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

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Secretary: Alice Ohlson

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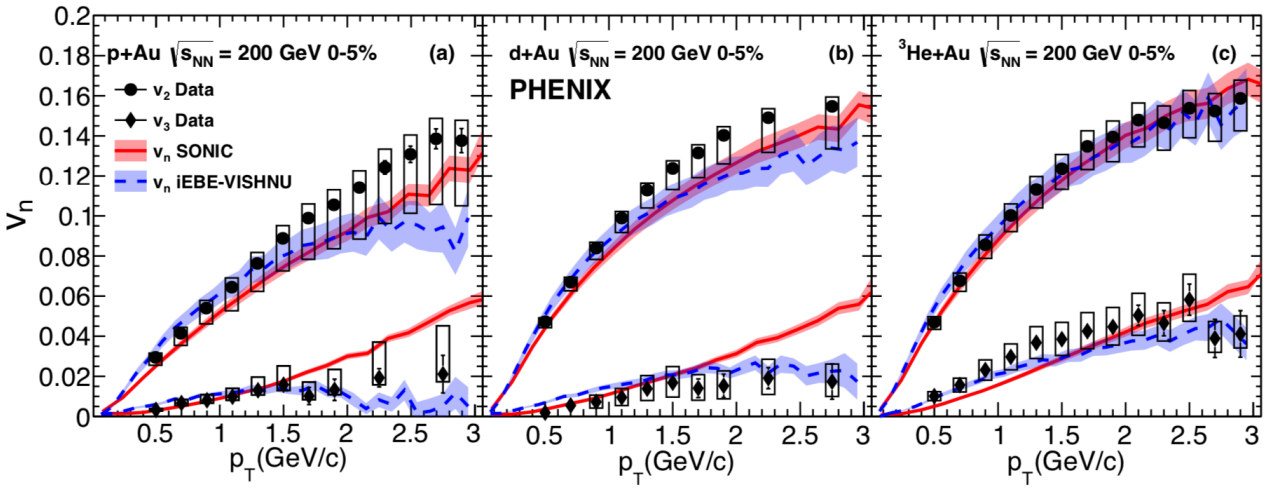
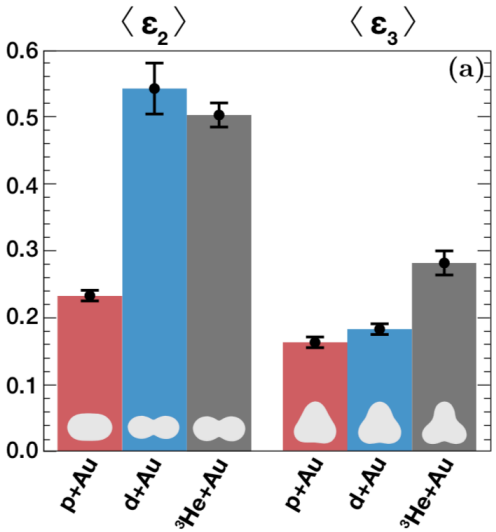
Anisotropic flow in small systems

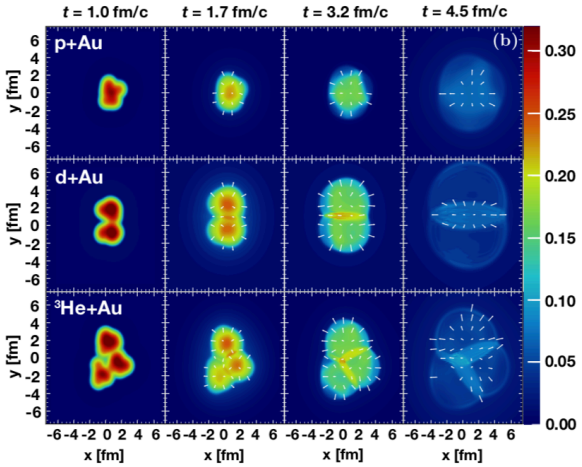




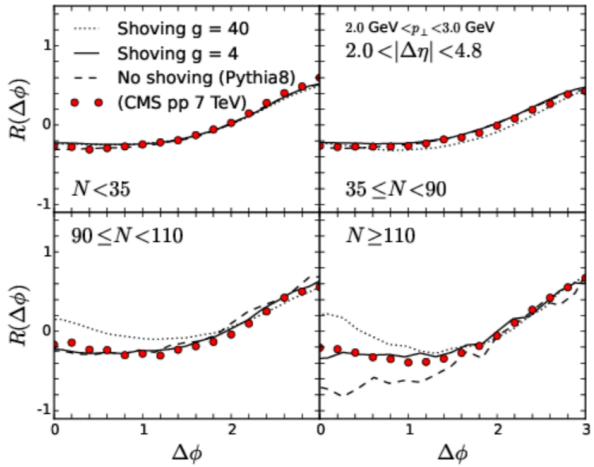
- Compelling evidence that final state anisotropy is driven by initial state geometry

Anisotropic flow in small systems

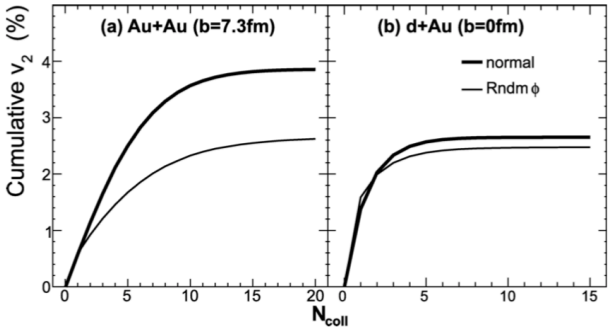
Hydrodynamics



String shoving



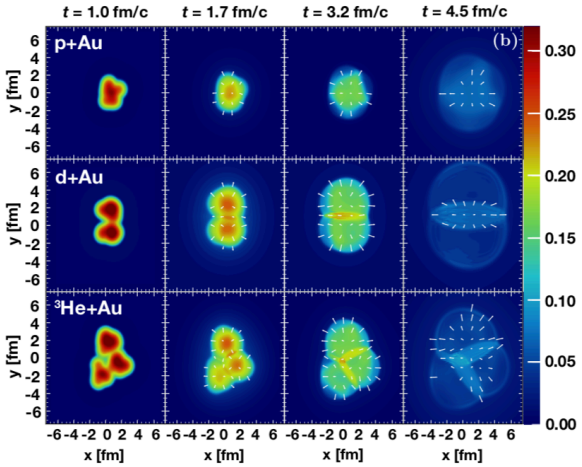
Escape mechanism



- Compelling evidence that final state anisotropy is driven by initial state geometry
- What mechanism converts the initial anisotropy to the final state momentum-space?

Anisotropic flow in small systems

Hydrodynamics



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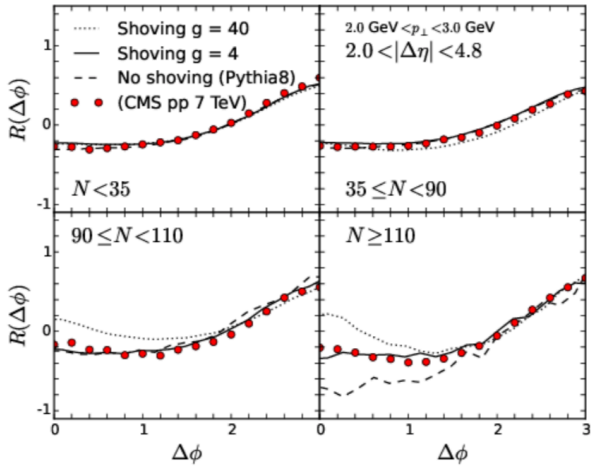
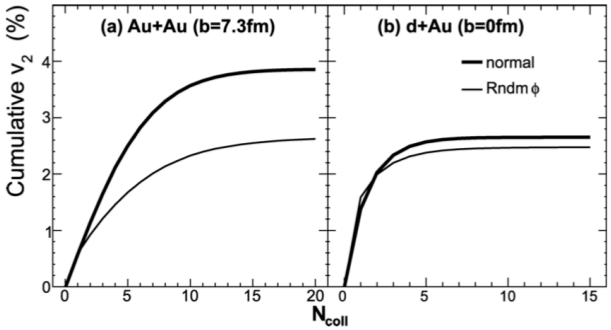


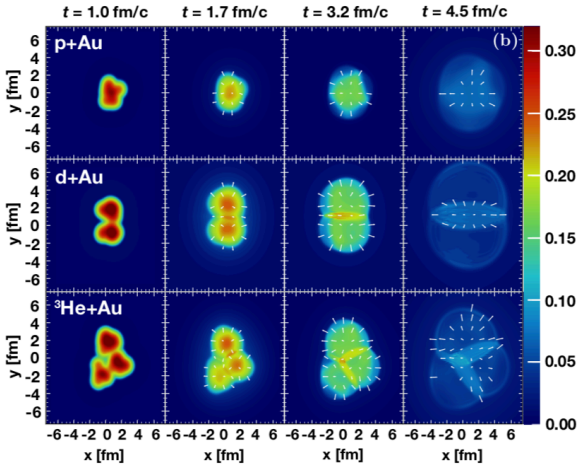
Escape mechanism



- Several mechanisms can produce flow-like effects
  - becomes a quantitative question: can all these models reproduce the PID-, multiplicity-, and pt-dependence of v_n (and higher-order $\{v_n,v_m\}$ correlations) seen in the data?

Anisotropic flow in small systems

Hydrodynamics



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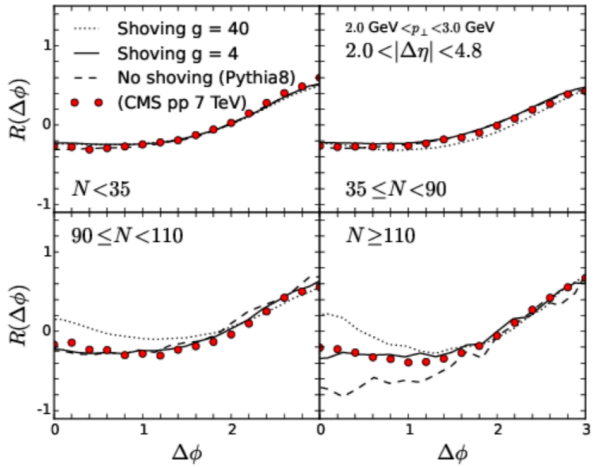
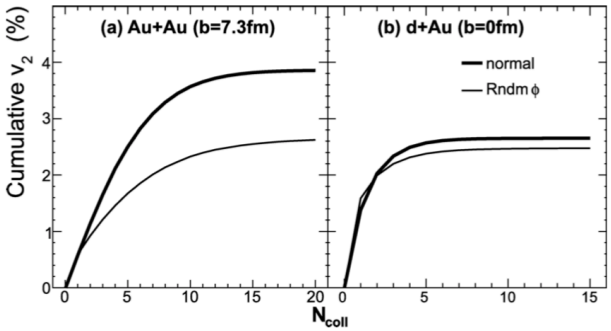
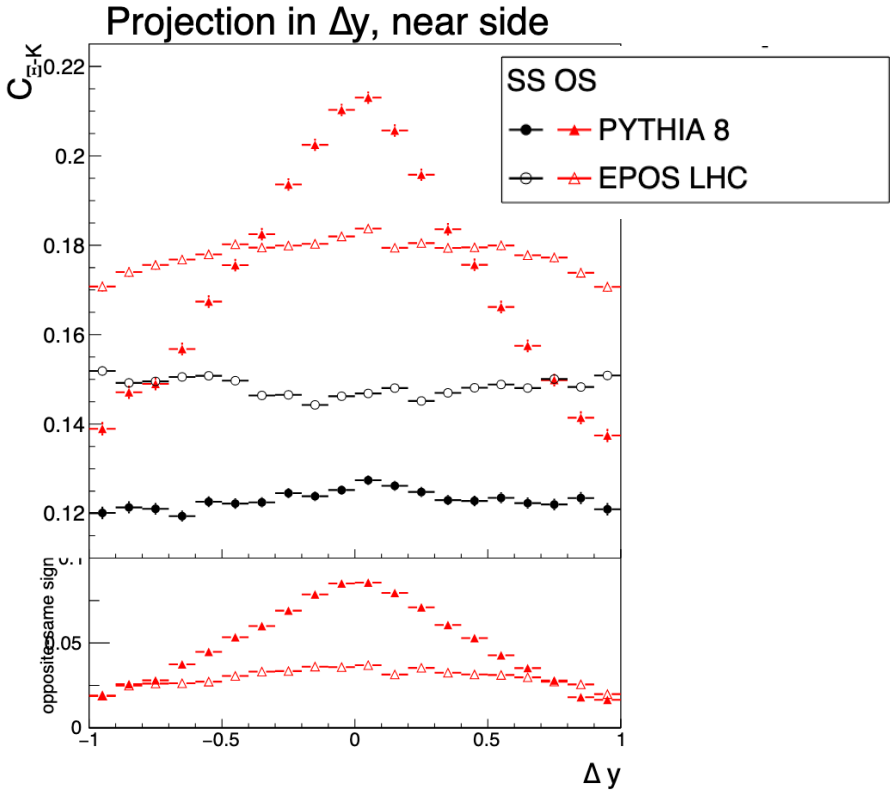


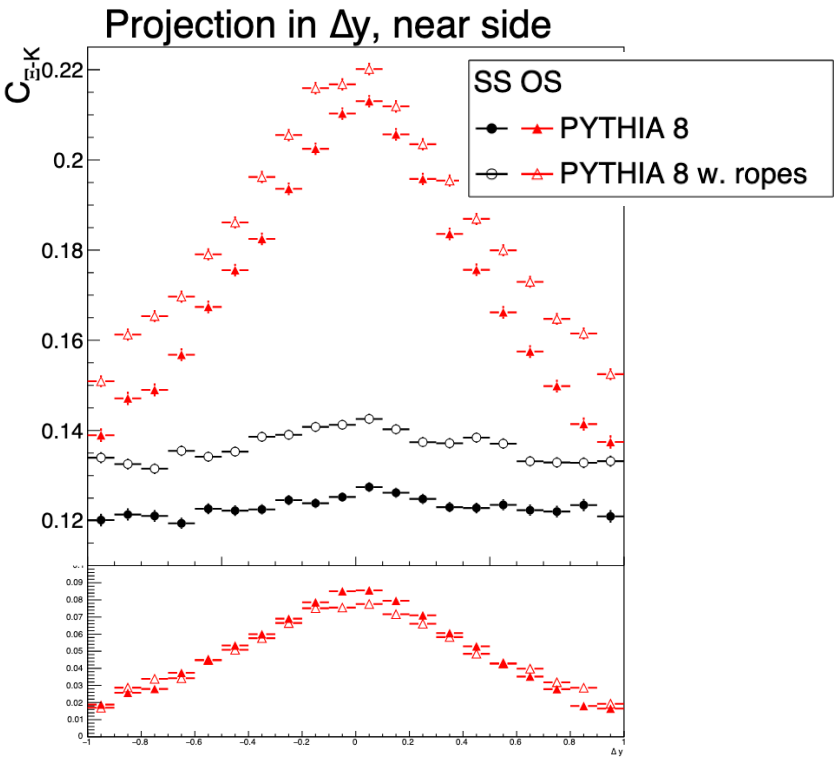
Escape mechanism



- Several mechanisms can produce flow-like effects
- Are kinetic observables the best ones for discriminating between medium + string-based pictures? What other observables would be more sensitive?

Strangeness enhancement

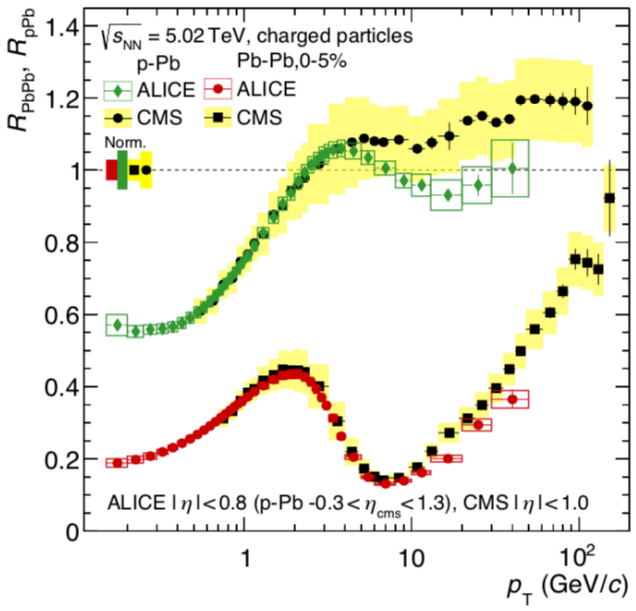


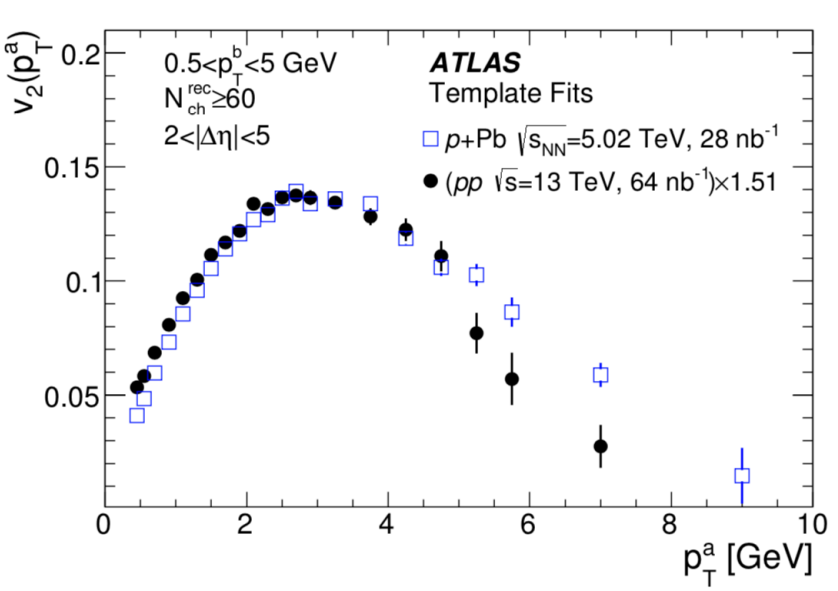


- Can the distribution of strange quark production in phase space tell us about the mechanism?
- Hypothesis: String-breaking → local correlations, medium → global production

Flow vs jet quenching

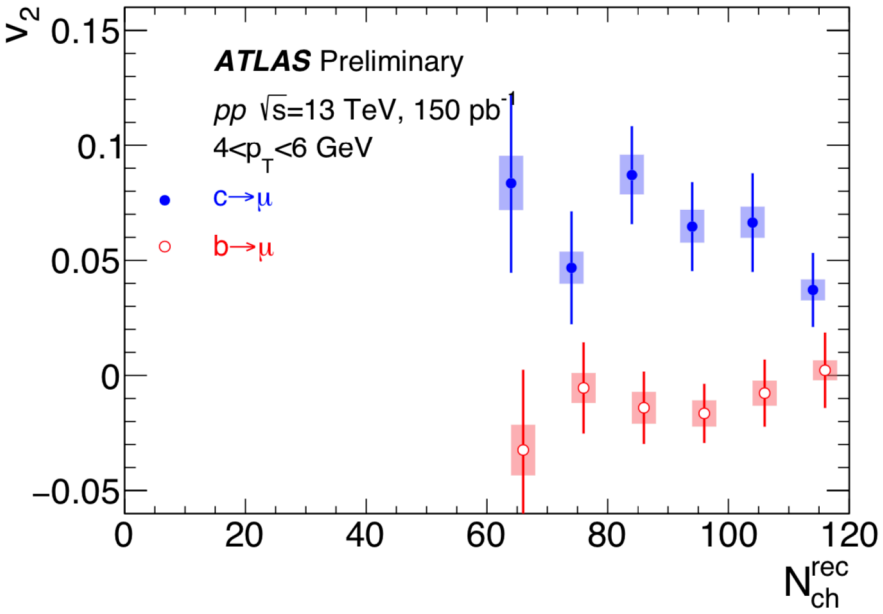
- In heavy-ion collisions, anisotropic flow and high-p_T yield suppression were viewed as two sides of a coin
- But in p+A collisions we see $v_n > 0$ with no suppression
  - (the comparison of light hadron v_n is challenging because the p_T ranges don't always overlap)

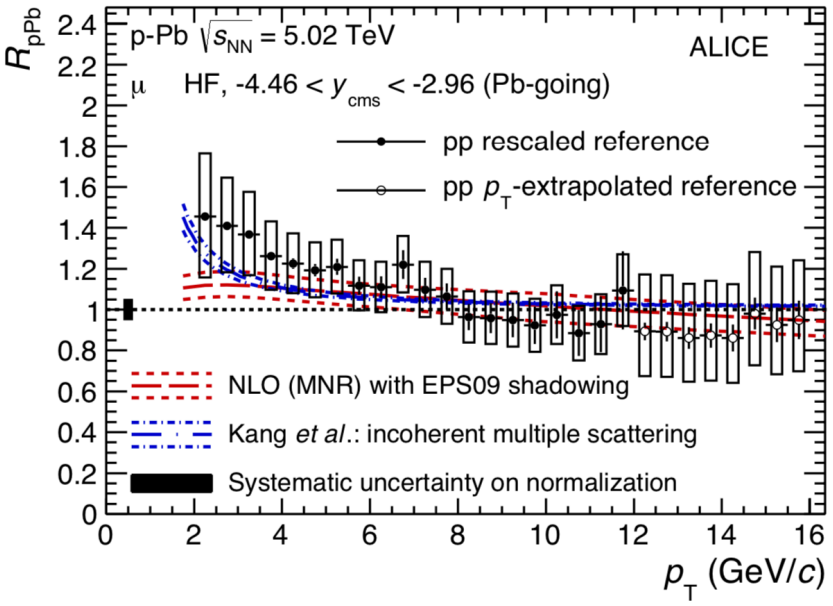




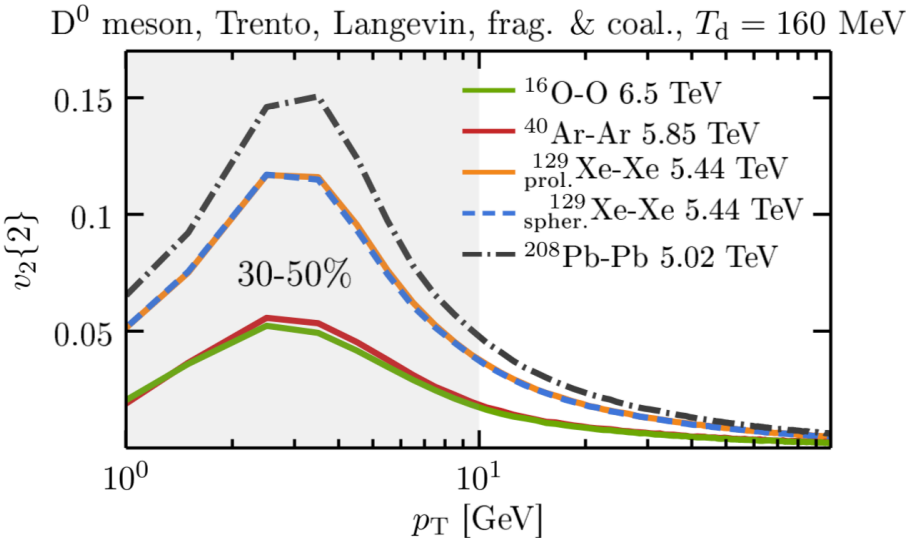
Flow vs jet quenching

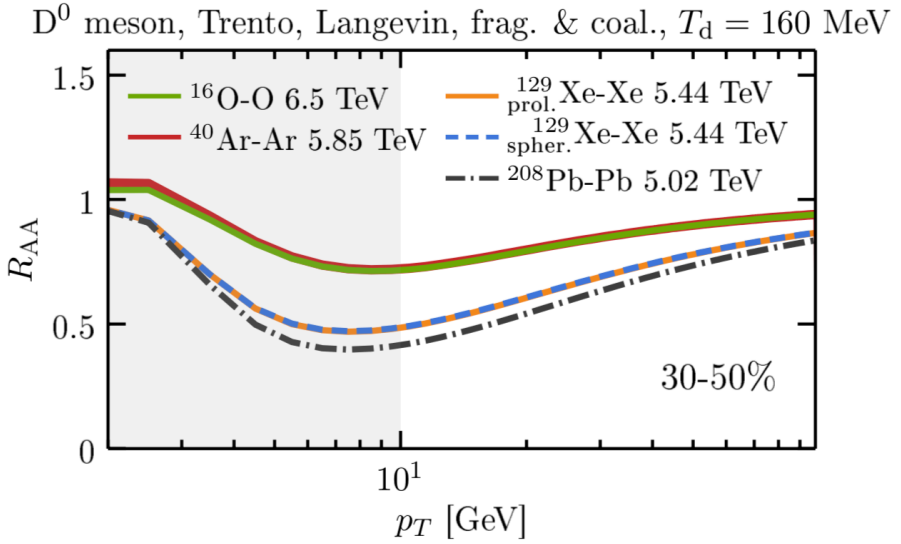
- In heavy-ion collisions, anisotropic flow and high-p_T yield suppression were viewed as two sides of a coin
- But in p+A collisions we see $v_n > 0$ with no suppression
  - clearly seen for heavy quarks (low-p_T hard probes)
  - not understood





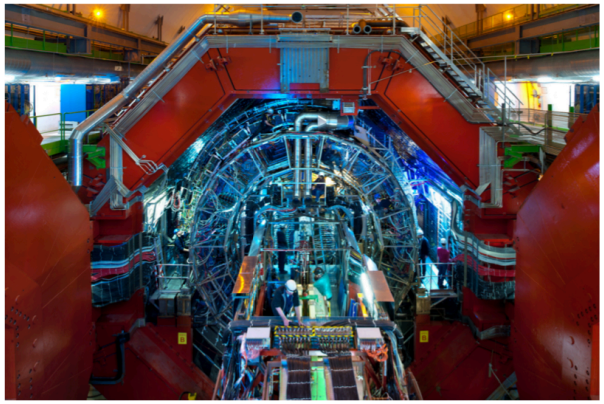
Heavy flavor flow & quenching





- Hydro+transport model predicts D^0 flow with mild suppression of R_{AA}
  - again a quantitative question: how big of an effect do we expect, compared to our experimental uncertainties?
  - need a similar calculation 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

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