

The $R_{AA/pA}$ plus v_2 puzzle (in small systems)

Several proposed solutions (not universally accepted)

1. nPDF effects

- Quite easy to fit R_{pPb} , might in fact be preferred (?)
- No energy loss/path-length effect: does not solve v_2

2. Initial state correlations

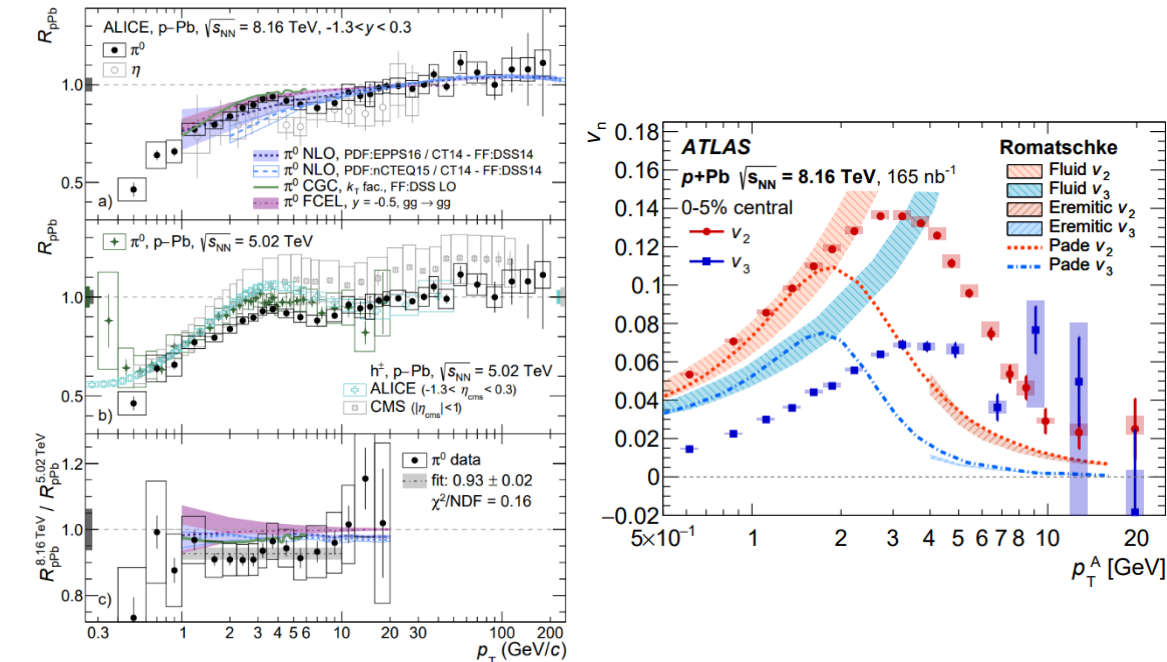
- v_2 is in the end a hard-soft correlation; why not in the scattering?
- Hard to combine with large $|Dh|$ gap intuition

3. Coalescence

- Can significantly boost v_2 , though not clear enough
- Only implemented till about 8 GeV; not clear if it solve R_{pPb}

4. Experimental subtlety in measuring event plane

- Experiments not always consistent
- Many years of careful studies have never yielded a small v_2



Hadrons, flow and coalescence:

$$R_{AA}(p_T) = \frac{\int_{AA} D I D u_r \sigma(p_T + \kappa[p_T] \mathcal{I} - e_{th}[u_r])}{\int_{pp} D I D u_r \sigma(p_T + \kappa[p_T] \mathcal{I} - e_{th}[u_r])}, \quad (1)$$

$$\mathcal{I} \equiv \int_{\tau_0}^{\tau_{fo}} s/T u_\mu dL^\mu, \quad e_{th}[u_r] = \frac{3T_{fo}}{\sqrt{1 + u_r^2} - u_r},$$

Simplest strategy possible..
Necessary: $p_T \gg T$

New mechanism

1. Hard parton needs to find a parton

- Take a nearby parton, from the boosted (!) medium @ freeze-out
- Boost is larger for pPb than for pp: **energy gain in pPb wrt pp**
- Boost is anisotropic
- Energy difference ~ 100 MeV: still very relevant up to 50 GeV (steep spectr.)

2. Same argument for RpO

- Ratio is insensitive to nPDFs (not included since consistent with unity)

Almost factor 2
difference in PbPb:

“Perhaps, in these times, it is not surprising that most solutions focused on the energetic high- p_T parton and neglected the typical but fast-moving partner from the **collective**.”

