Hyperon Global Polarization
I. Maldonado
Analyzed data
Event Plane Angle
Hyperon reconstruction
Preliminary angular distributions
Summary

Hyperon global Polarization

Progress on the study

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PHSD data - Hyperons

Analyzed data

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- Reconstructed and corrected PHSD dataset $\rightarrow$ AuAu at $\sqrt{s_{NN}} = 7.7$ GeV by E. Nazarova
- $\approx$ 55000 events
- Macro for new mpdroot distribution
- Event Plane angle with ZDC, TPC and MCTracks
- Hyperons identification through its weak decay.
- Daughter tracks $\rightarrow$ ID with MC association

Event Plane Angle

Analysis with PHSD $\sqrt{s_{NN}} = 7.7$ GeV

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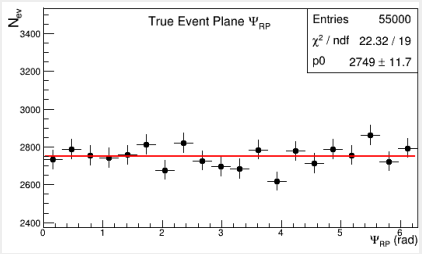
MC $\rightarrow \Psi_{RP}$ randomly in $(0^o, 360^o)$ isotropic distribution.



For reconstructed data we get the Event plane angle $\Psi_{EP}^{(n)}$.

$$\Psi_{EP}^{(n)} = \frac{1}{n} \arctan \frac{Q_y}{Q_x}$$

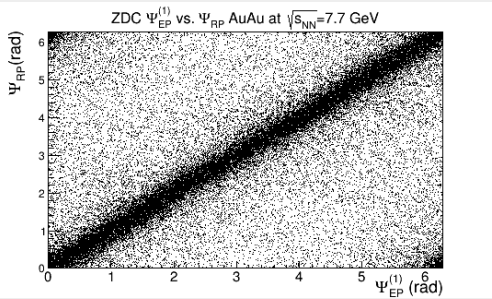
where:

$$Q_x = \sum_i w_i \cos(n\phi_i)$$

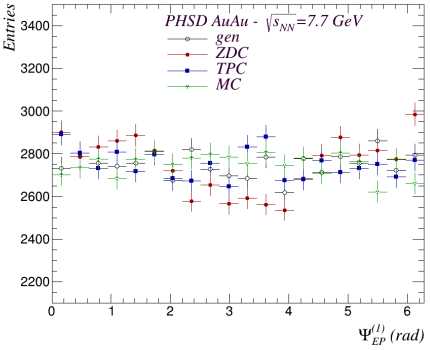
$$Q_y = \sum_i w_i \sin(n\phi_i)$$

Where w_i is p_T for TPC and E_{Loss} for ZDC and ϕ_i is the angle of the track or the module respectively.

Event Plane Angle - $\Psi_{EP}^{(1)}$



Only this pattern for ZDC



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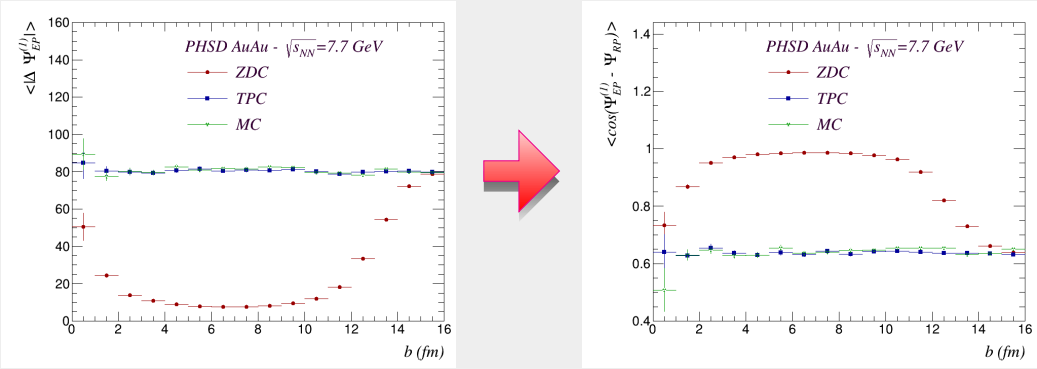

The difference in angle is smaller for ZDC, and also the resolution increases for semicentral collisions.

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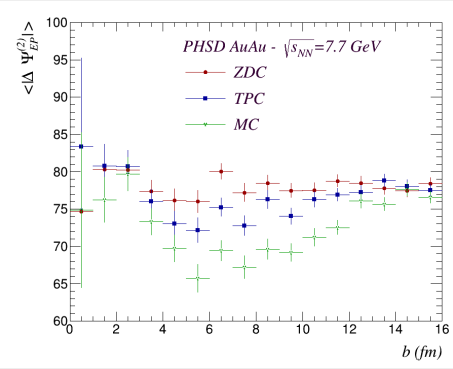

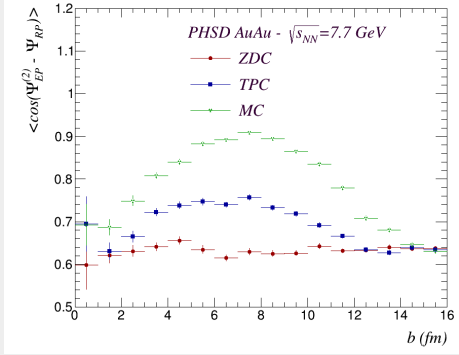

PHSD data - Hyperons Identification

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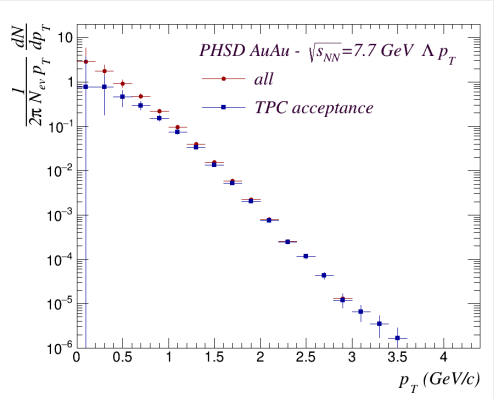
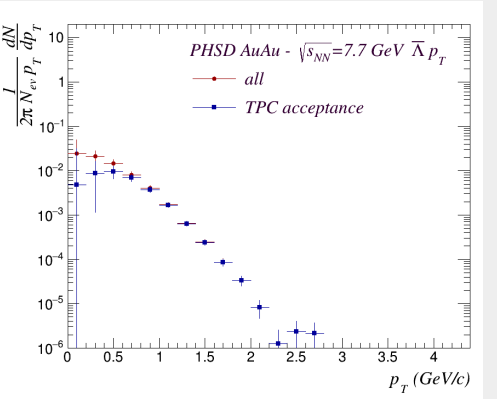
p_T distribution - Generated data





Analysis with PHSD $\sqrt{s_{NN}} = 7.7$ GeV

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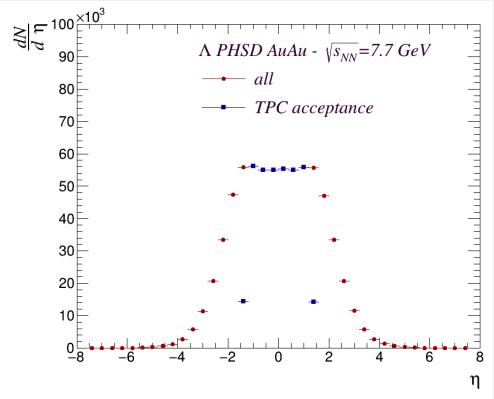
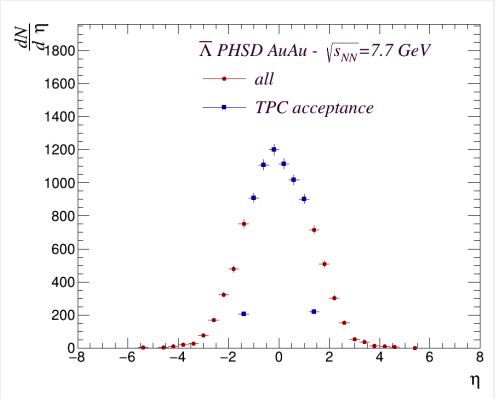
η distribution - Generated data





Analysis with PHSD $\sqrt{s_{NN}} = 7.7$ GeV

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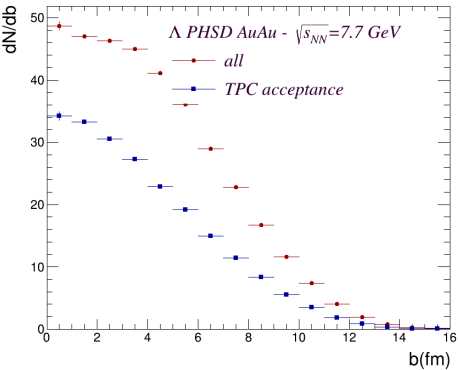
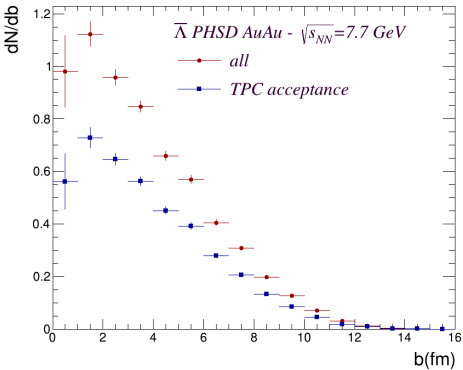
Ψ_{EP} - Generated data





Cuts on Kinematical variables

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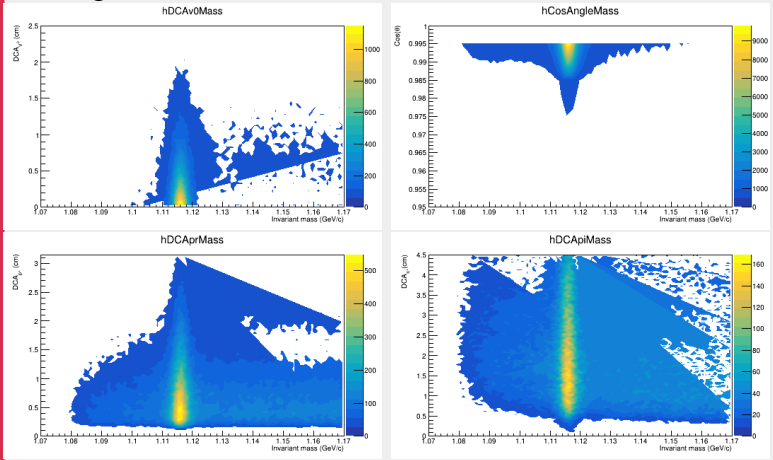
Daughter tracks with MC association



- DCA $V^0 < 0.5$ cm
- $\cos(\theta) > 0.98$
- DCA $p > 0.1$ cm
- DCA $\pi > 0.3$ cm

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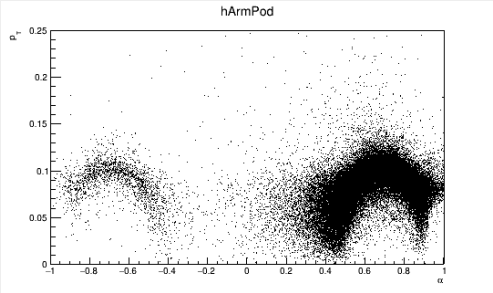
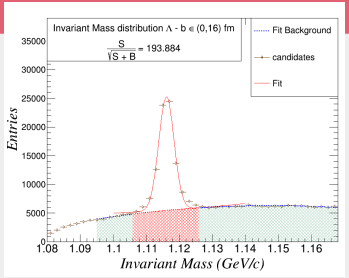
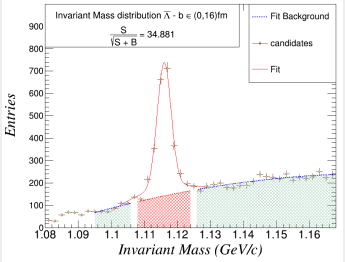
MC association for daughter tracks is used to remove background

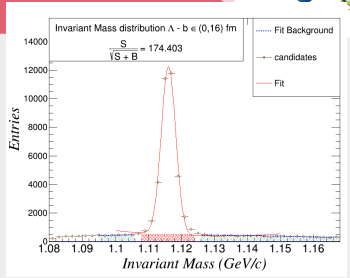


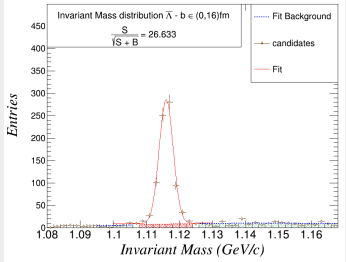
Invariant Mass distribution





cuts





PHSD data - Preliminary angular distributions

Preliminary distribution without R_{EP}

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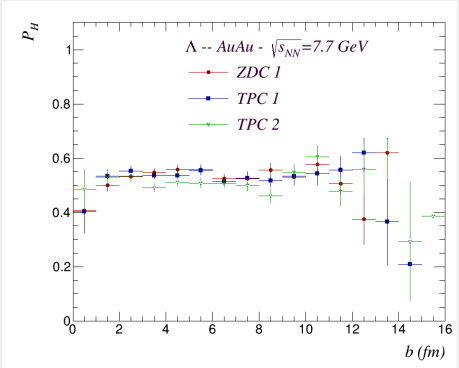
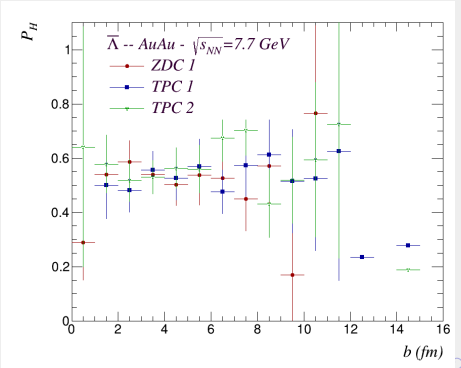
$$\mathcal{P}_H = \frac{8}{\pi \alpha_H} \left\langle \sin\left(\phi_p^* - \Psi_{EP}^{(1)}\right) \right\rangle$$





PHSD data - Summary

Work in progress

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We have presented preliminary:

- Event plane angle measurement with reconstructed tracks
- Identification of hyperons
- polarization distributions

We need to increase the sample of analyzed data and compare with other samples.