

Resonance and Hyperon production in Heavy-ion collisions with ALICE

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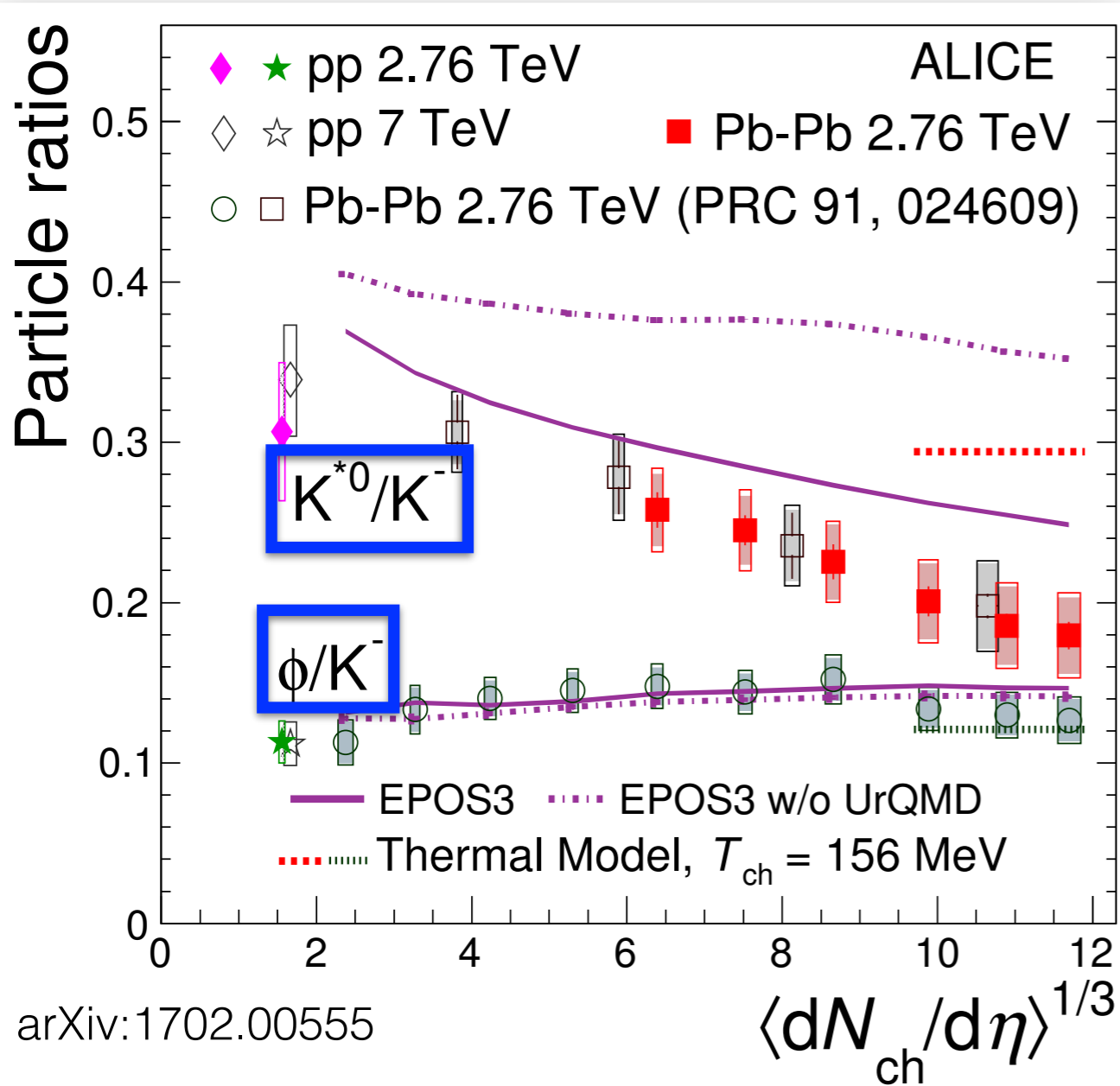
2017 Pusan-Inha Physics Workshop at PNU
- Origin & Evolution of Hyperon -
2017.08.16



Outline

- Resonance
 - study of hadronic phase
- Hyperon
 - strangeness production
- Mean transverse momentum

K^{*0} suppressed, no suppression observed for Φ

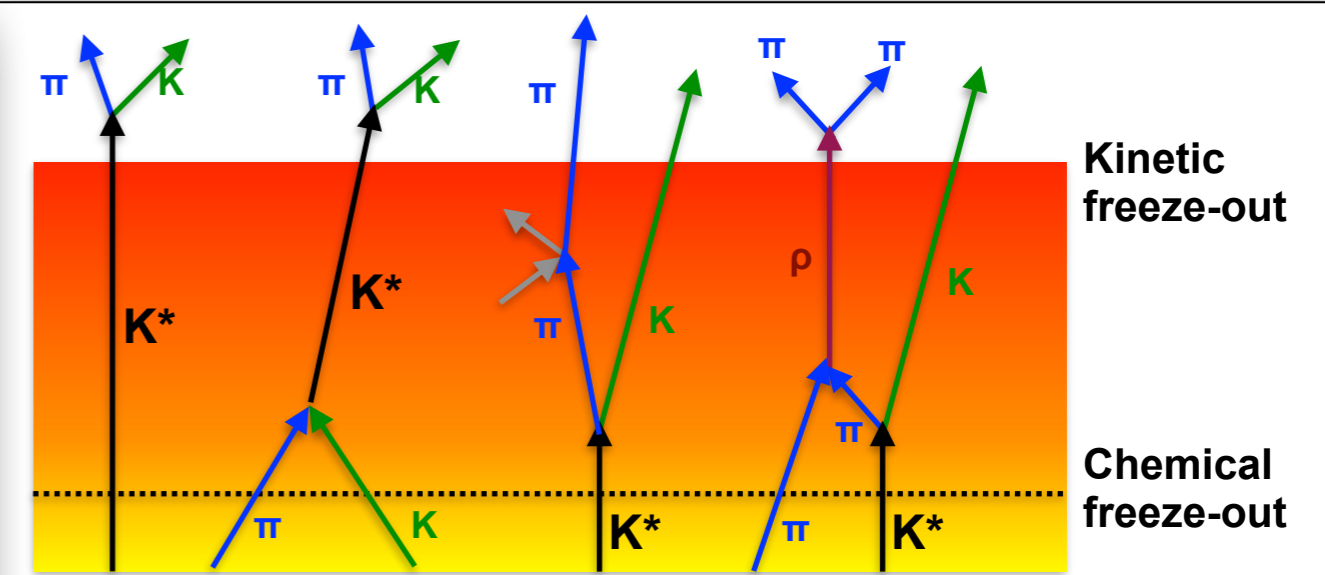
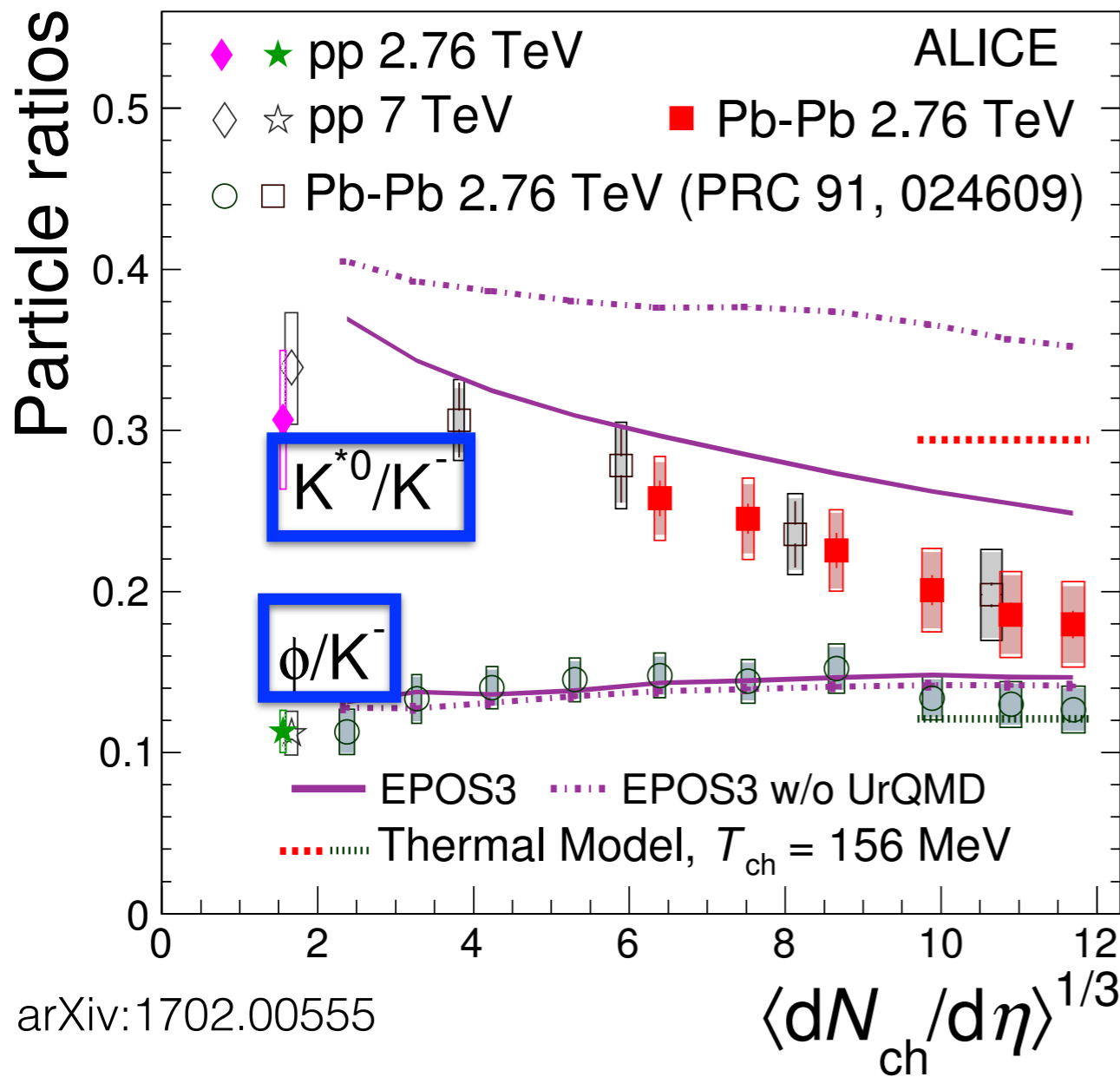


Lifetime(fm/c): $\tau_p(1.3) < \tau_{K^*}(4.2) < \tau_{\Sigma^*}(5.5) < \tau_{\Lambda^*}(12.6) < \tau_{\Xi^*}(21.7) < \tau_{\Phi}(46.2)$



ALICE

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Resonance decay **Regeneration** **Re-scattering**

In the hadronic phase

Regeneration: (pseudo) elastic scattering of decay products

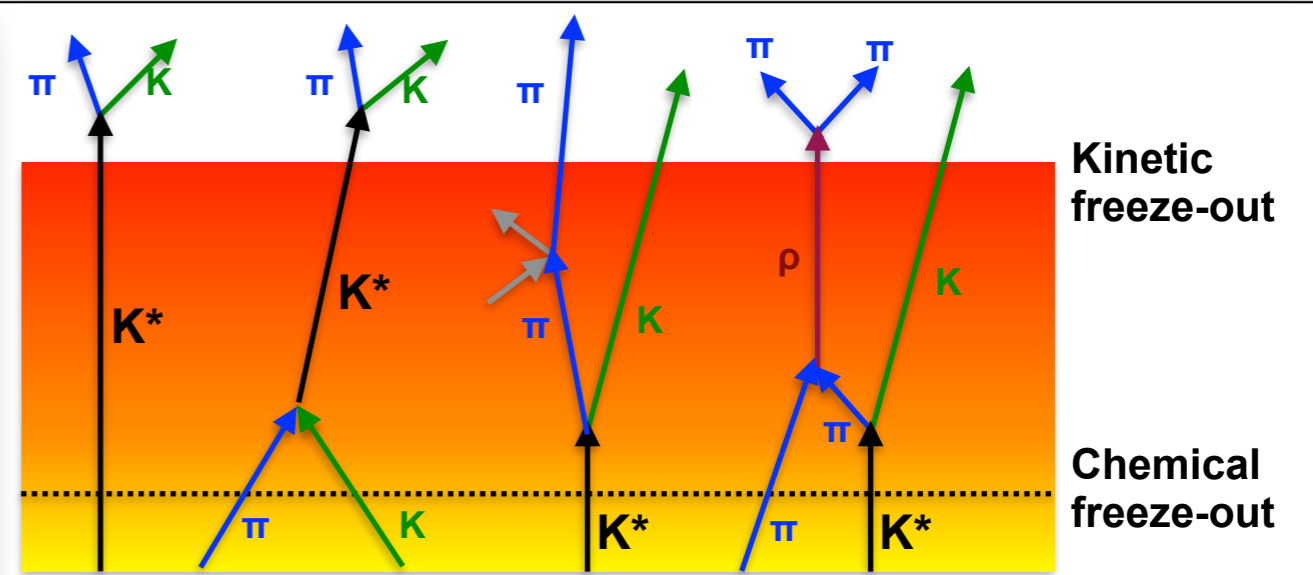
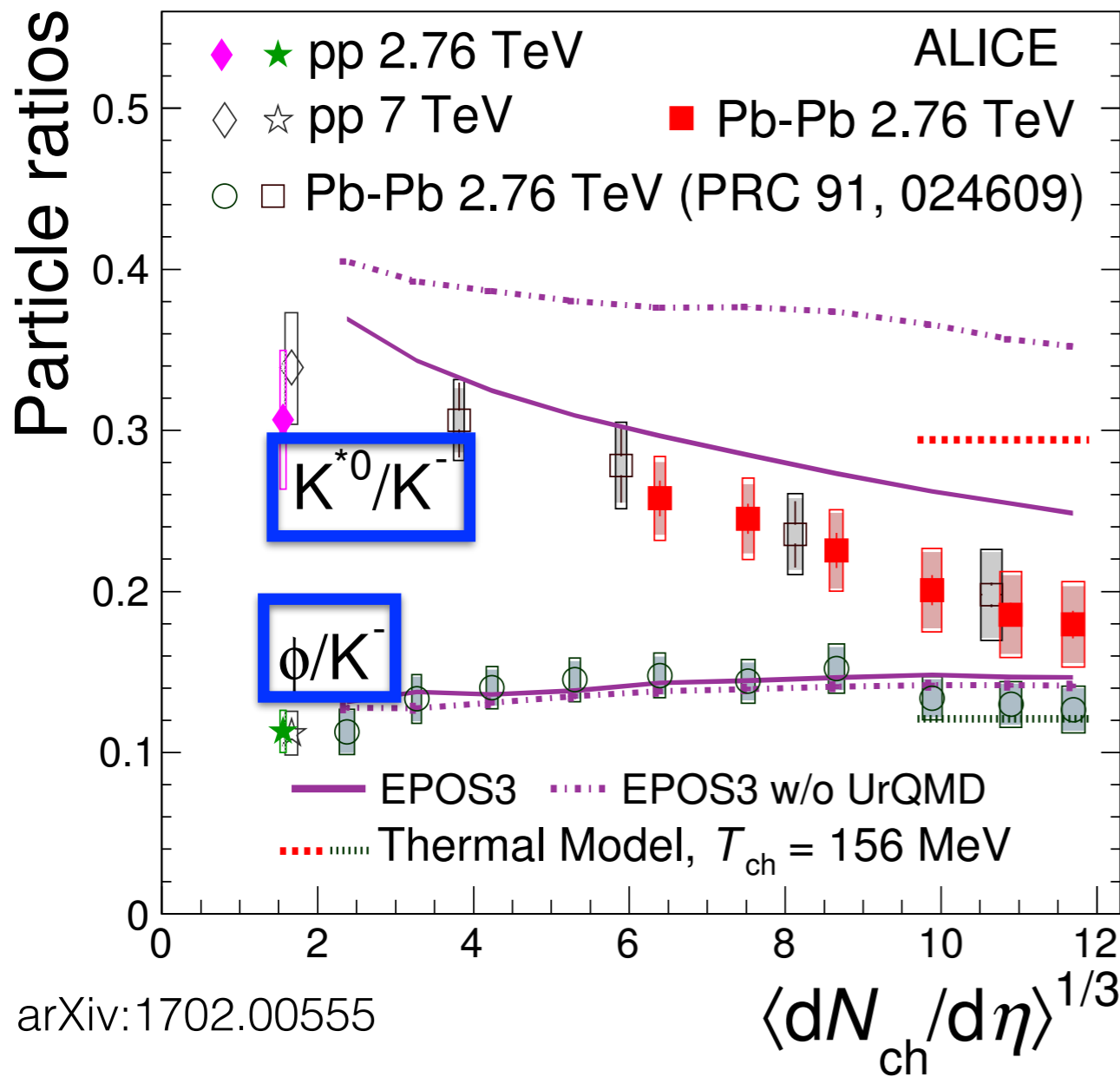
Re-scattering: elastic or (pseudo) elastic scattering through a different resonance

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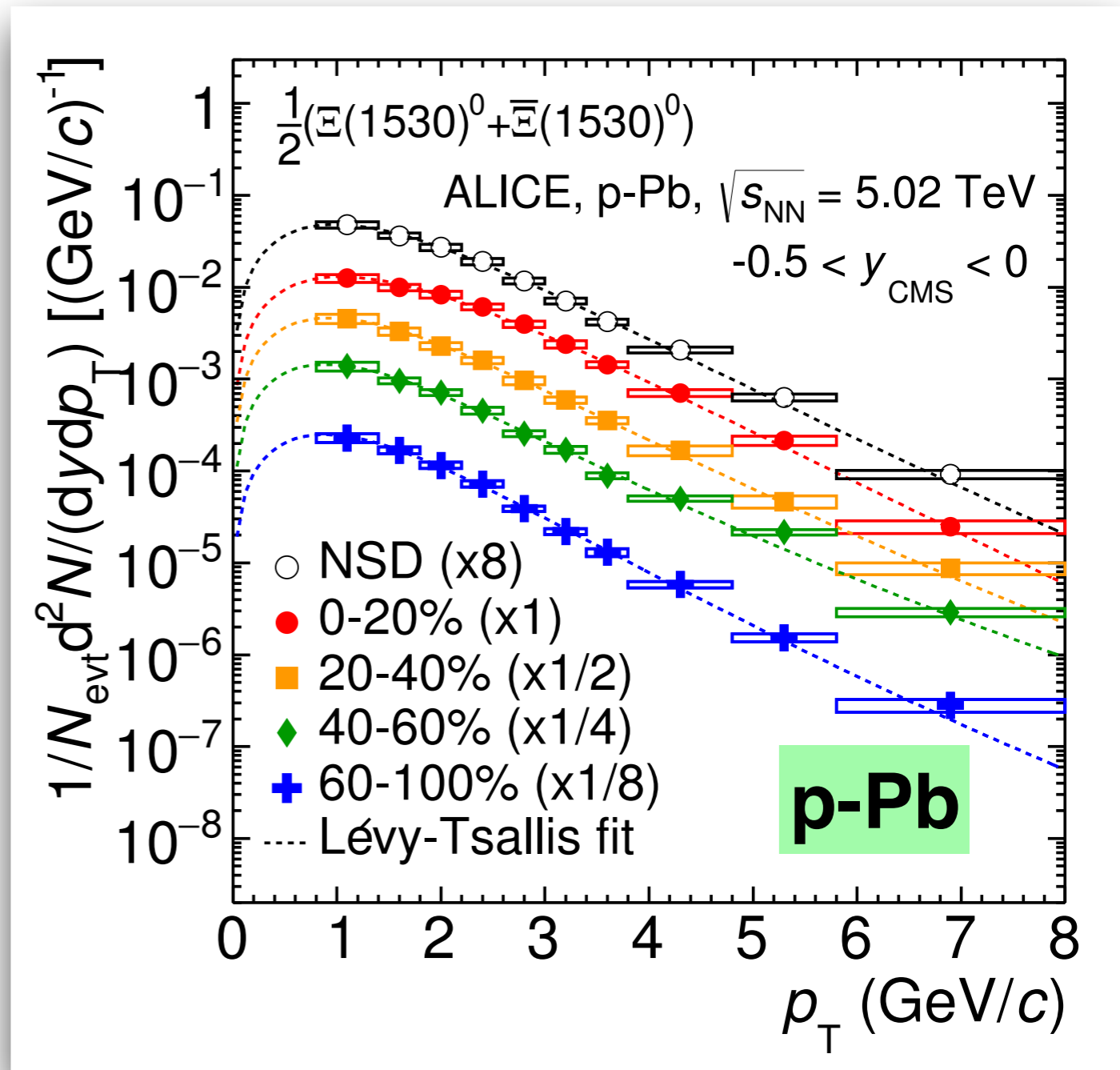
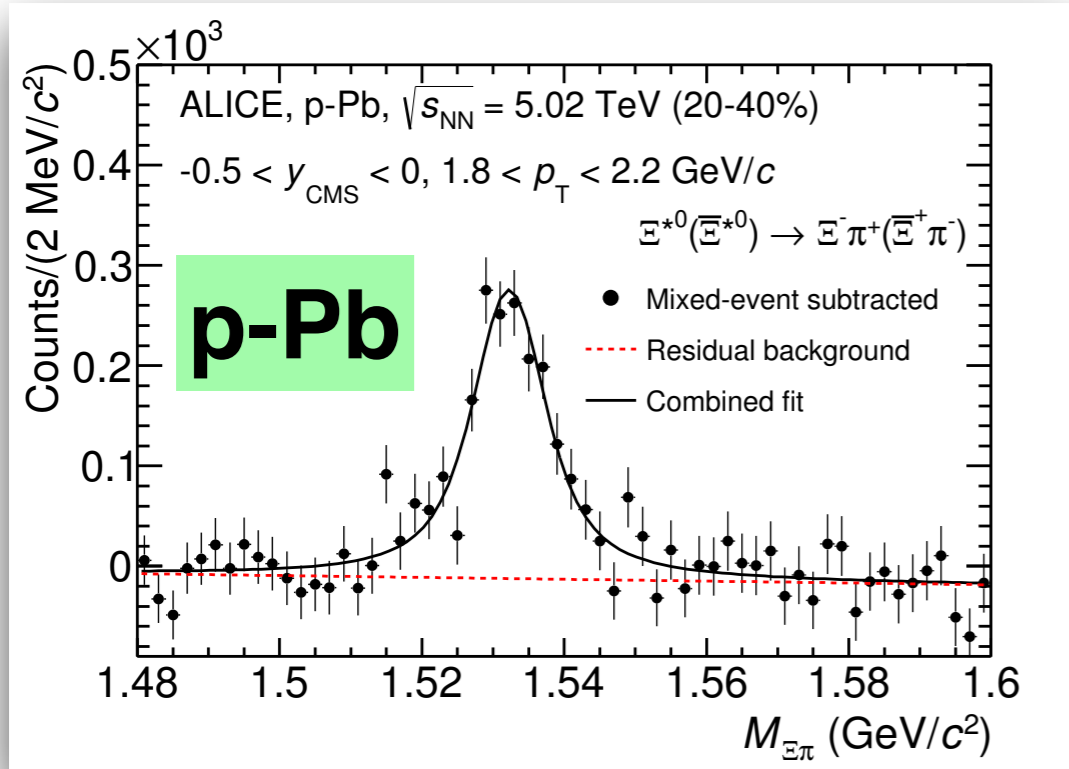
List of particles

	$c\tau$ (fm)	quark content	Decay modes
$\rho(770)^0$	1.3	$(u\bar{u}+d\bar{d})/\sqrt{2}$	$\pi^+ + \pi^-$
$K^*(892)^0$	4.2	$d\bar{s}$	$K^+ + \pi^-$
$\Sigma(1385)^+$	5.5	uus	$\Lambda\pi^+ \rightarrow (p\pi^-)\pi^+$
$\Lambda(1520)$	12.6	uds	$p + K^-$
$\Xi(1530)^0$	21.7	uss	$\Xi^- \pi^+ \rightarrow (\Lambda\pi^-)\pi^+ \rightarrow ((p\pi^-)\pi^-)\pi^+$
$\phi(1020)^0$	44	$s\bar{s}$	$K^+ + K^-$

Production of $\Xi(1530)^0$



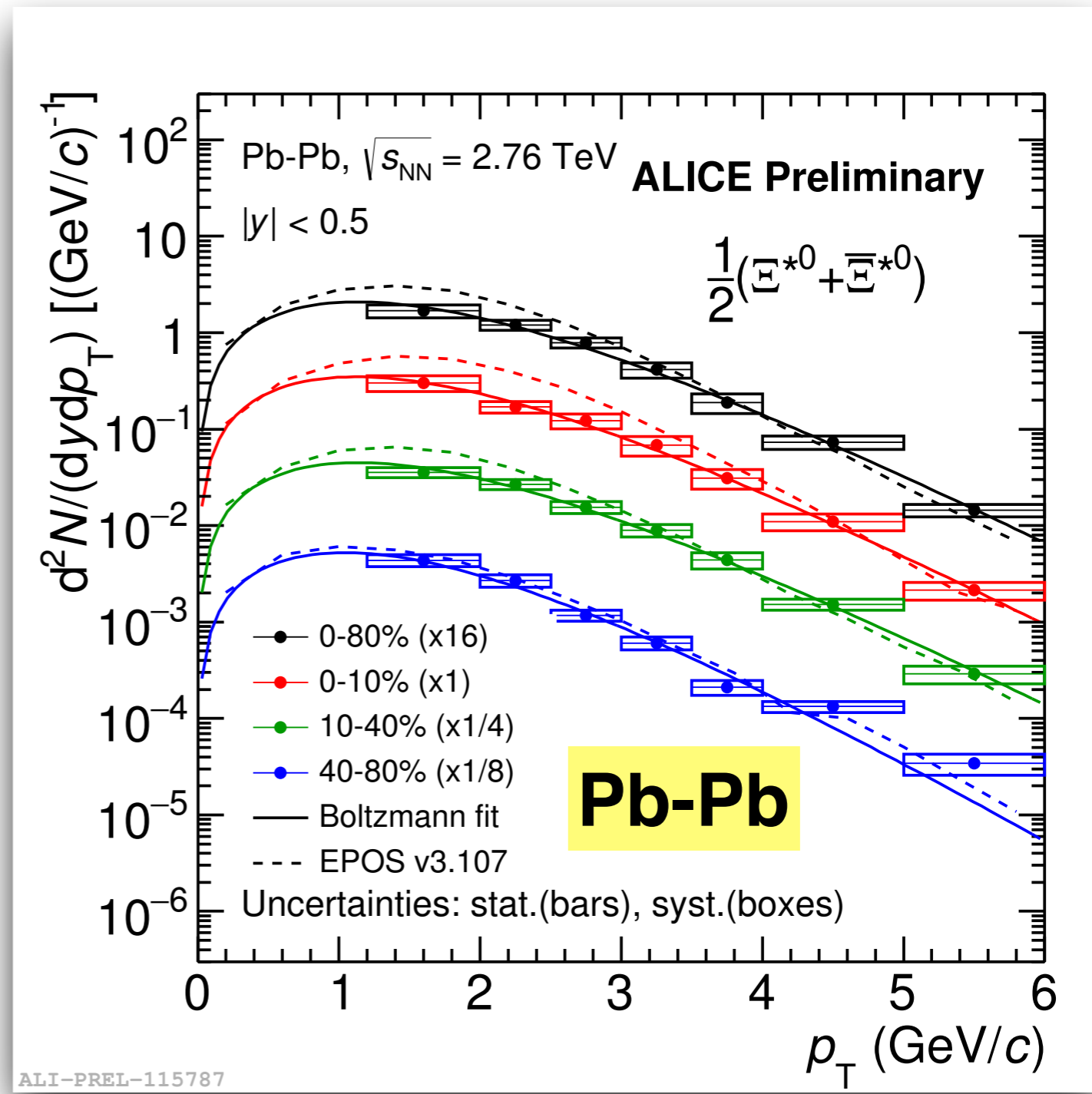
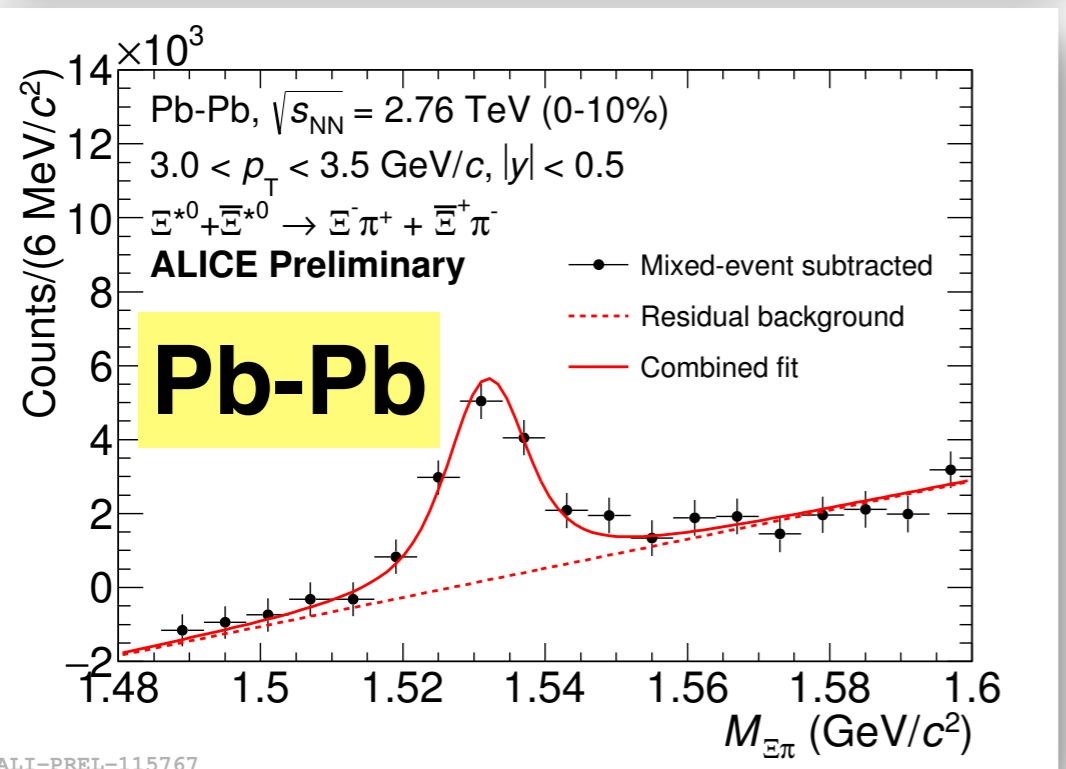
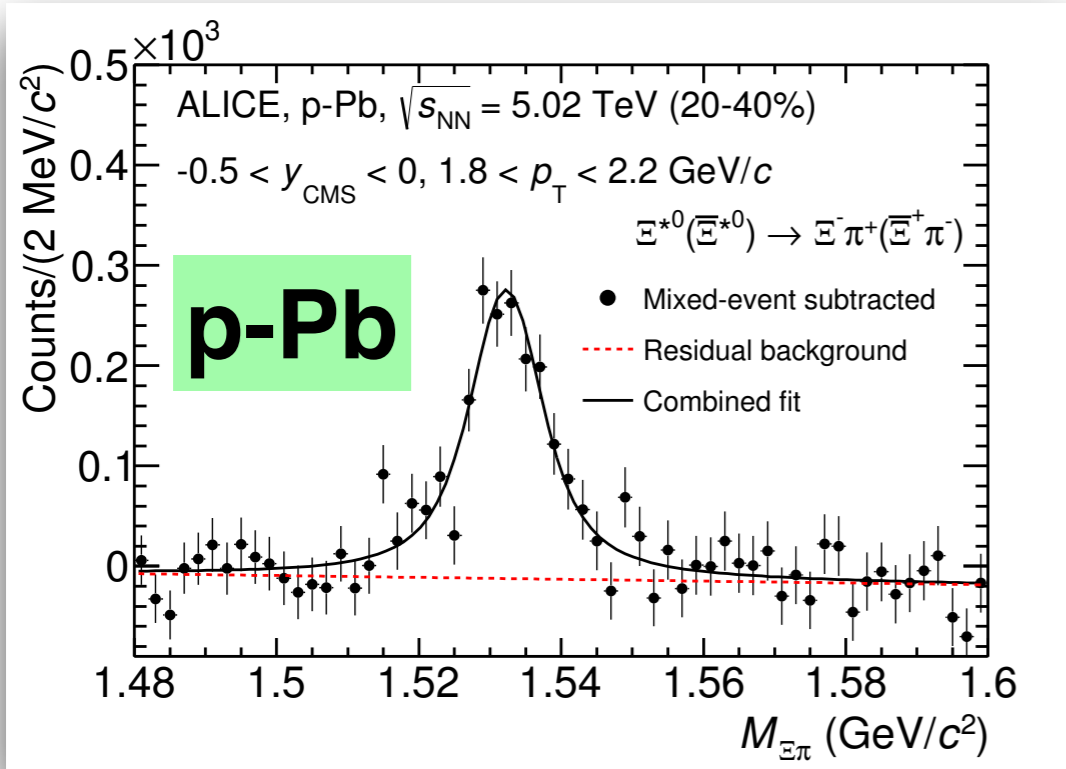
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Production of $\Xi(1530)^0$



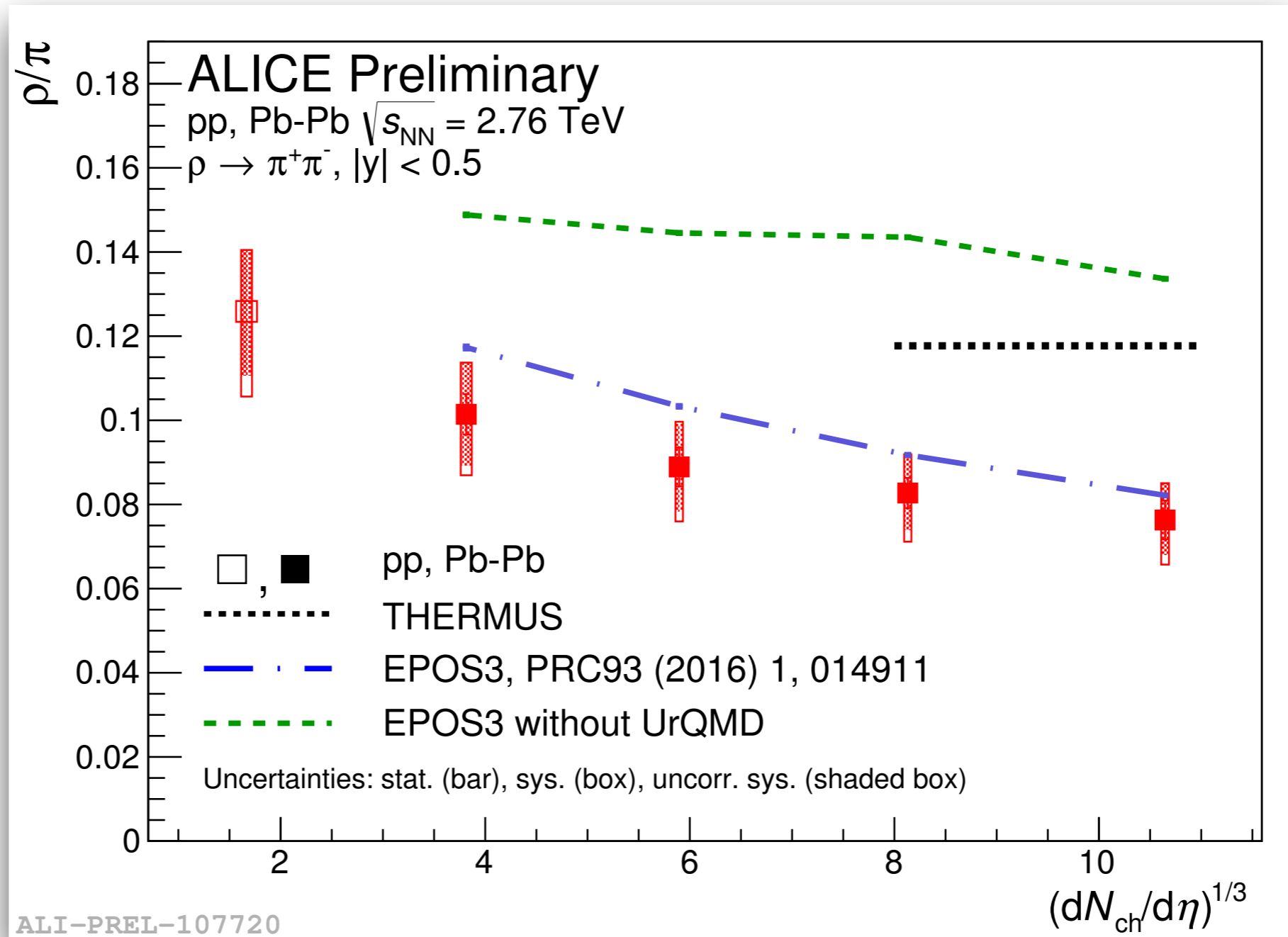
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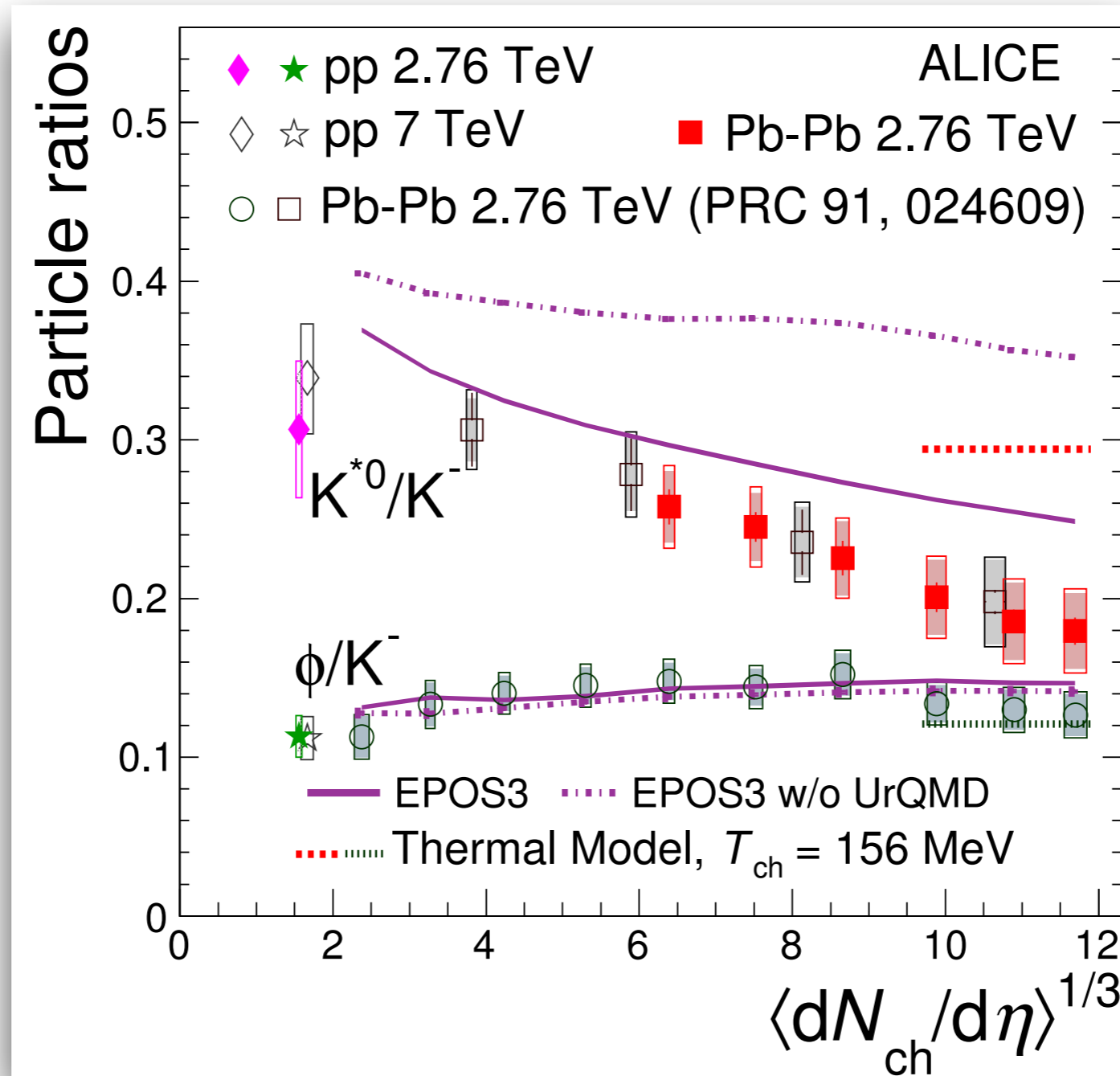
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Ratio of resonance yields in Pb-Pb



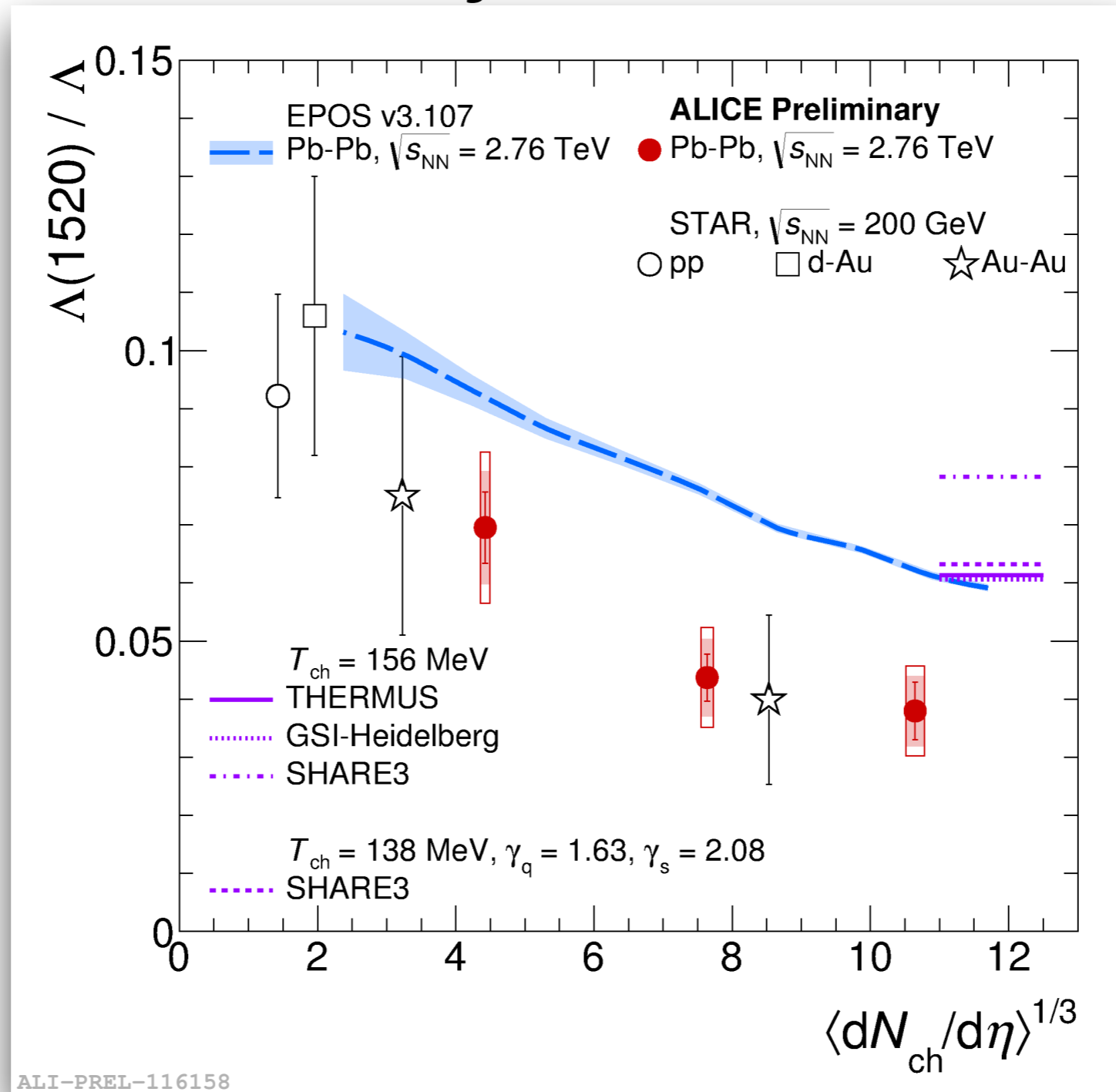
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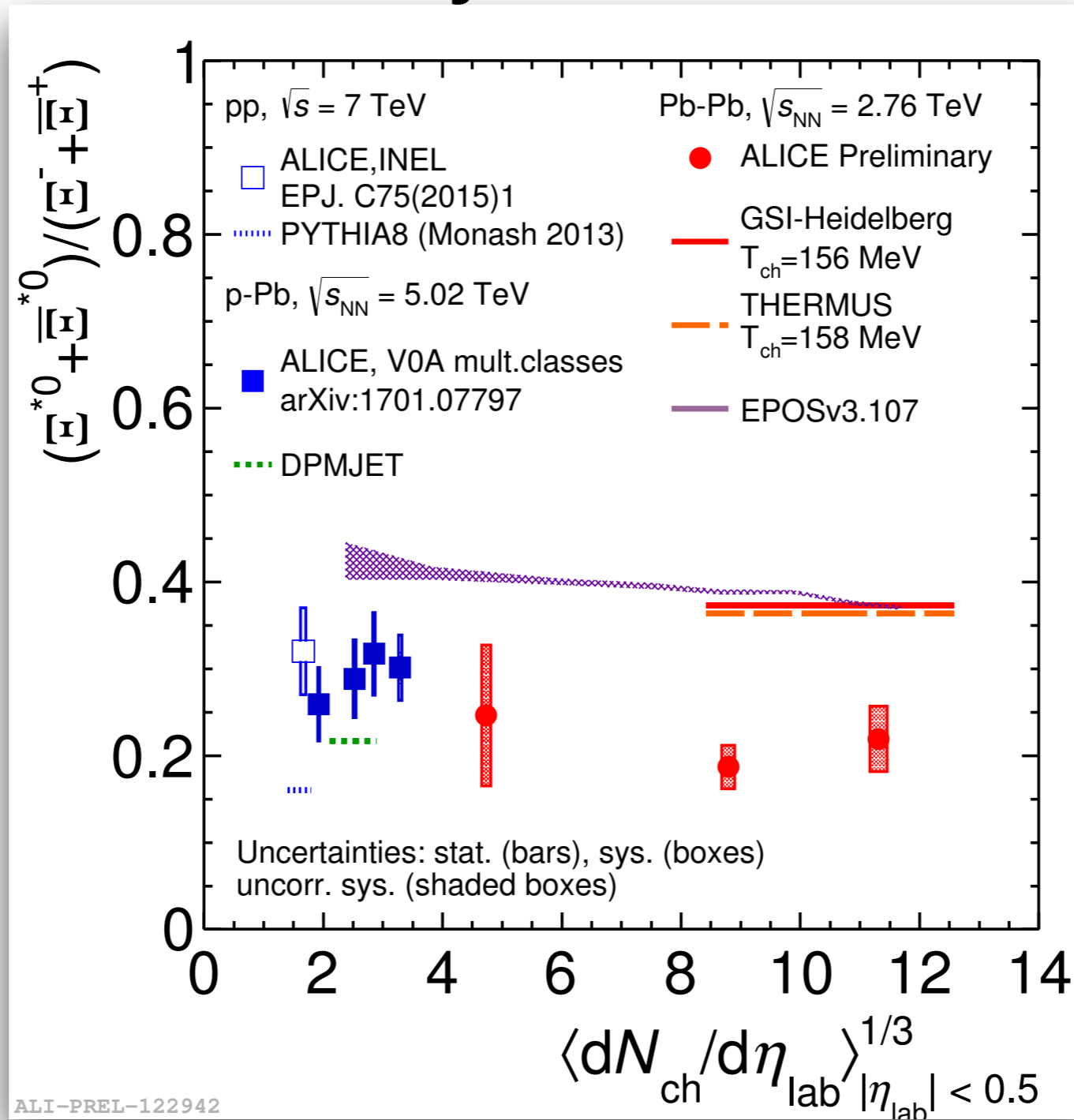
Ratio of resonance yields in Pb-Pb



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Ratio of resonance yields in Pb-Pb

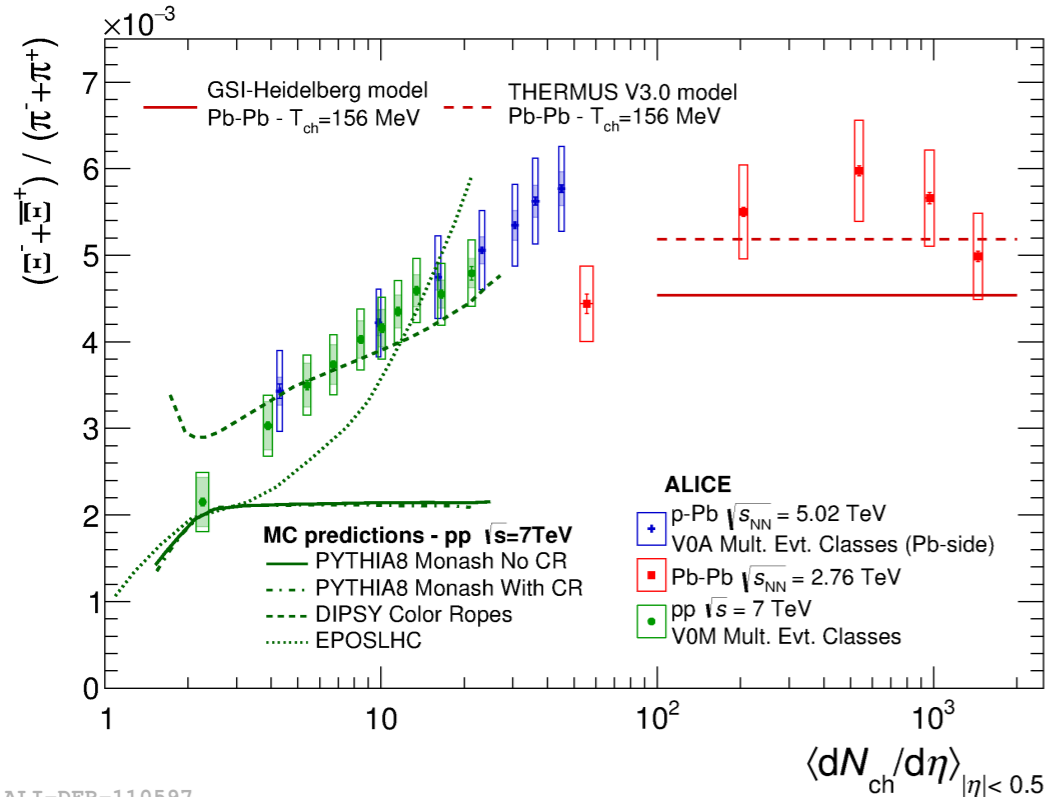


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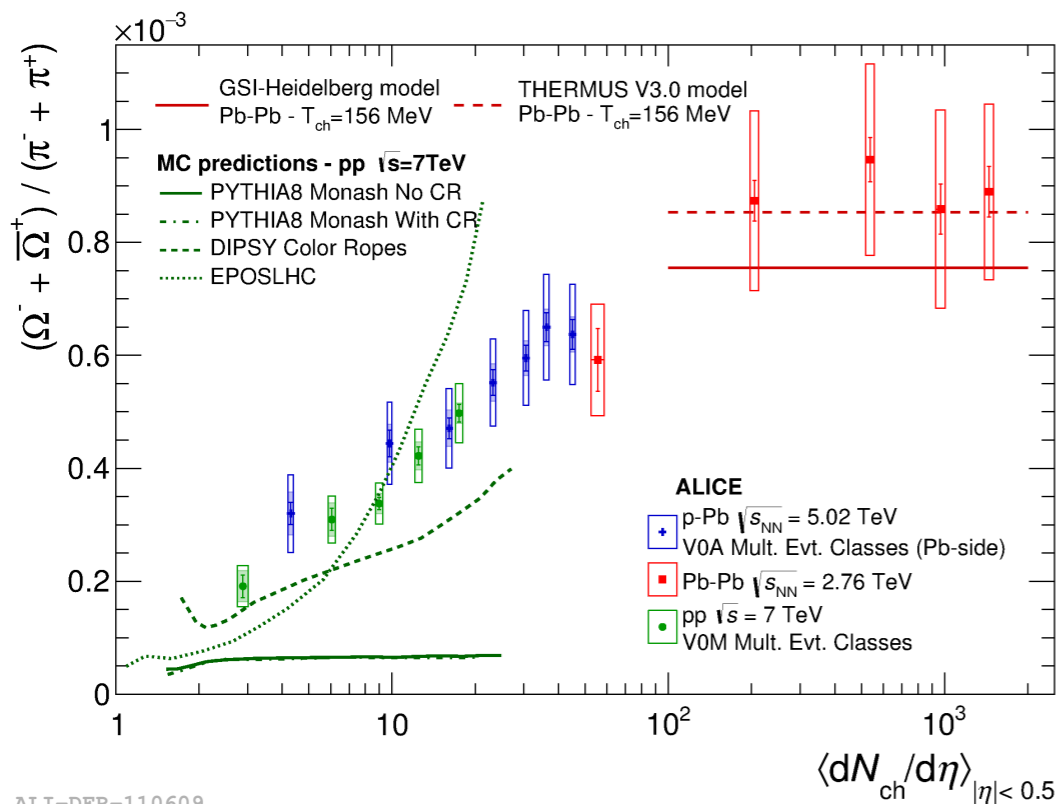
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- Hyperon
 - strangeness production
- Mean transverse momentum

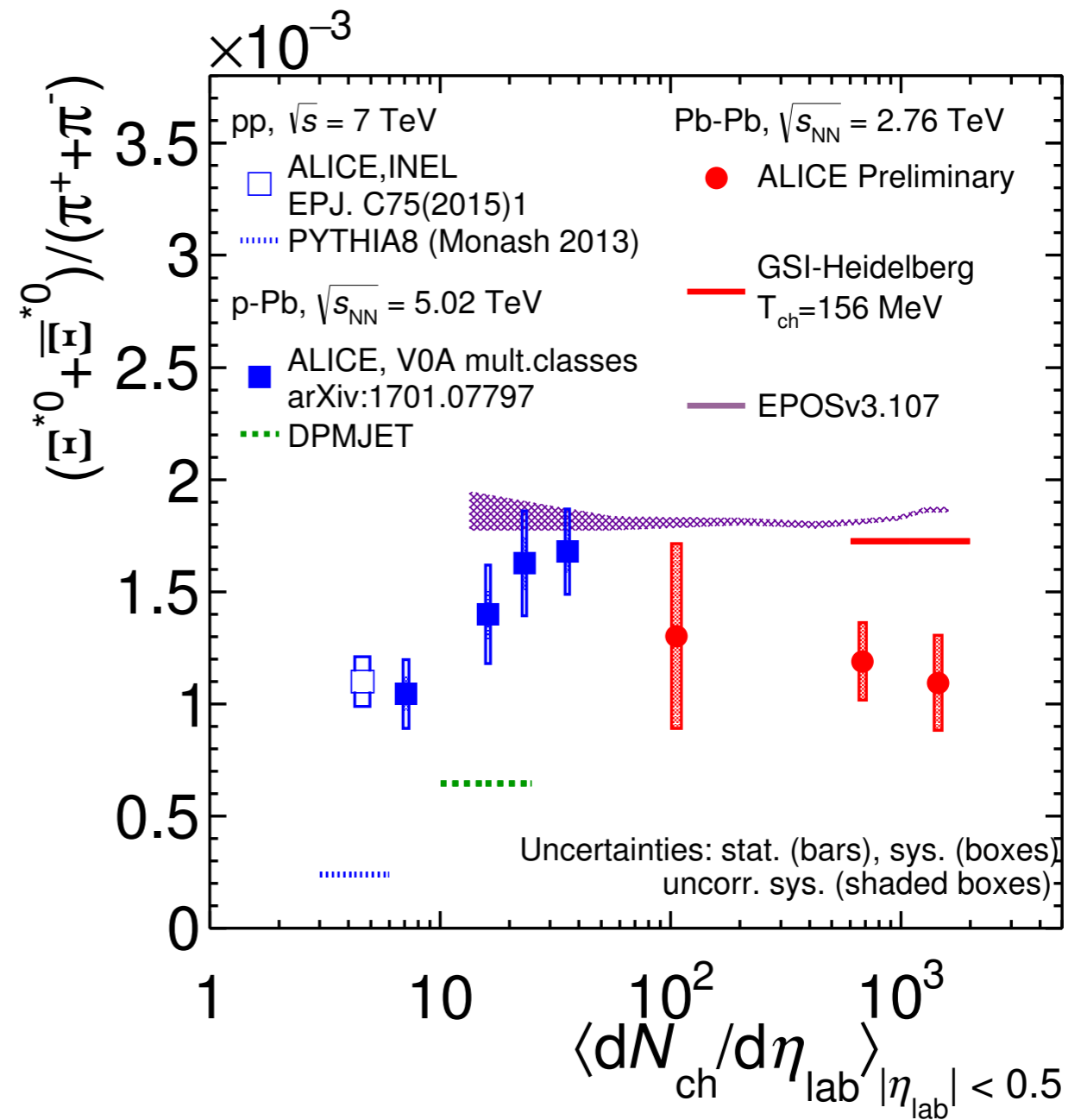
Hyperon to π



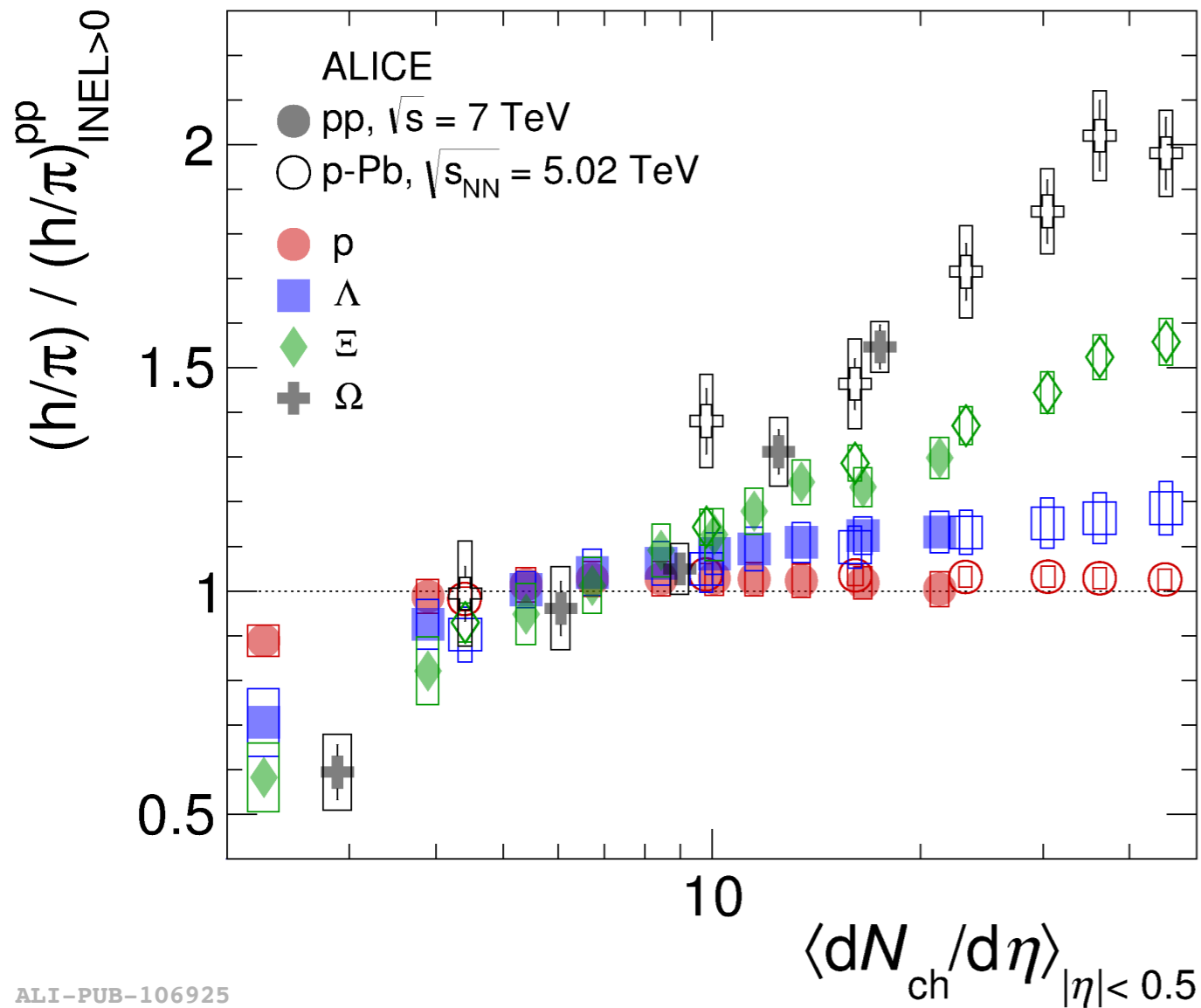
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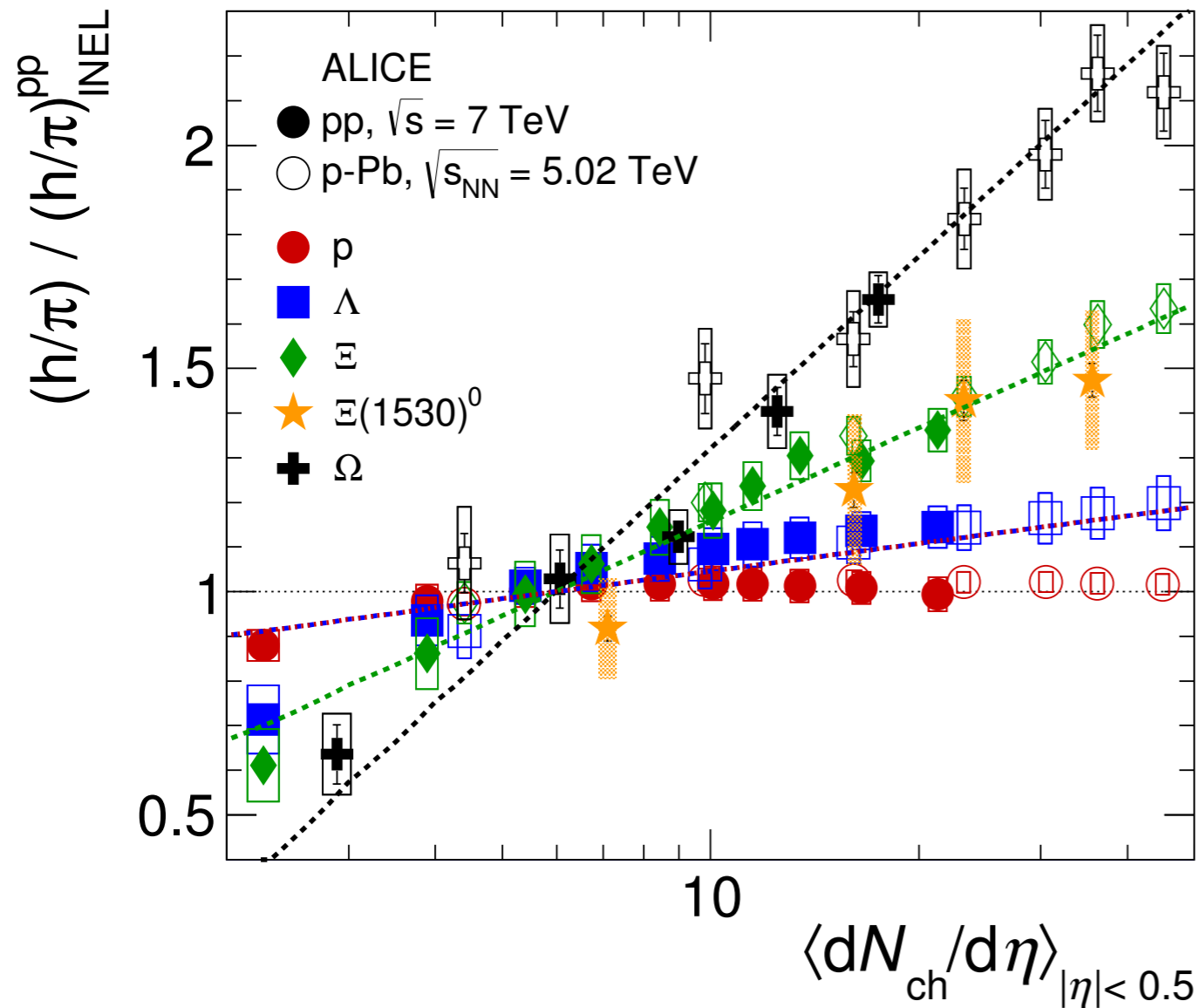
Hyperon to π



Increase in small system might be due to

- Mass
- Strangness content

Hyperon to π



Increase in small system might be due to

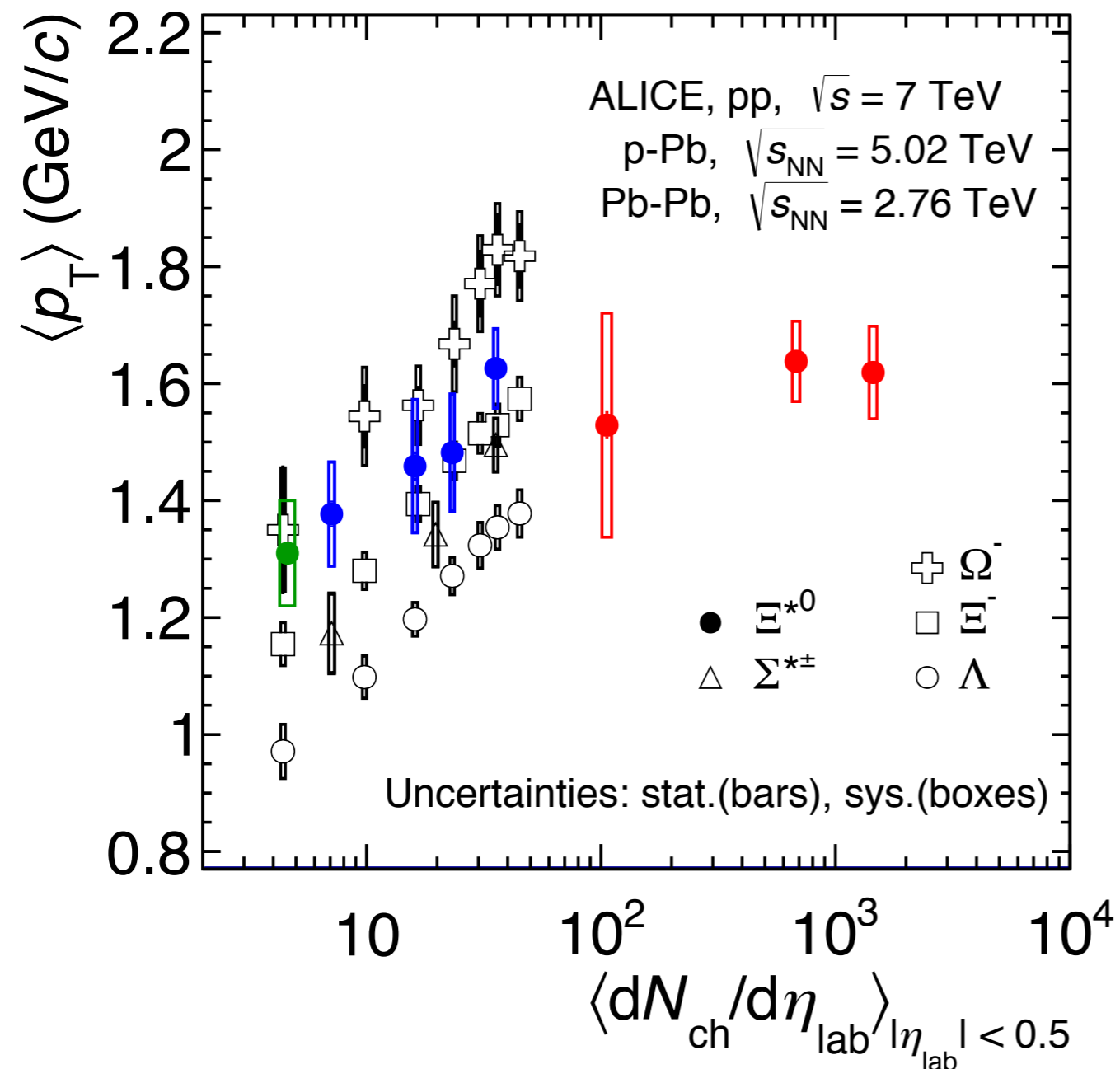
- Mass

- Strangness content

Outline

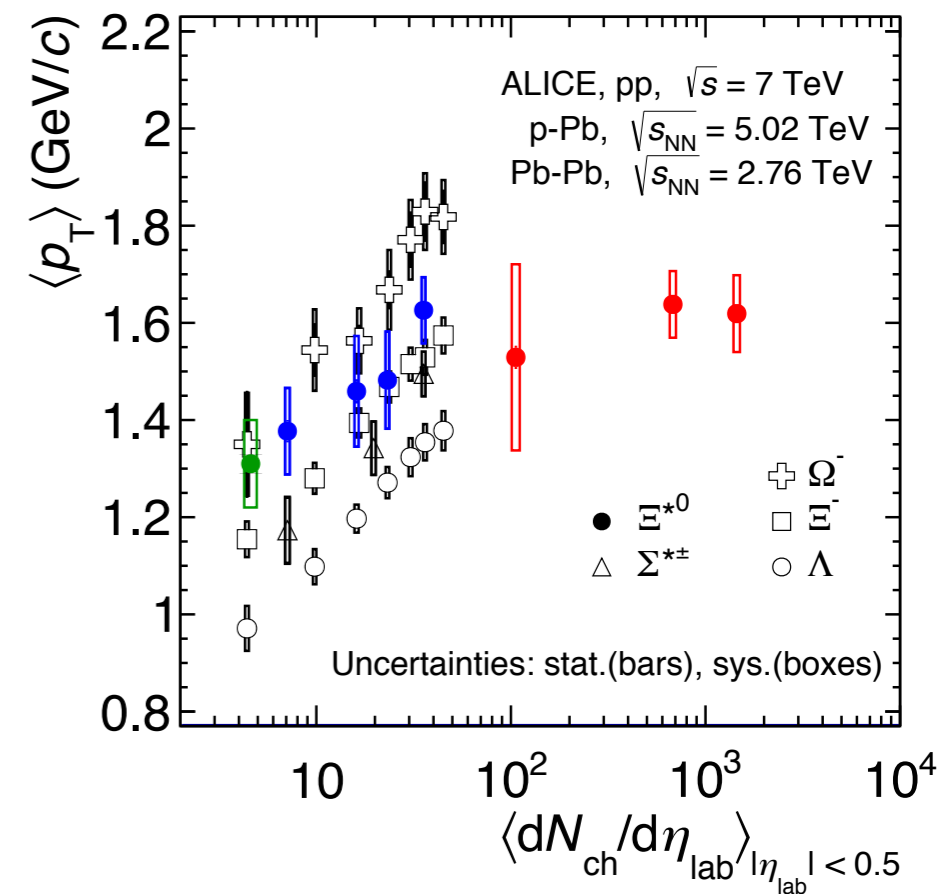
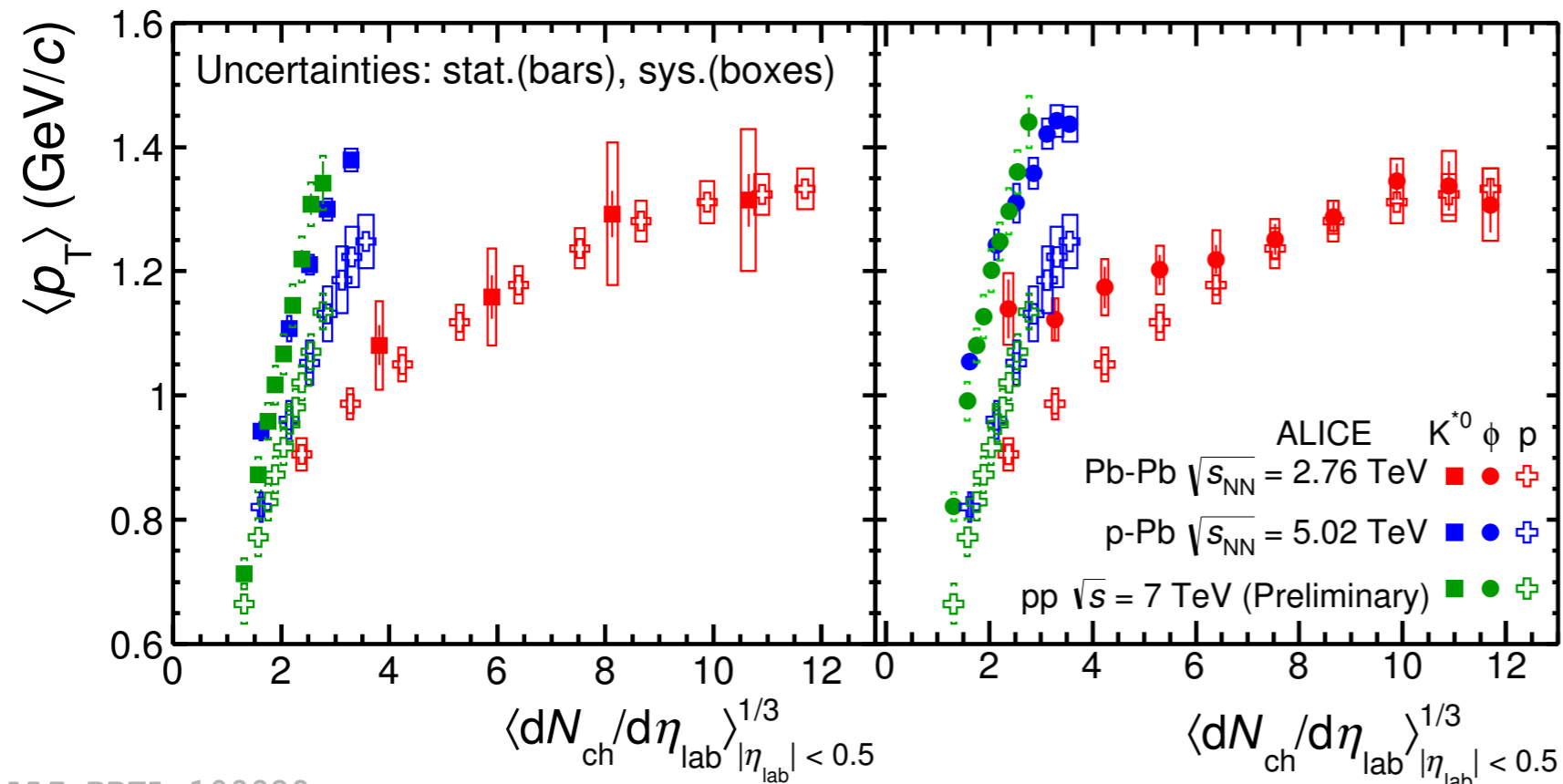
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- **Mean transverse momentum**

Mean transverse momentum



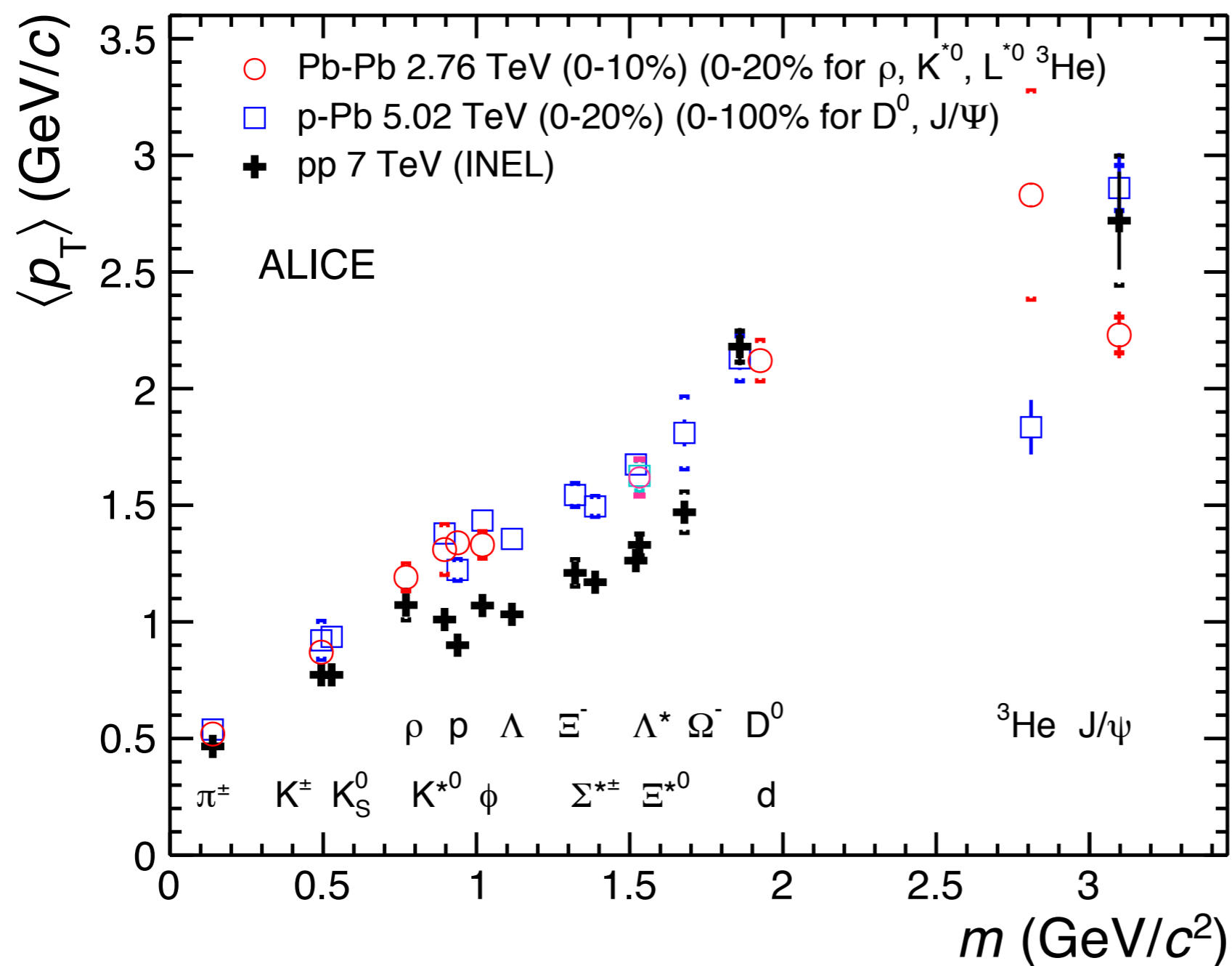
- $\langle p_T \rangle$ increases with multiplicity
- $\langle p_T \rangle$ follows mass ordering in small system (pp, p-Pb)

Mean transverse momentum

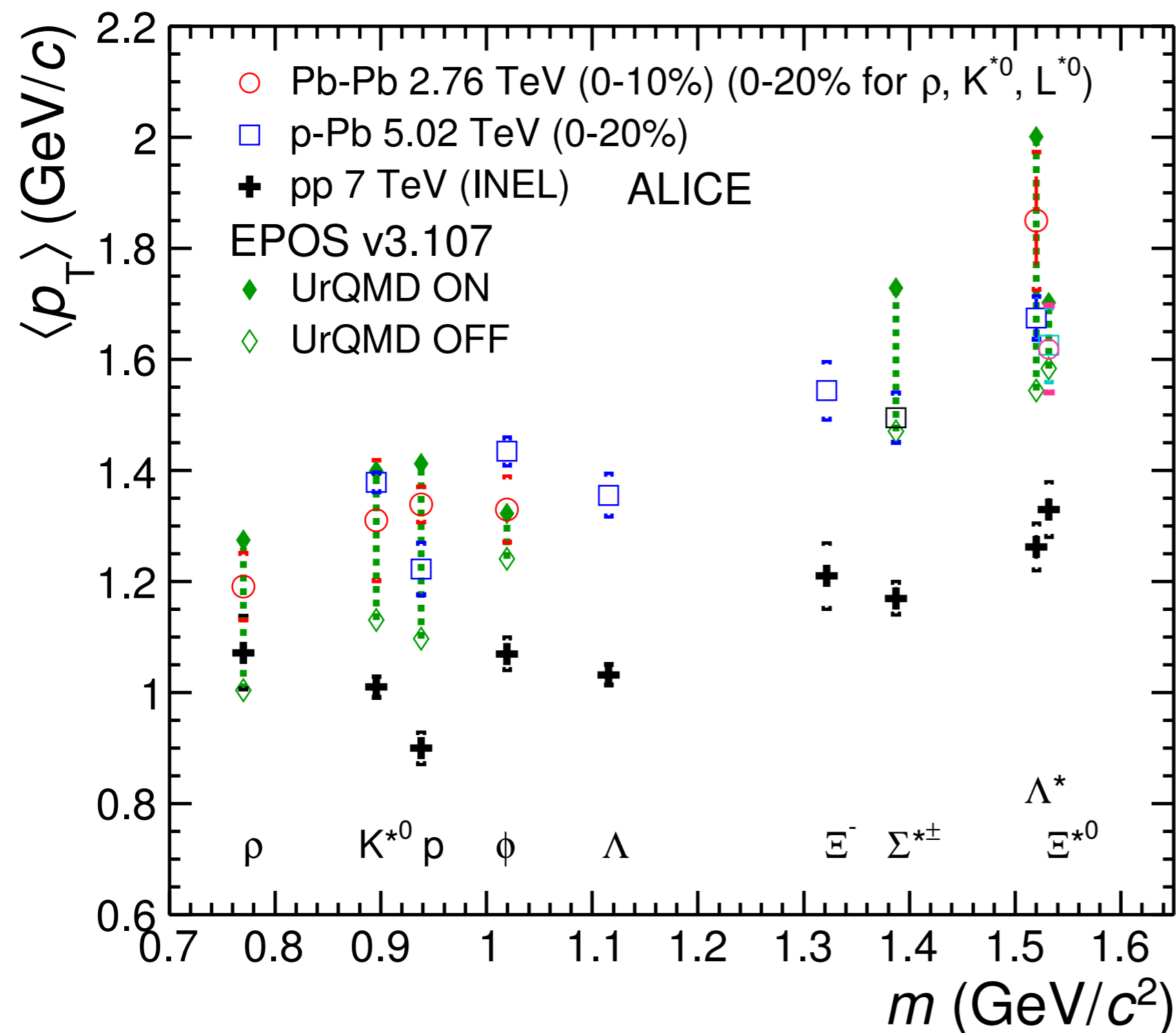


- $\langle p_T \rangle$ of K^{*0} , Φ and proton
 - fast increase in small system

Mean transverse momentum



Mean transverse momentum



- **EPOS** prediction

- **Ultra-relativistic Quantum Molecular Dynamics ON/OFF**

- **UrQMD** takes account re-scattering/regeneration effects in hadronic phase

- $\langle p_T \rangle$ with UrQMD ON is larger than it with OFF due to re-scattering effect

Summary

- **Resonance**
 - yield of short-lived resonances decrease with system size due to re-scattering effect in hadronic phase
- **Hyperon**
 - strangeness production in small system is related to strangeness content, not due to mass
- **Mean transverse momentum**
 - follows mass ordering