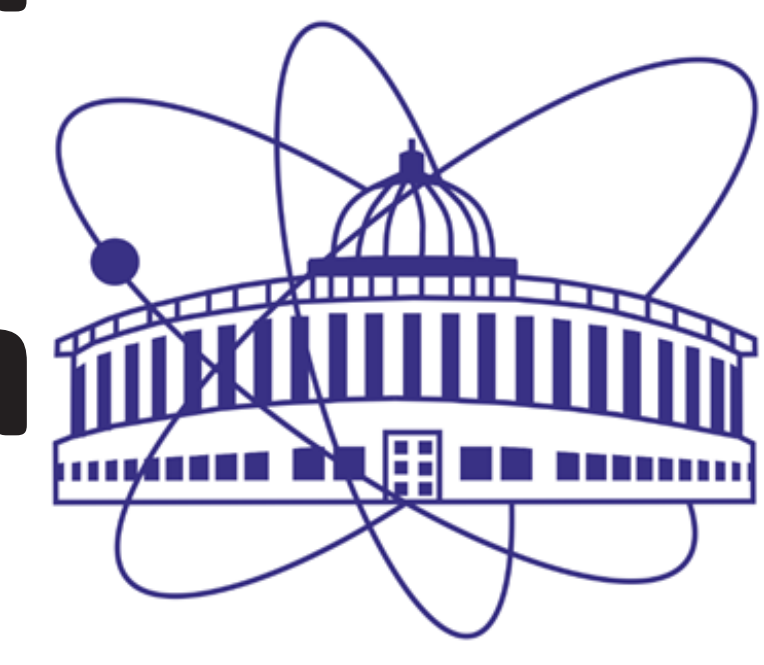


Particle physics at intermediate and high energies 2026

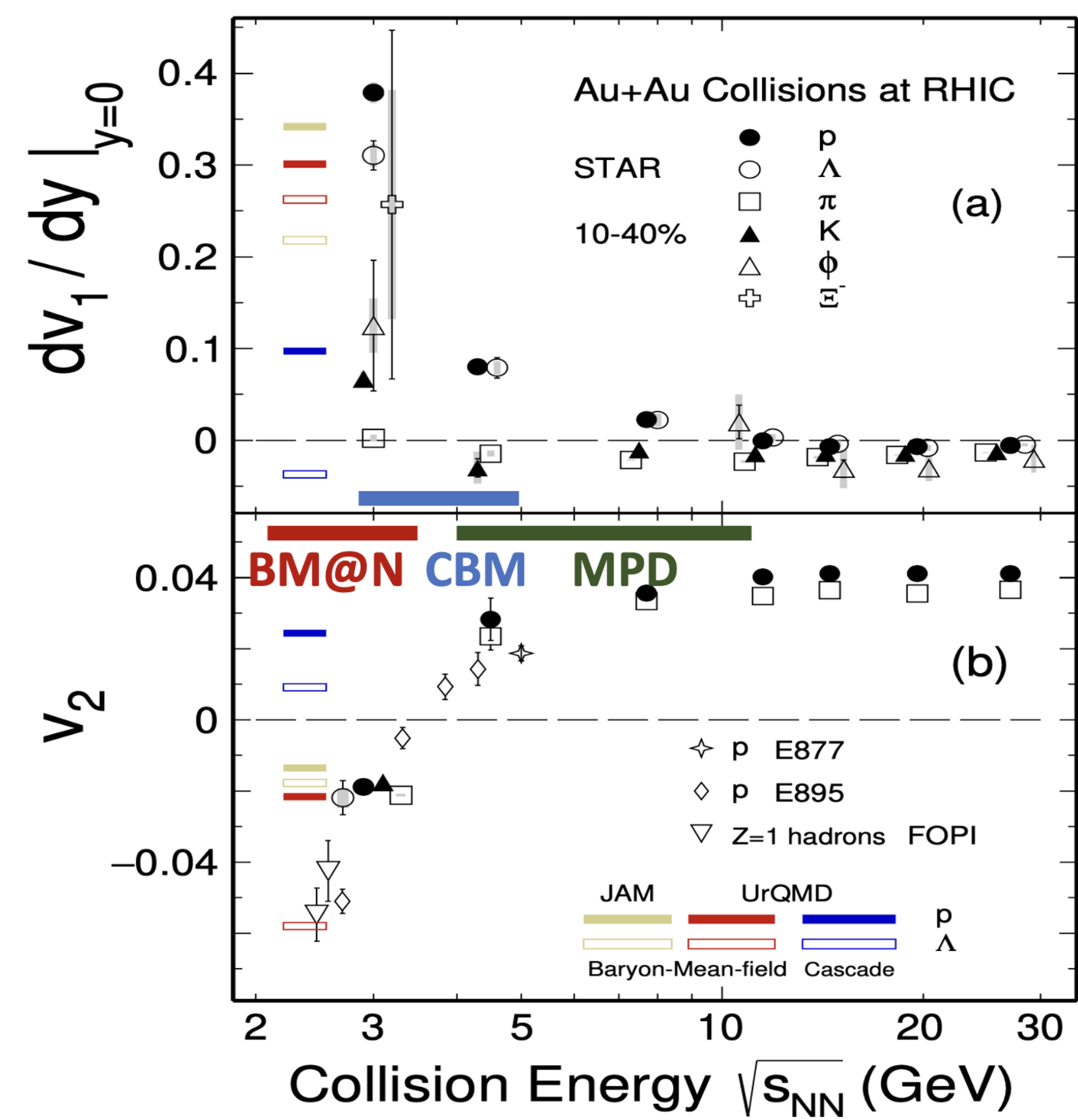
Directed flow measurements of Λ hyperons in the MPD-FXT experiment at NICA energies



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Collective flow at NICA energies



$$\frac{dN}{d\varphi} \approx 1 + 2 \sum_{n=1} v_n \cos[n(\varphi - \Psi_{RP})]$$

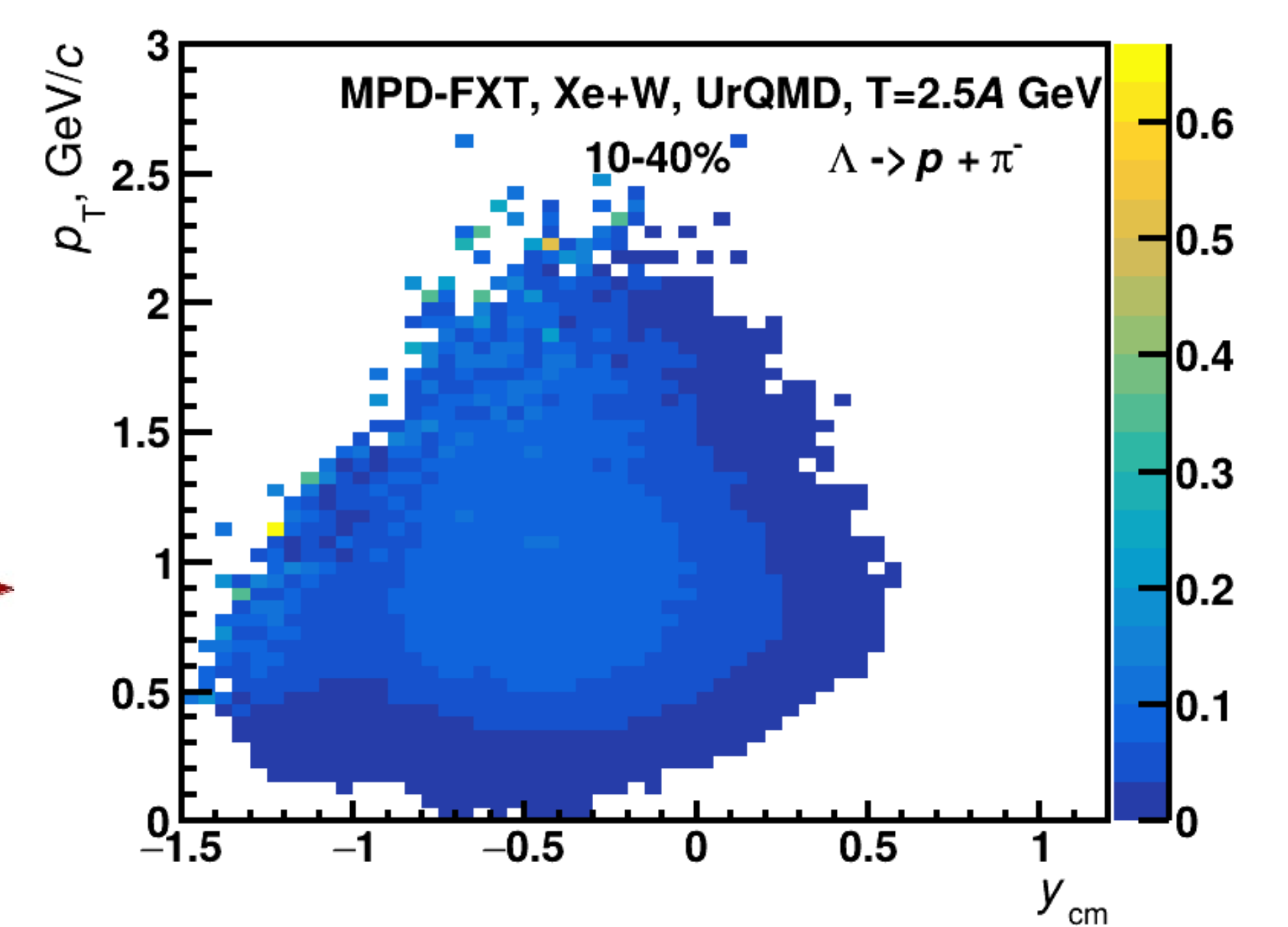
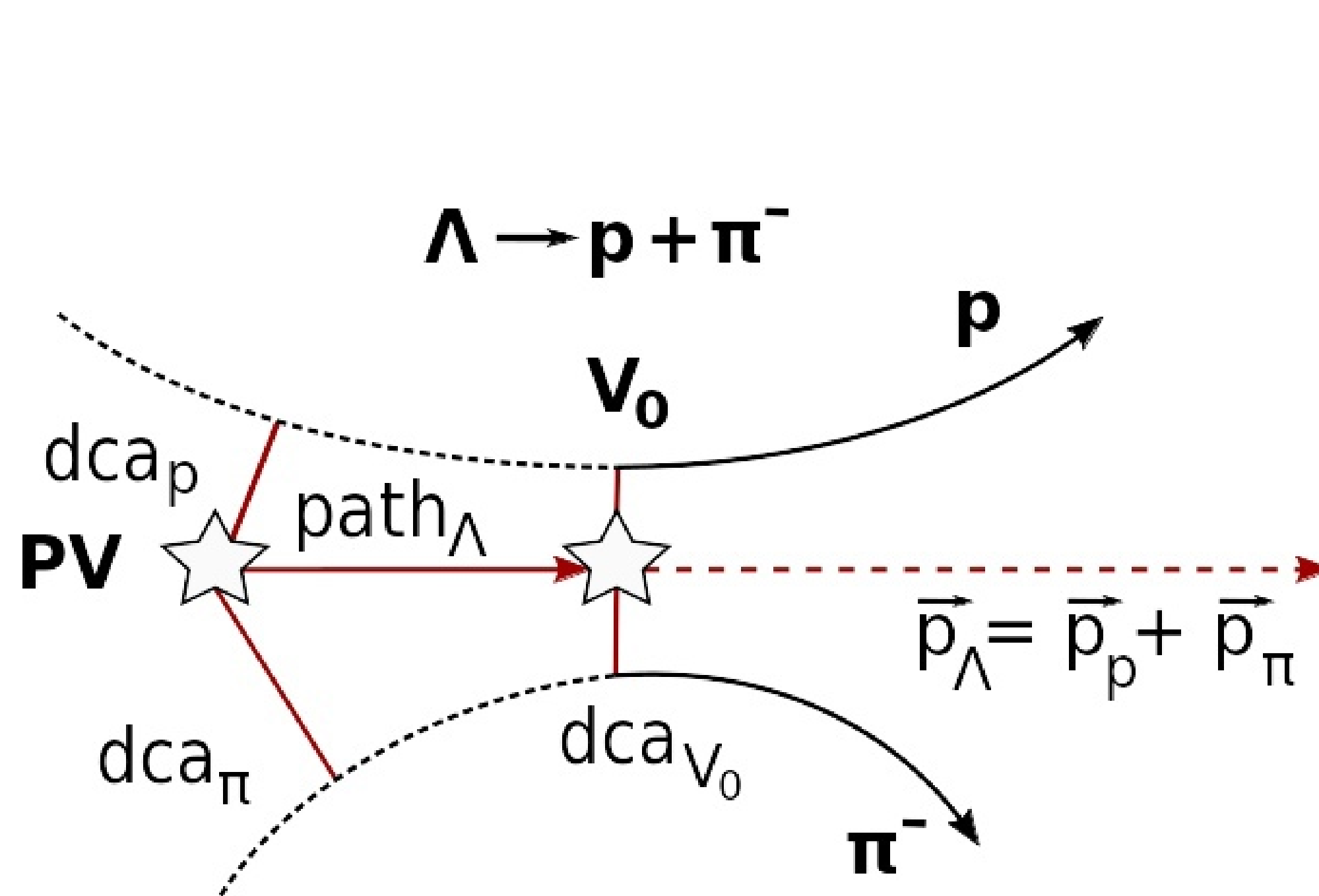
Anisotropic flow v_n at NICA energies is a delicate balance between:

- The ability of pressure developed early in the reaction zone
($t_{\text{exp}} = \frac{R}{c_s}$, $c_s = \sqrt{\frac{dp}{d\varepsilon}}$)
- The passage time for removal of the shadowing by spectators
($t_{\text{pass}} = \frac{2R}{\gamma_{\text{CM}}\beta_{\text{CM}}}$)

Study the anisotropic of Λ will provide information about:

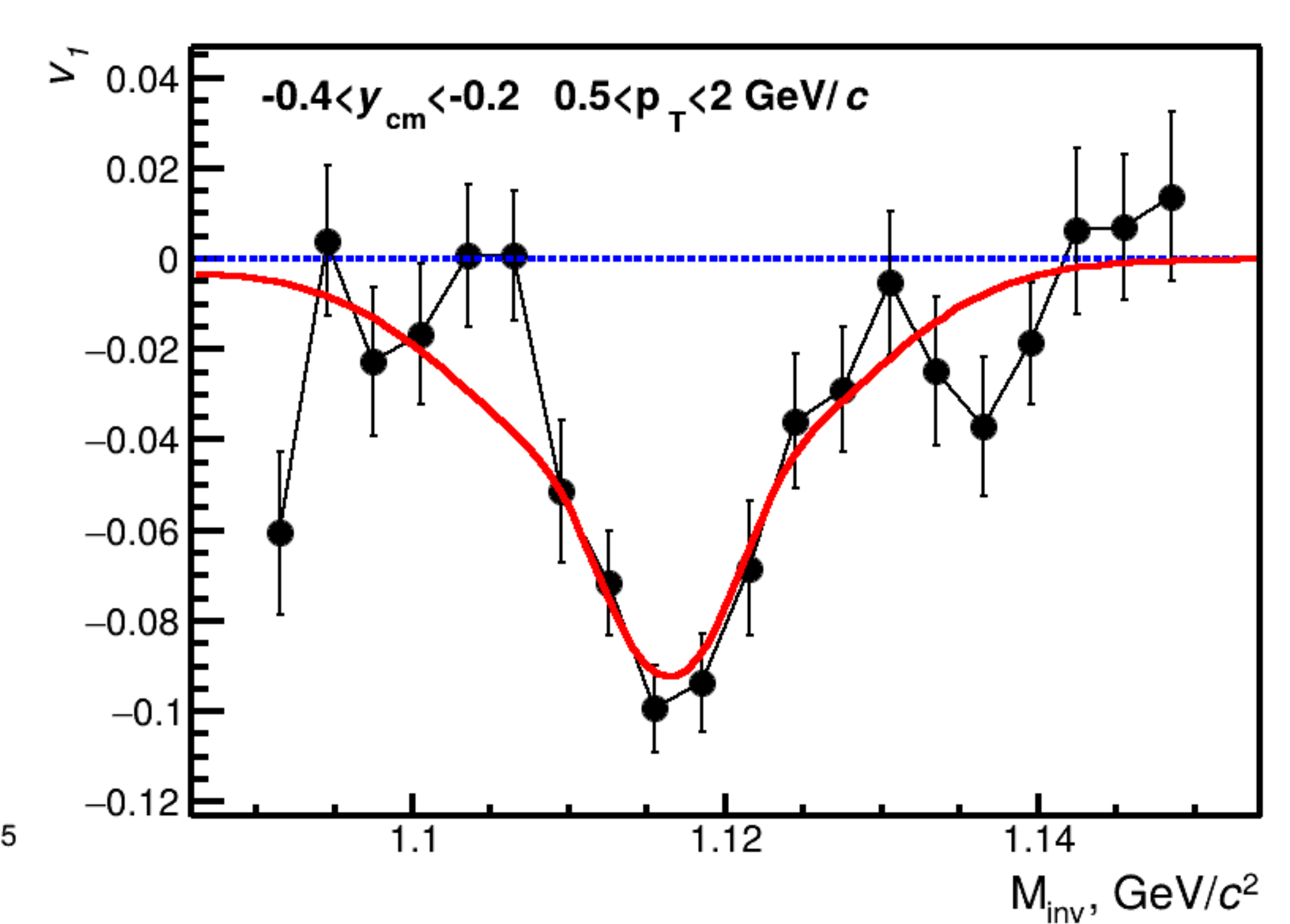
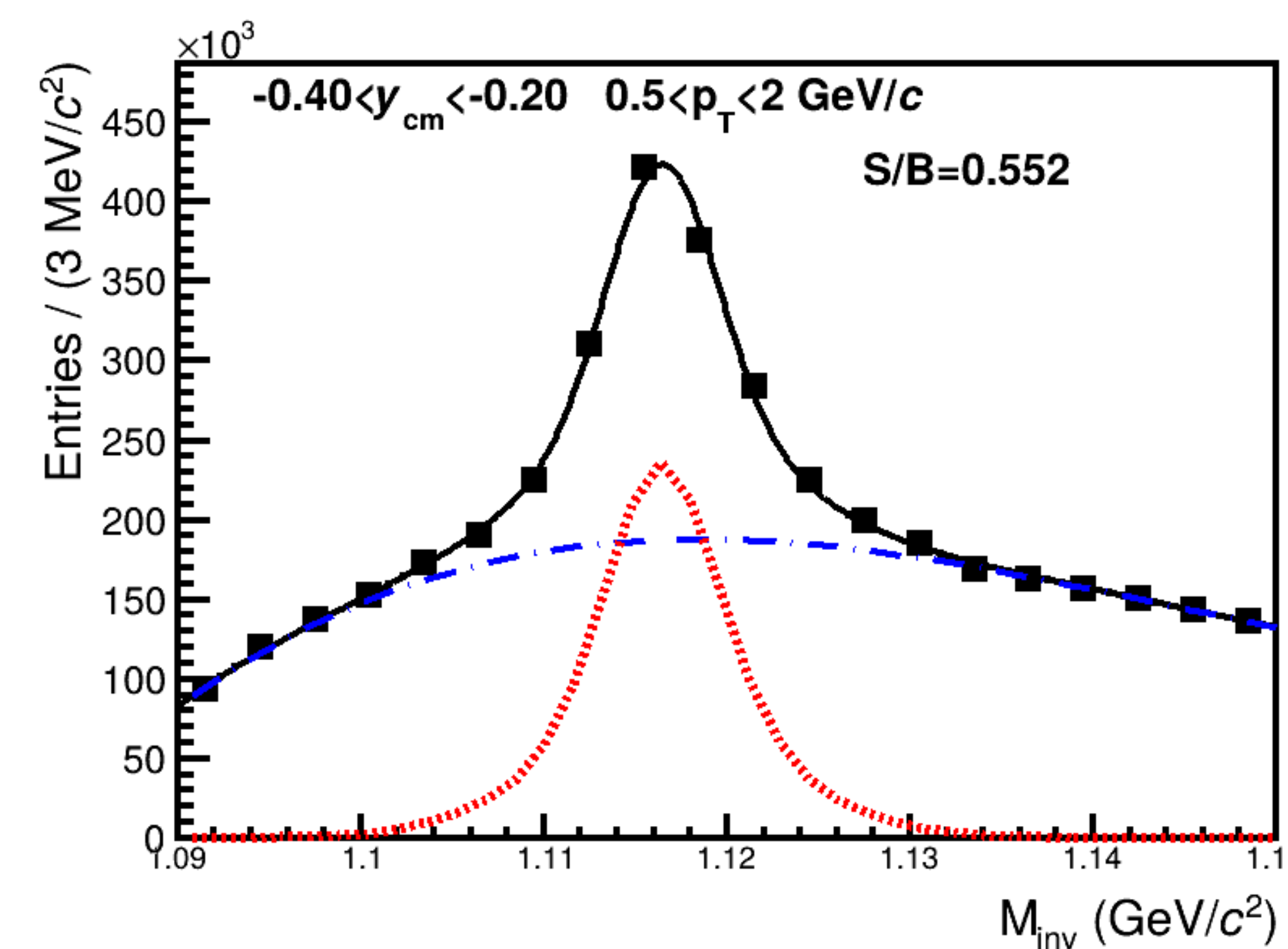
- Early stage of the evolution of colliding nuclei
- Hyperon-nucleus interactions
- Strong repulsive Λ potential

Λ hyperons reconstruction



- Selection of daughters (p , π) by charge
- Reconstruction of Λ candidates and its topological selection with KFParticle
- A comparison of reconstructed Λ with simulated ones to extract the efficiency map

Invariant mass method

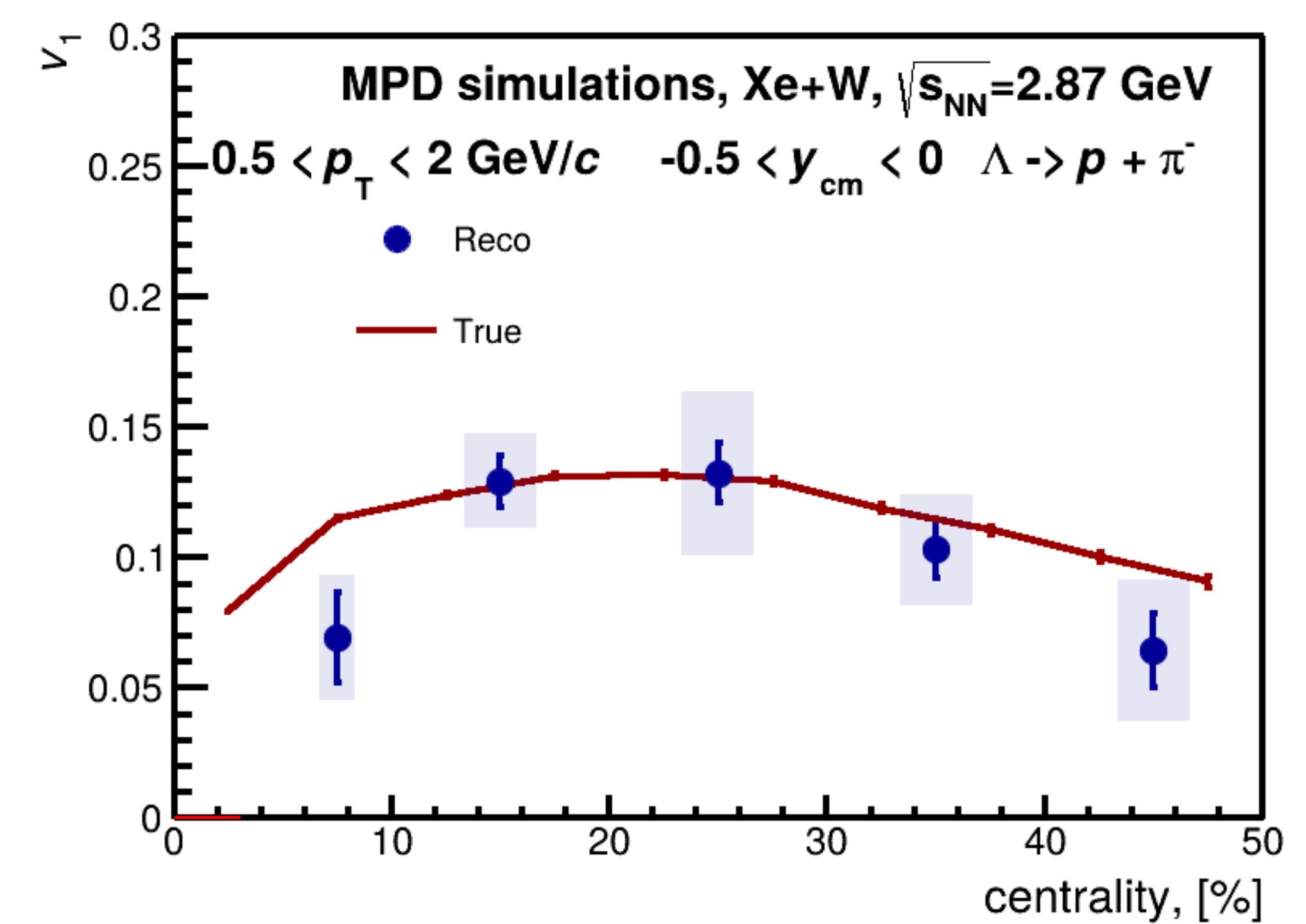
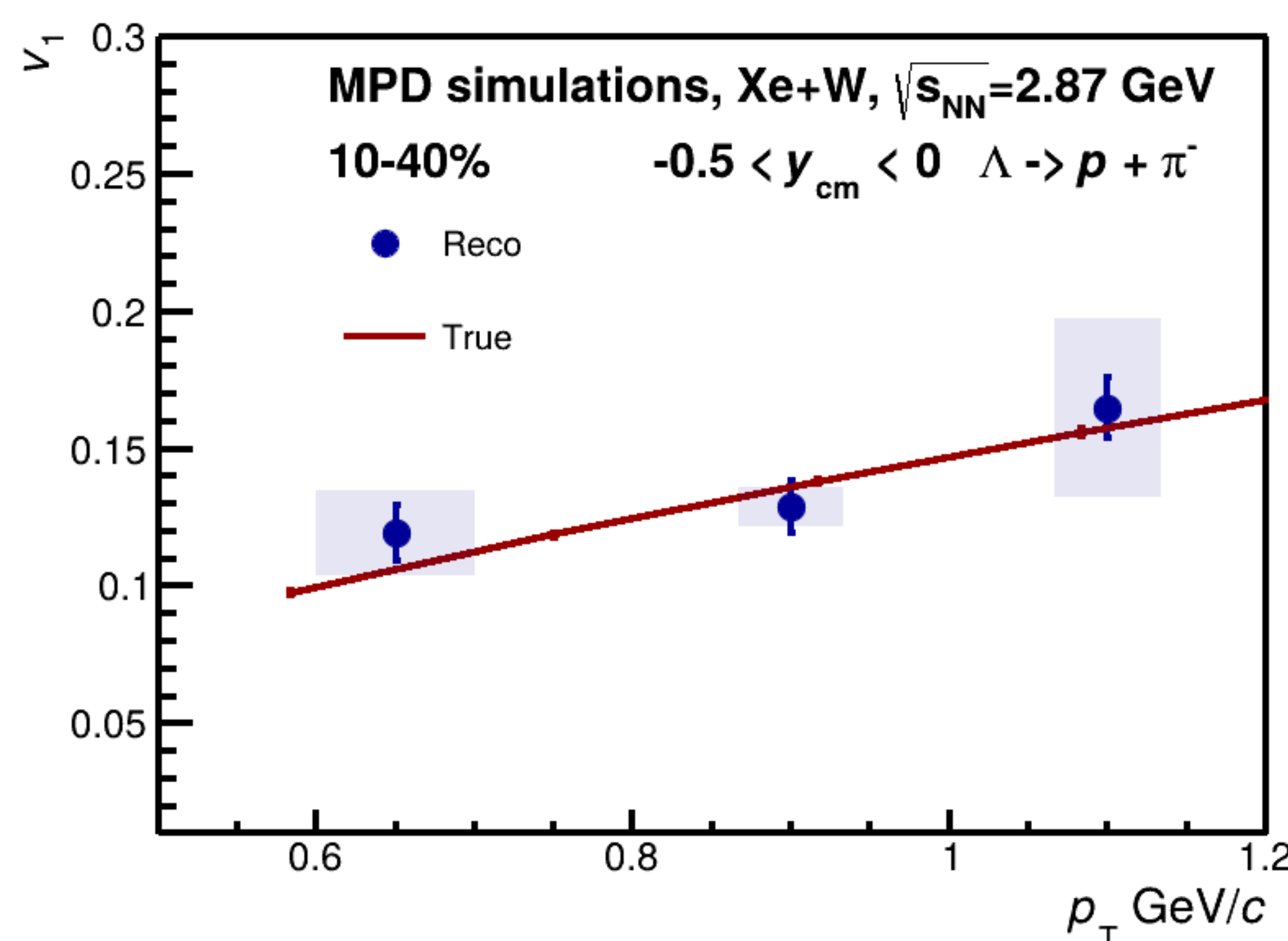
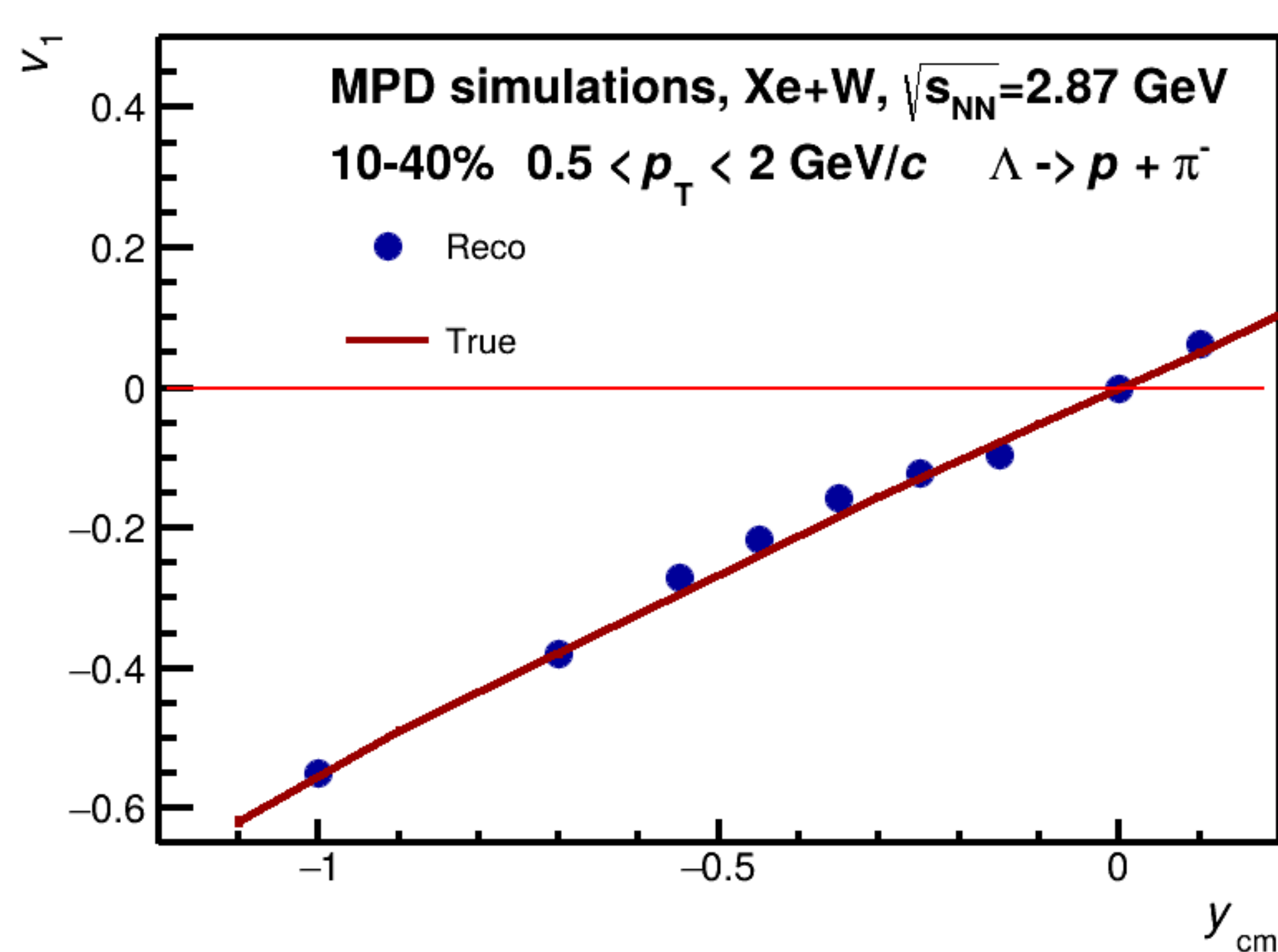


$$v_n^{SB}(m_{\text{inv}}) = v_n^S \frac{N^S}{N^{SB}(m_{\text{inv}})} + v_n^B \frac{N^B(m_{\text{inv}})}{N^{SB}(m_{\text{inv}})}$$

To extract the directed flow of Λ hyperons the invariant mass fitting method was used. One needs to fit $v_1(m_{\text{inv}})$ taking into account the ratio of signal to background of corresponding invariant mass distribution.

The distribution was fitted by gaussian function with third degree polynomial function, while the $v_1^B(m_{\text{inv}})$ was described by first degree polynomial function.

v_1 as a function of y_{cm} , p_T and centrality for Xe+W at 2.87 GeV/n in the MPD-FXT



- v_1 as a function of center-of-mass rapidity y_{cm} (left), transverse momentum p_T (middle) and centrality(right). Reconstructed signals has a good agreement with the simulated ones.

- The systematic uncertainties originates from the symmetry plane reconstruction systematics.

Conclusions

- The performance of differential v_1 measurements of Λ hyperons as a function of rapidity, transverse momentum and centrality in the MPD-FXT Xe+W at 2.87 GeV/n was presented.
- The reconstructed signal shows a good agreement with the simulated 'True' signal in the mid-central collisions.