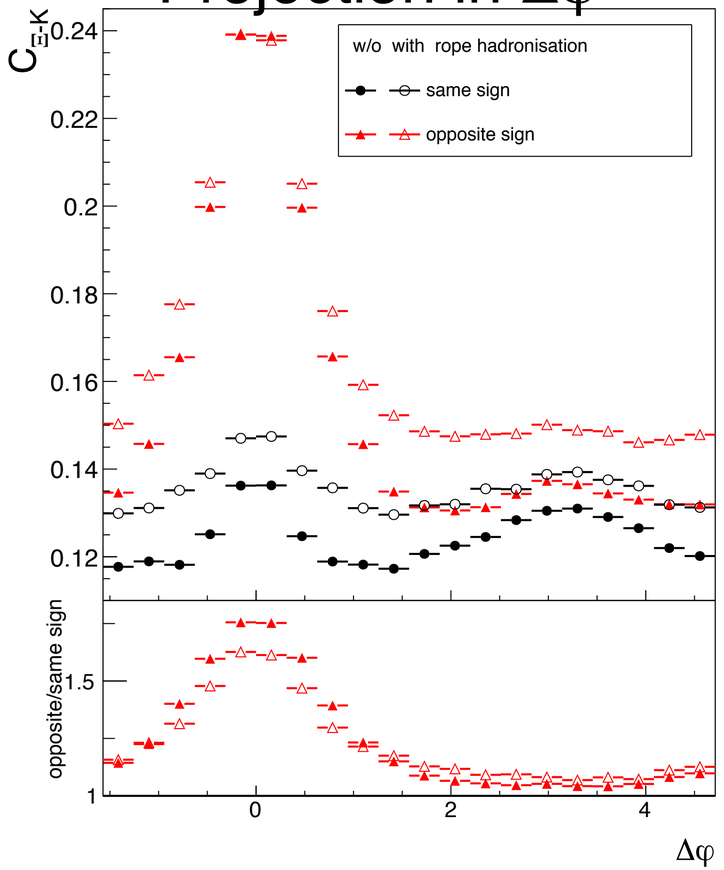


- Do heavy flavor particles exhibit same radial flow as light particles?
  - ✓E.g. Investigate blast wave fits on light flavors and their "predictions" for heavy flavor spectra

Strangeness enhancement

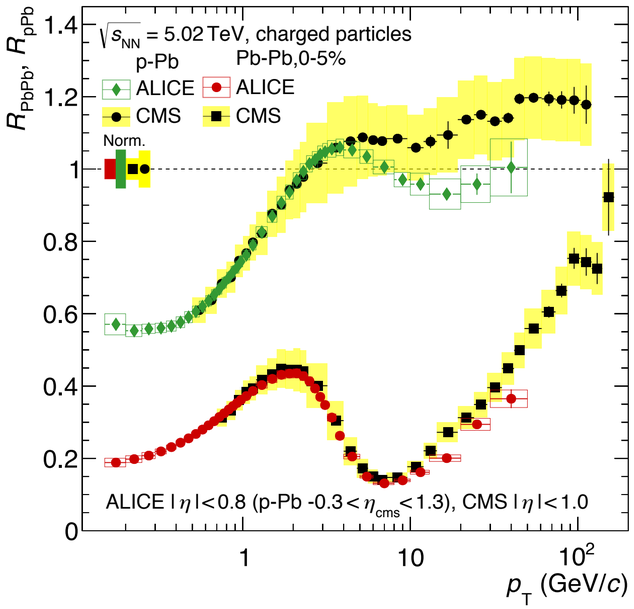


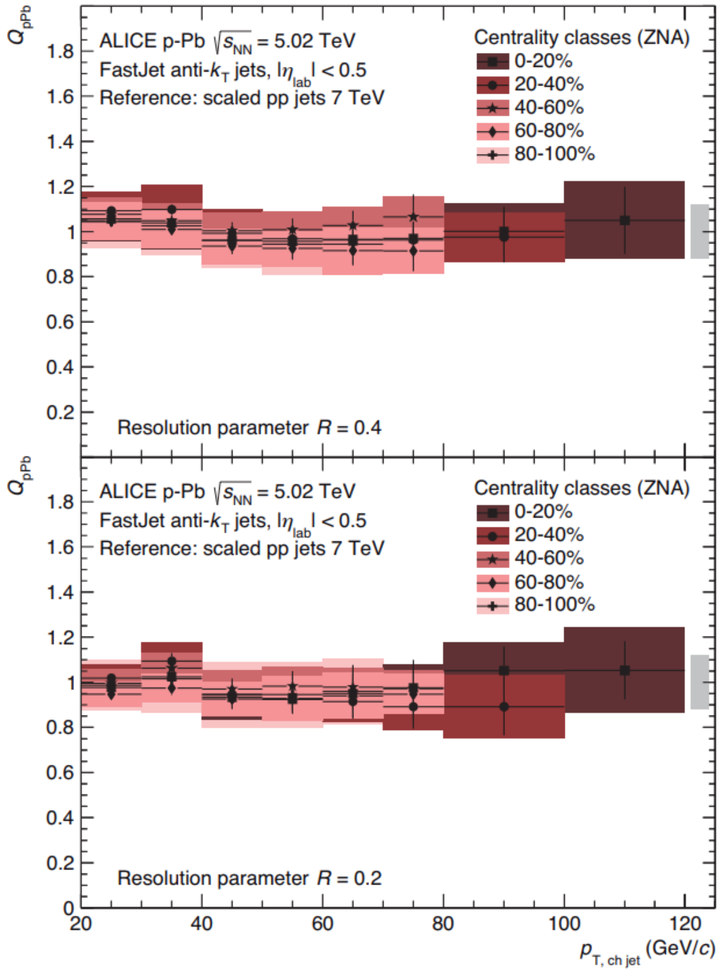
$\Xi - K$ correlations: Projection in $\Delta\varphi$

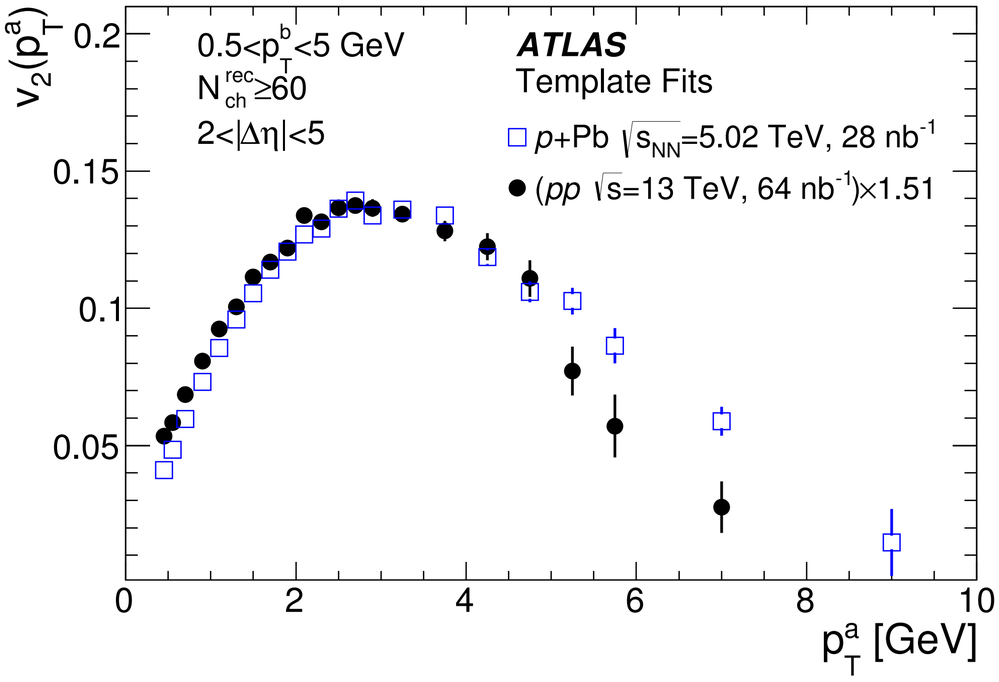


- What is the mechanism and how are produced strange quarks distributed in phase space?

Searches for jet quenching in small systems

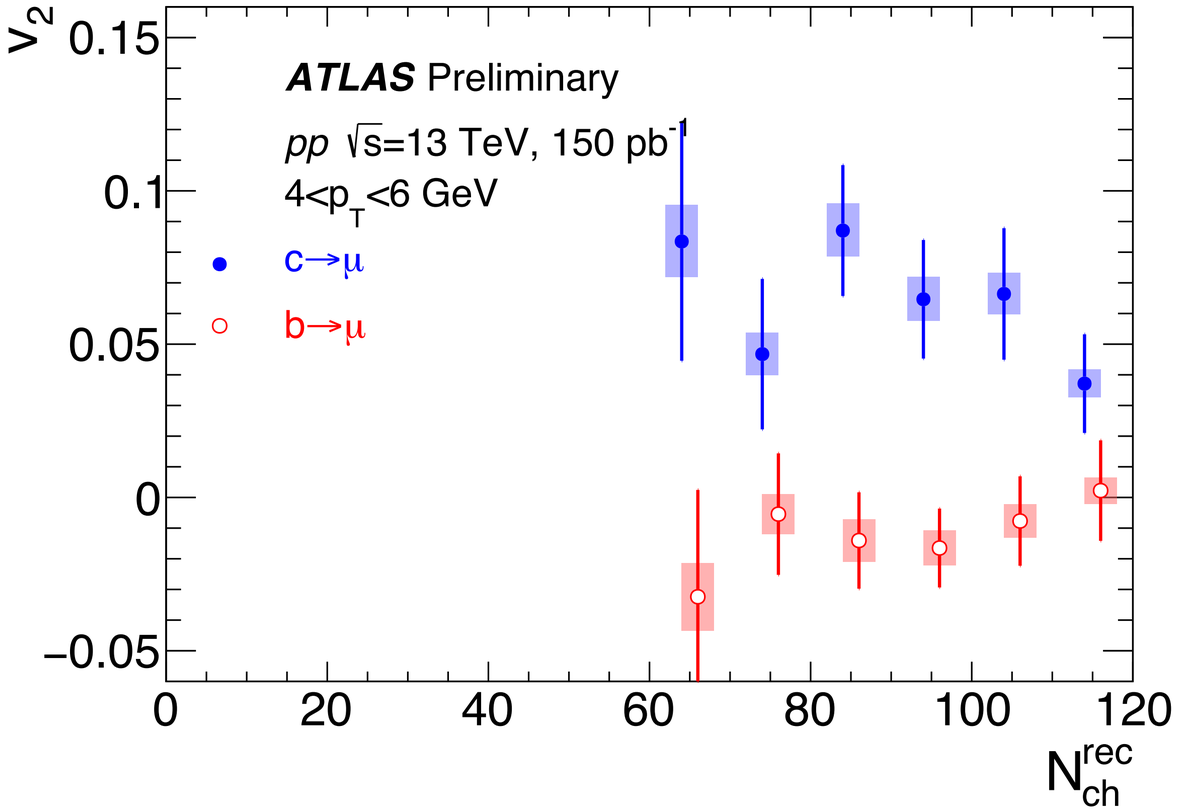


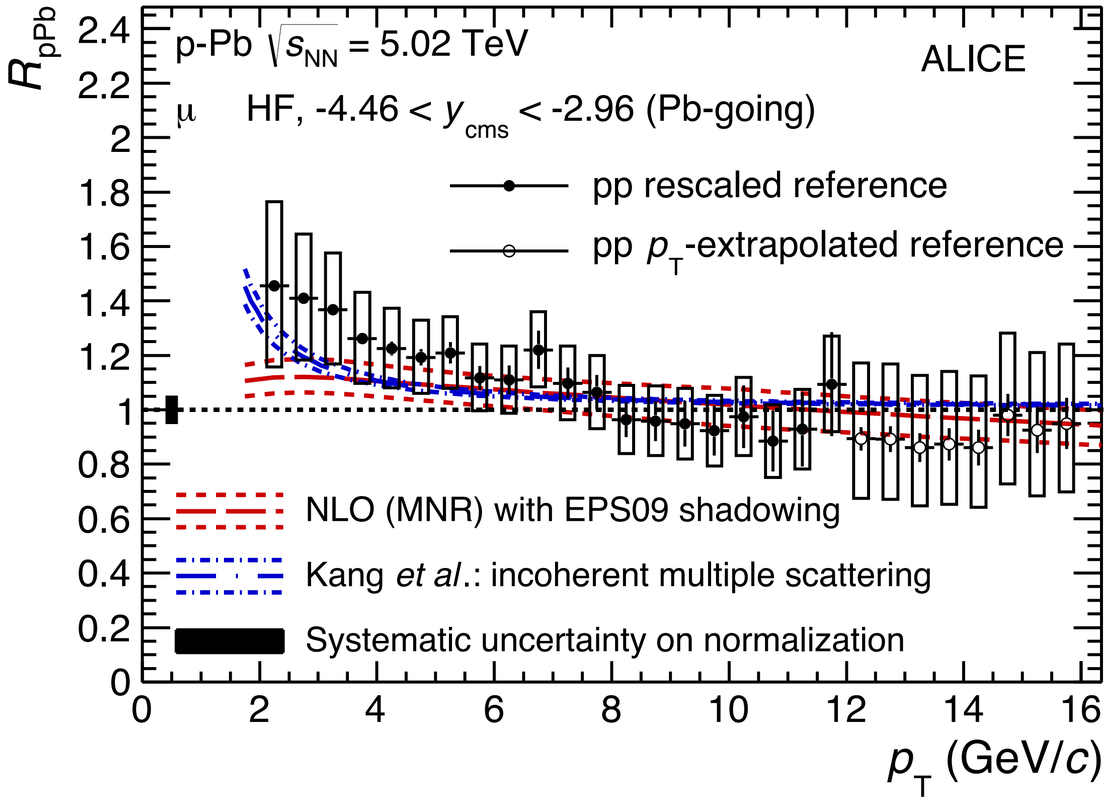




- Effect likely small → more precise and novel measurements needed

Heavy flavor flow and R_{pPb}

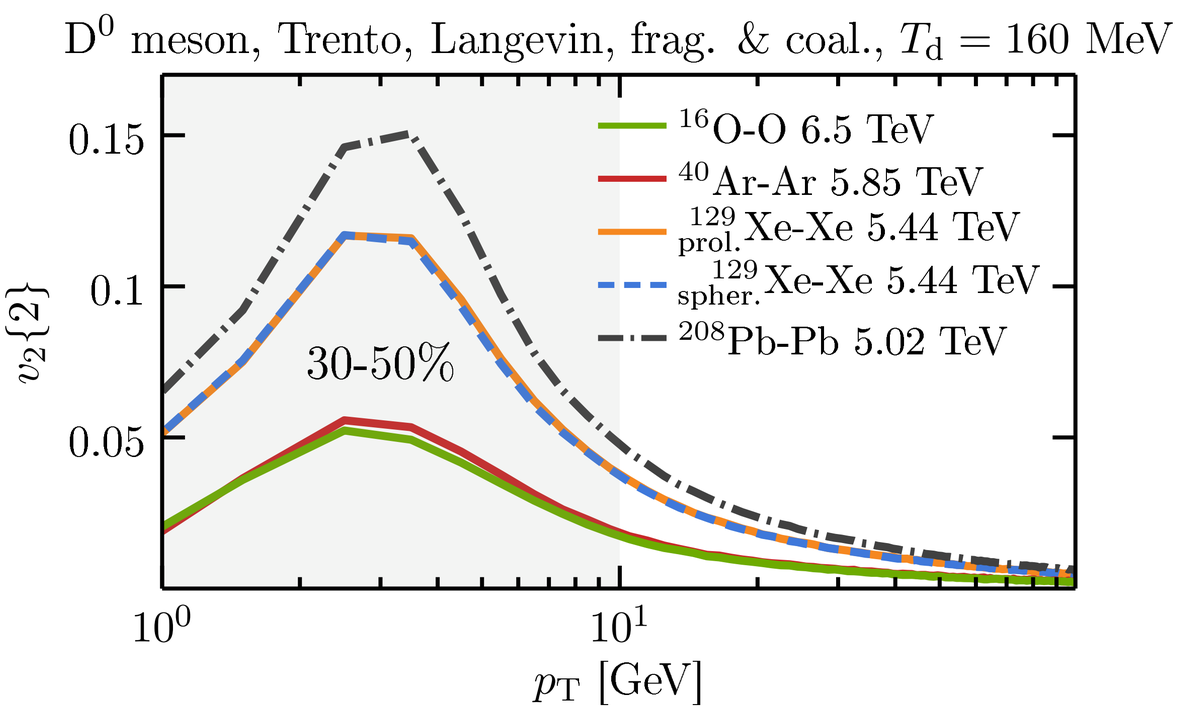


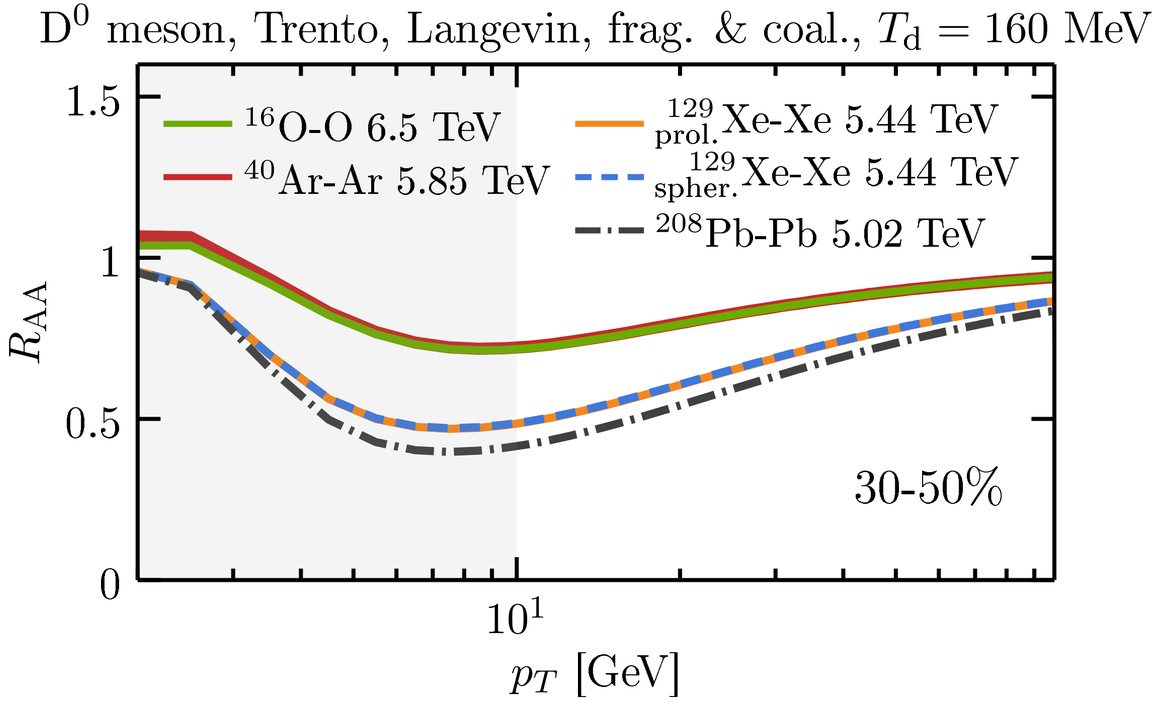


- Heavy flavor flow and R_{pPb} follow similar trends as light hadrons

Heavy flavor flow and R_{pPb}

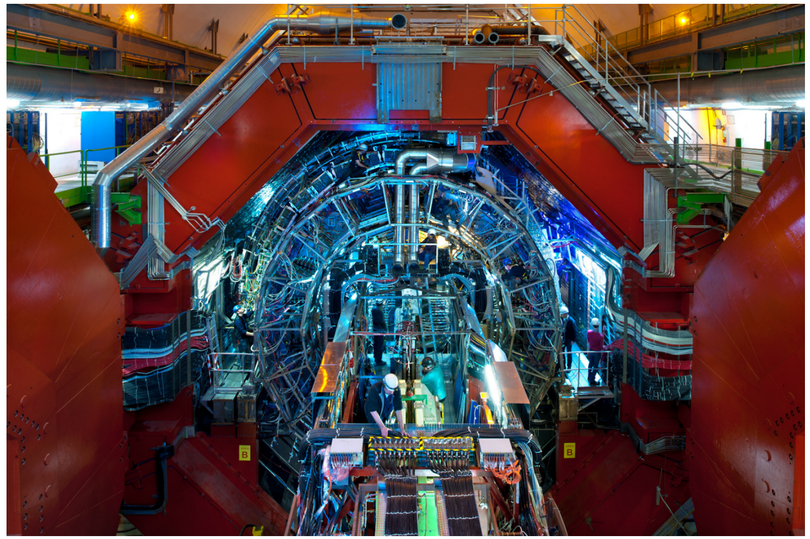
arXiv:1907.03308





- Hydro+transport model predict D^0 flow and mild R_{AA} suppression for small systems
- Same cross check should be made with jet quenching models for light hadrons

Summary of proposals in light systems



- Experiment
  - ✓More orders of v_n in pp and p-Pb
  - ✓Two-particle correlations with strange hadrons

- Theory
  - ✓Higher harmonic flow using string mechanisms
  - ✓Hydro predictions for two particle correlations with strangeness
  - ✓Blast wave predictions for heavy-flavor spectra
  - ✓Simultaneously predictions of light hadron v_n and R_{AA} at high p_T

$$L_{QCD} = \sum_q \overline{\psi}_q \left(i\gamma_\mu D^\mu - m_q \right) \psi_q - \frac{1}{2} Tr\left[\overline{G}_{\mu\nu} \overline{G}^{\mu\nu} \right]$$