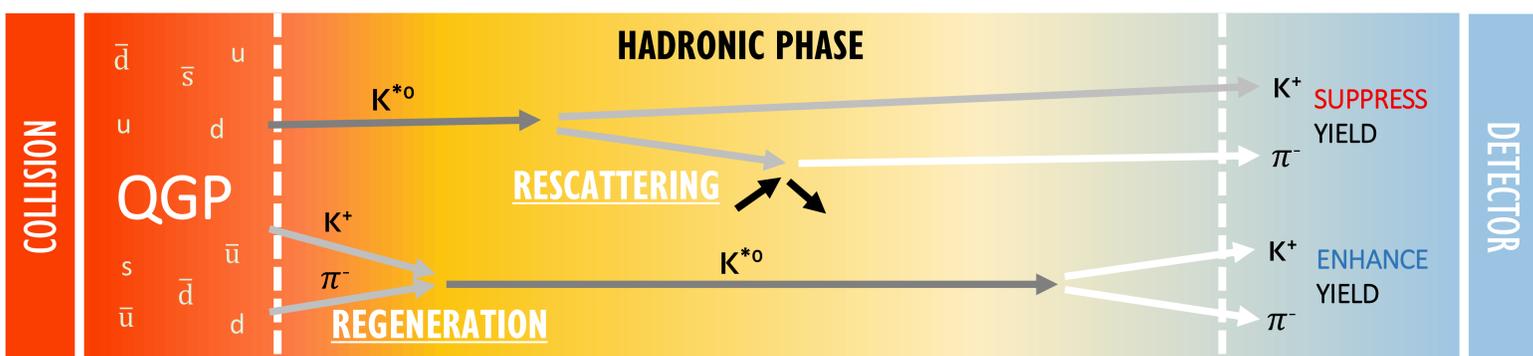
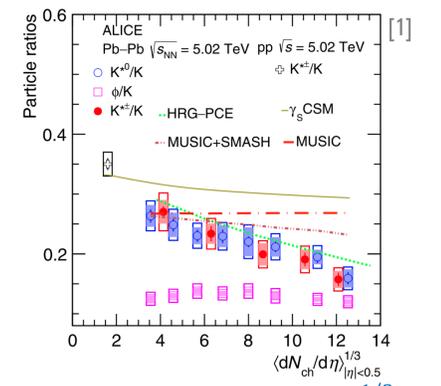


MOTIVATION

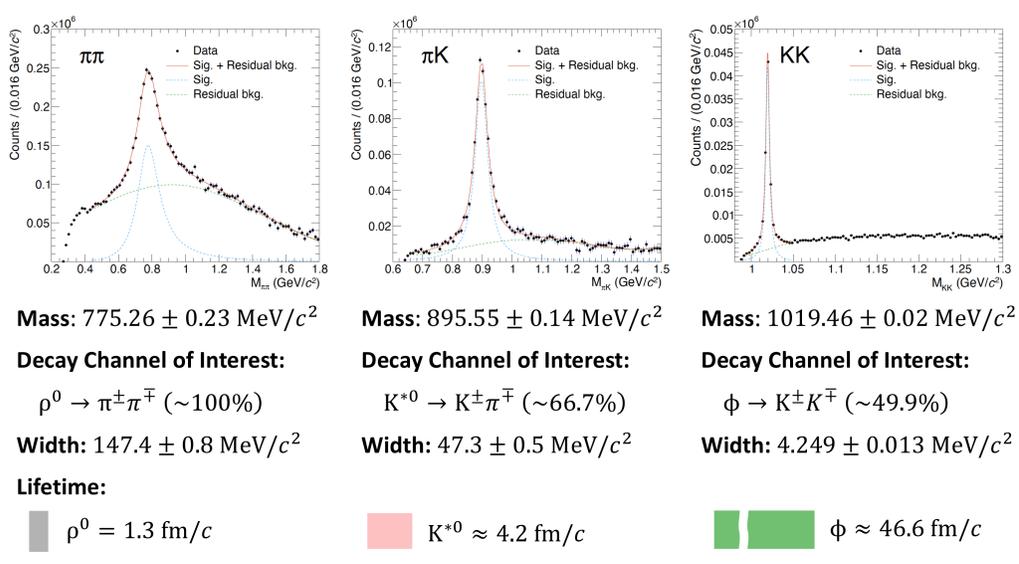


Due to their **short lifetimes**, **resonances** are sensitive to interactions during the hadronic phase. These interactions can modify the **yield ratio** between resonance and stable particles through rescattering and regeneration.



Particle ratio ↓ with $\langle dN_{ch}/d\eta \rangle_{|\eta|<0.5}^{1/3}$ ↑ ⇒ Rescattering dominance.

PARTICLE INFORMATION AND RECONSTRUCTION [2]

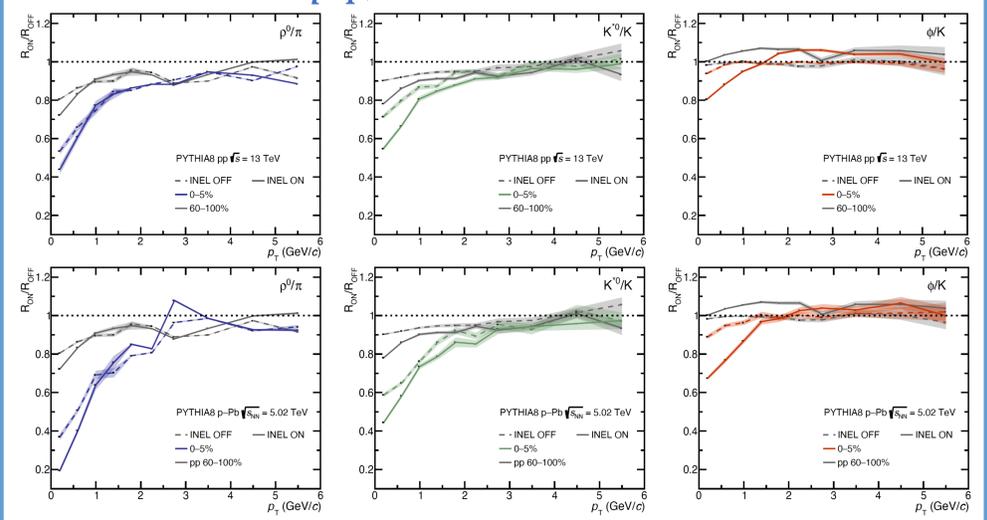


Mass: $775.26 \pm 0.23 \text{ MeV}/c^2$ **Decay Channel of Interest:** $\rho^0 \rightarrow \pi^\pm \pi^\mp$ (~100%) **Width:** $147.4 \pm 0.8 \text{ MeV}/c^2$ **Lifetime:** $\rho^0 = 1.3 \text{ fm}/c$

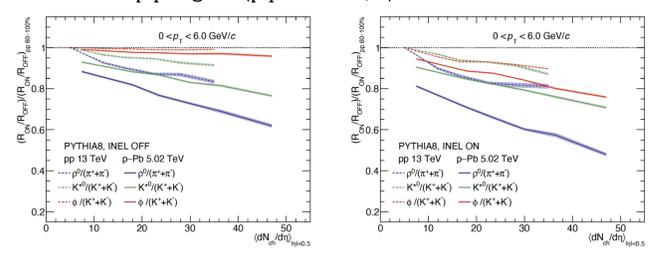
Mass: $895.55 \pm 0.14 \text{ MeV}/c^2$ **Decay Channel of Interest:** $K^{*0} \rightarrow K^\pm \pi^\mp$ (~66.7%) **Width:** $47.3 \pm 0.5 \text{ MeV}/c^2$ **Lifetime:** $K^{*0} \approx 4.2 \text{ fm}/c$

Mass: $1019.46 \pm 0.02 \text{ MeV}/c^2$ **Decay Channel of Interest:** $\phi \rightarrow K^\pm K^\mp$ (~49.9%) **Width:** $4.249 \pm 0.013 \text{ MeV}/c^2$ **Lifetime:** $\phi \approx 46.6 \text{ fm}/c$

DOUBLE RATIOS vs p_T , MULTIPLICITY

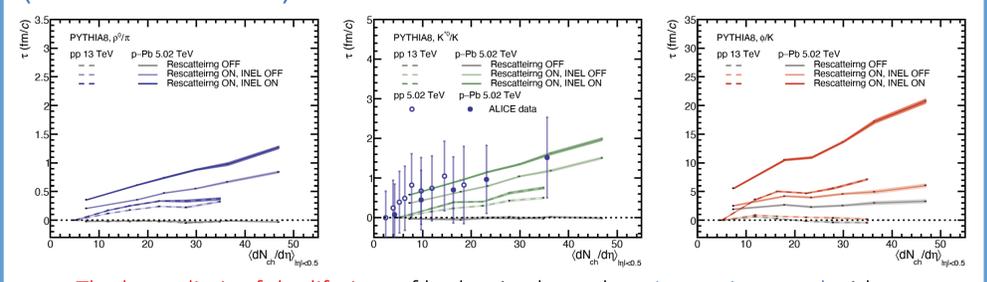


- p_T dependent double ratios of the particle yield ratios between the hadronic rescattering on and off options (denoted as R_{ON}/R_{OFF}).
- **Larger suppression** is seen for **p-Pb collisions** compared to pp, especially in low p_T region ($p_T < 2 \text{ GeV}/c$).



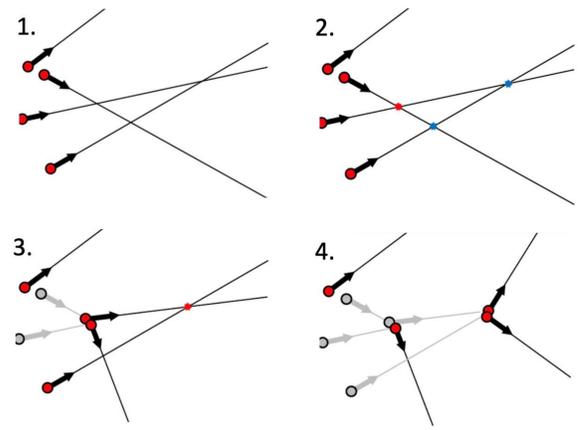
• Multiplicity dependent double ratios show **decreasing trend** with **increasing multiplicity**, showing larger suppression with the particle with **shorter lifetime**.

(LOWER LIMIT OF) THE LIFETIME OF HADRONIC PHASE



- **The lower limit of the lifetime** of hadronic phase show **increasing trend** with increasing system size, yet showing **different values** for different particles.

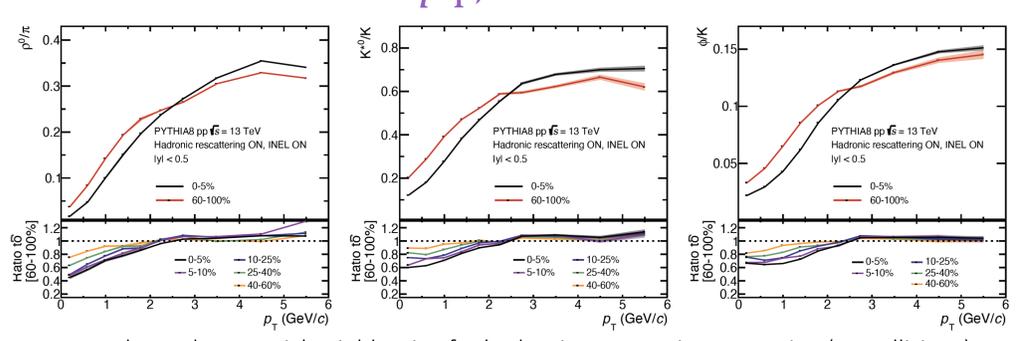
HADRONIC RESCATTERING IN PYTHIA8 [3]



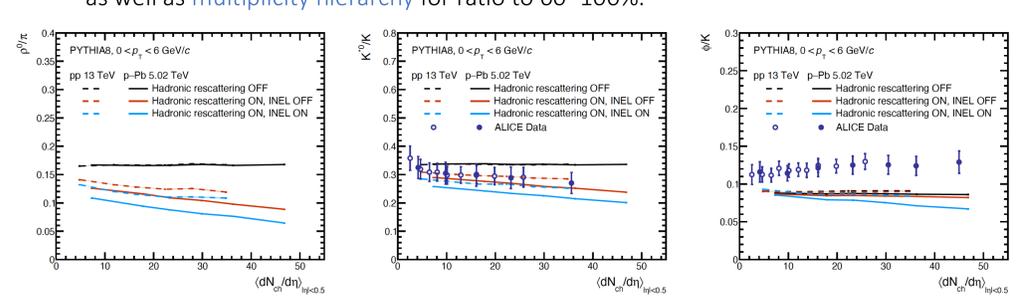
1. Listing potential scatterings.
2. Performing the first scattering.
3. Checking if the scattered particles will have another scattering.
4. If yes, adding to the potential scattering list and repeat these processes until there's no more scattering.

pp and p-Pb events with hadronic rescattering off, rescattering on with and without inelastic scattering options are produced.

PARTICLE YIELD RATIOS vs p_T , MULTIPLICITY



- p_T dependent particle yield ratios for hadronic rescattering on setting (pp collisions).
- **Lower particle yield ratios** are seen for **0-5% multiplicity class** compared to 60-100%, as well as **multiplicity hierarchy** for ratio to 60-100%.



- Multiplicity dependent yield ratios in $p_T < 6.0 \text{ GeV}/c$ for three different configurations.
- **Rescattering on** options show decreasing trend with **increasing multiplicity** and **system size**.

OUTLOOK & PLAN

- The interactions during hadronic phase can affect the particle yield ratio between resonance and stable particles.
- The rescattering effect on the particle yield ratios was studied using ρ^0 , K^{*0} and ϕ mesons and their stable particles.
- The particle yield ratios showed multiplicity hierarchy, especially in low p_T region, showing decreasing trend with increasing multiplicity.
- Double ratios showed clear hierarchy in the resonance lifetimes.
- The lower limit of the lifetime of hadronic phase showed increasing trend with increasing multiplicity and system size.
- We plan to analyse with the regeneration on configuration and compare it with the results presented in this poster.

REFERENCES:

- [1] Phys. Rev. C 109, 044902 (2024)
- [2] Phys. Rev. D 110 030001 (2024)
- [3] Eur. Phys. J. C (2020) 80:907

This study is uploaded to: arXiv:2506.22368