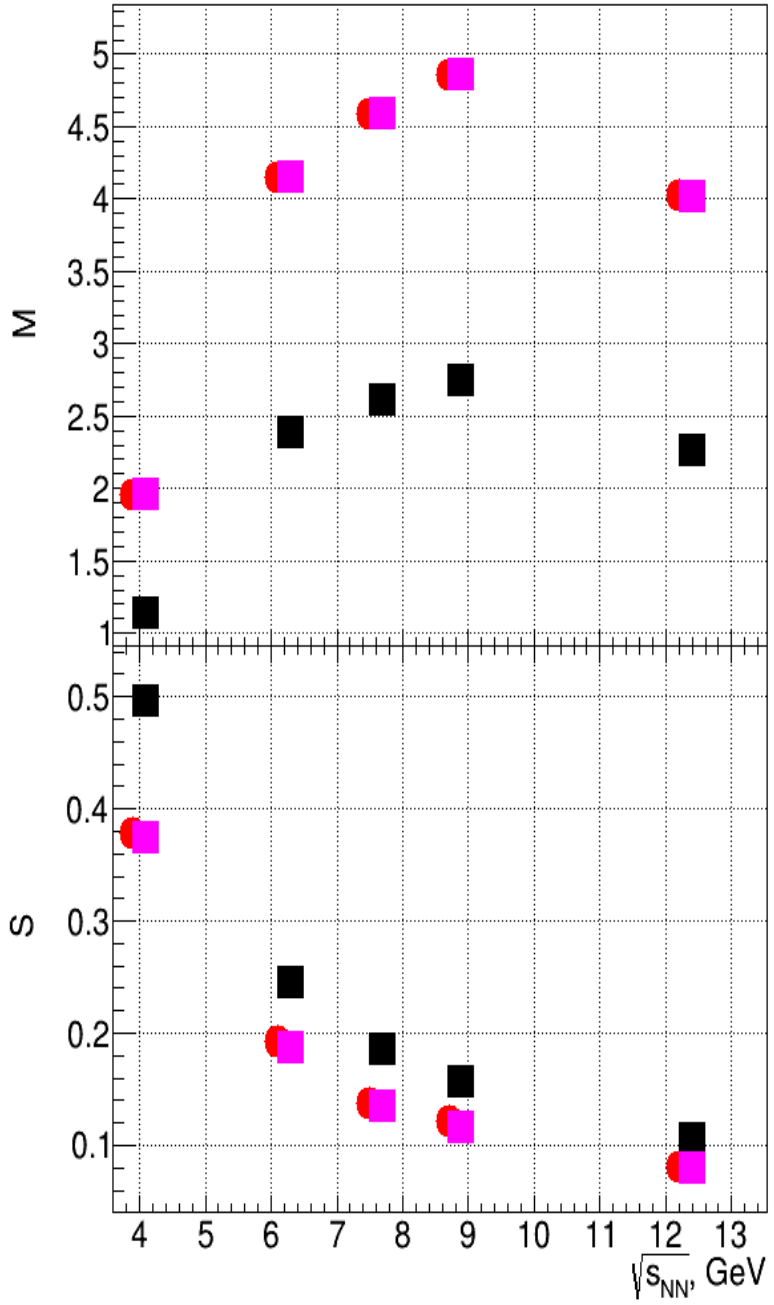
## Data sets

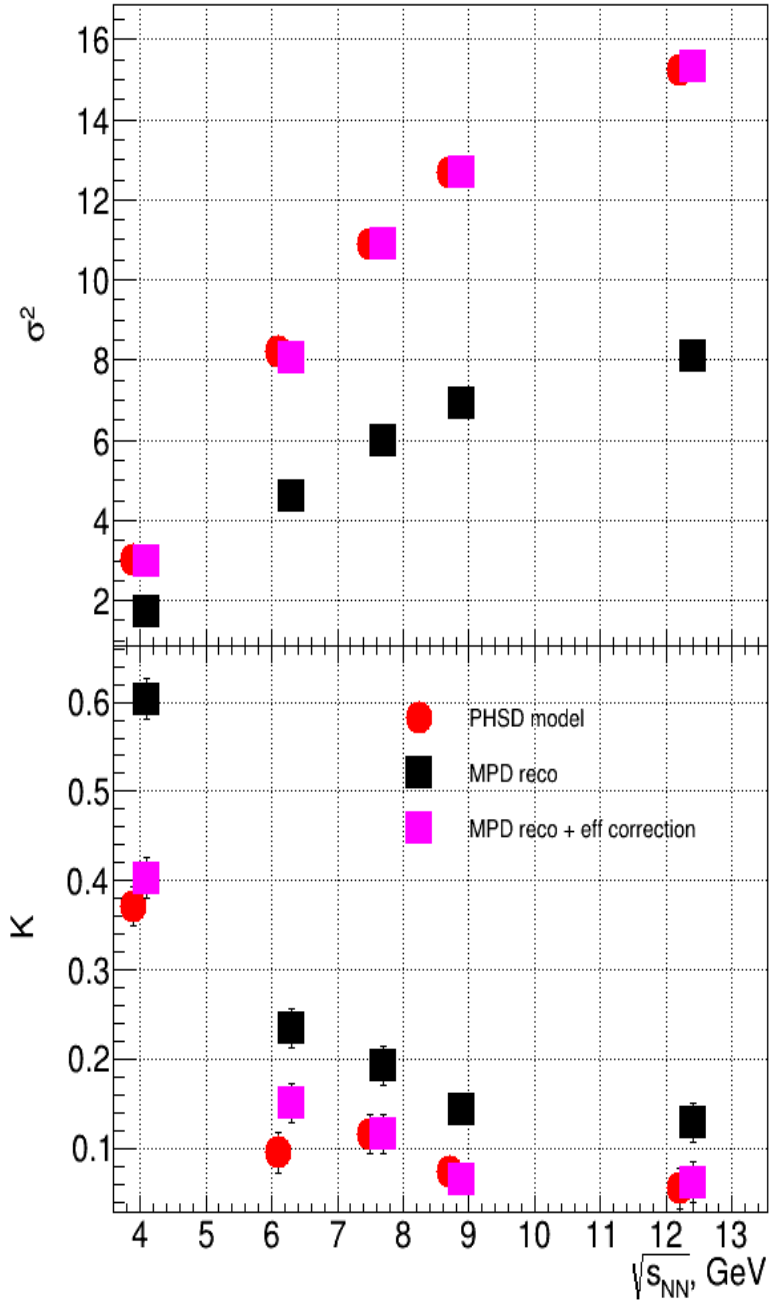
- PHSD event generator
- √s = 4 GeV, 6.2 GeV, 7.6 GeV, 8.8 GeV and 12.3 GeV
- 0 < b < 3 fm
- CSR mode ON
- Approximately 50K events per energy ( 8.8 GeV –> 1M )

## Common selection criteria

- $| z_{vertex} | < 50$ cm
- $N_{hits} > 20$ + suppress track splitting (MC)
- $| y | < 0.5$ (MC) PID probability cut = 0.95
- $0.4$ GeV/c $< p_t < 0.8$ GeV/c (MC)
- Primary particles (via GEANT)

# Moments of net-K distributions



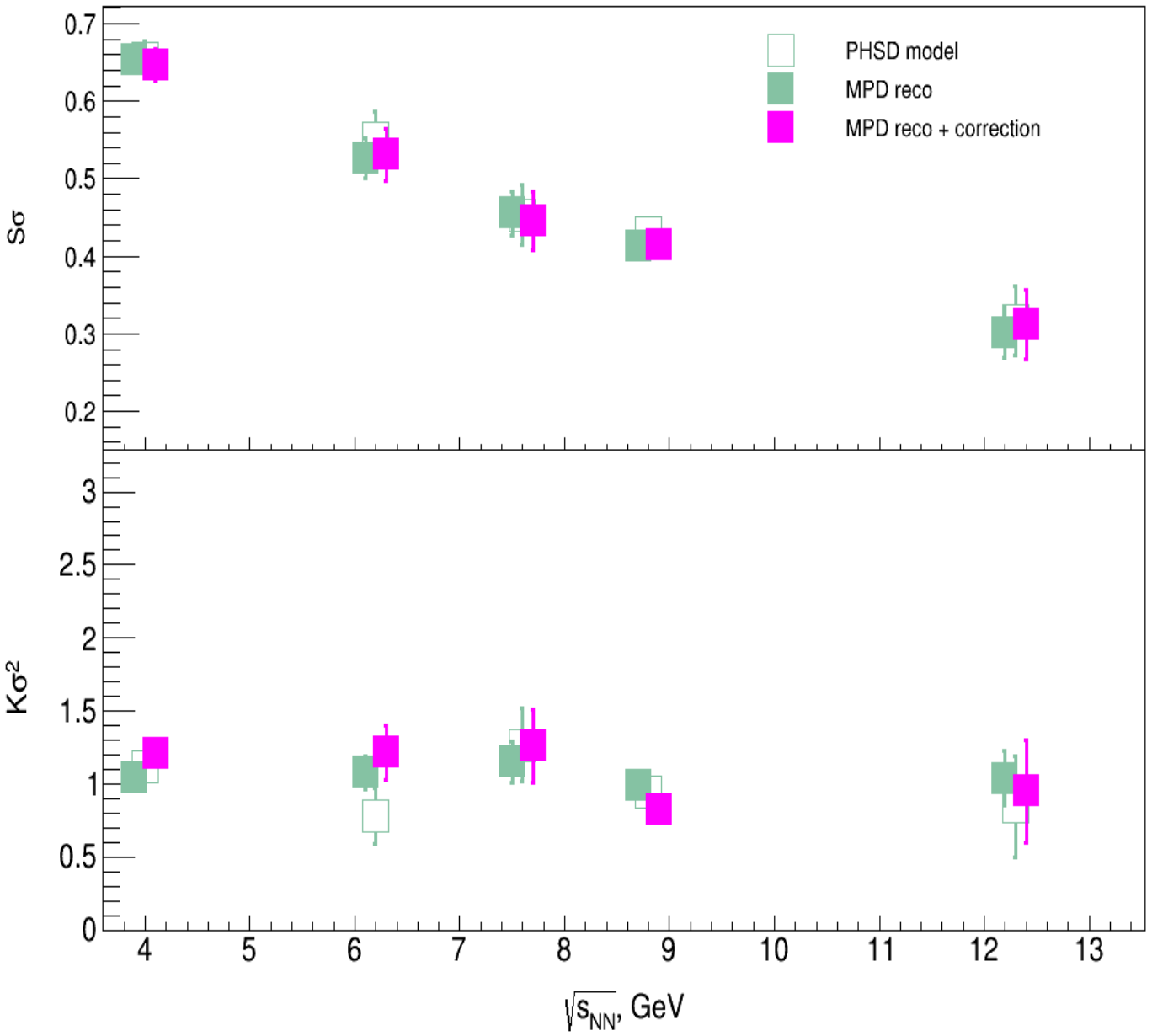

$$\delta M = \frac{\sigma}{\sqrt{N_{ev}}}$$

$$\delta(\sigma^2) = \sigma^2 \sqrt{\frac{2}{N_{ev}}}$$

$$\delta S = \sqrt{\frac{6}{N_{ev}}}$$

$$\delta K = \sqrt{\frac{24}{N_{ev}}}$$

# Moments products




$$\frac{k_3}{k_2} = S\sigma \qquad \frac{k_4}{k_2} = K\sigma^2$$

$$\epsilon_K = \frac{\delta K}{|K|} \qquad \epsilon_{\sigma^2} = \frac{\delta \sigma^2}{|\sigma^2|}$$

$$\epsilon_{K\sigma^2} = \epsilon_K + \epsilon_{\sigma^2}$$

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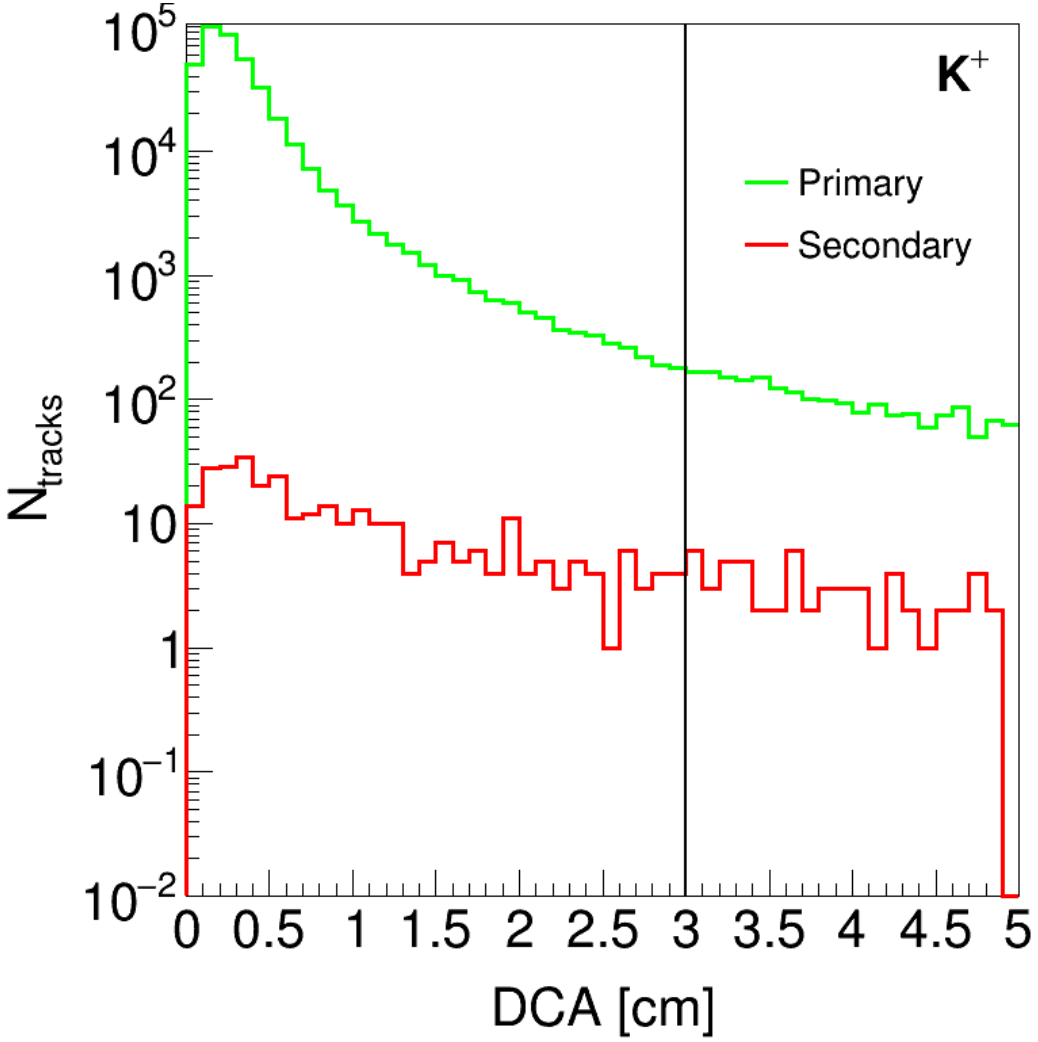
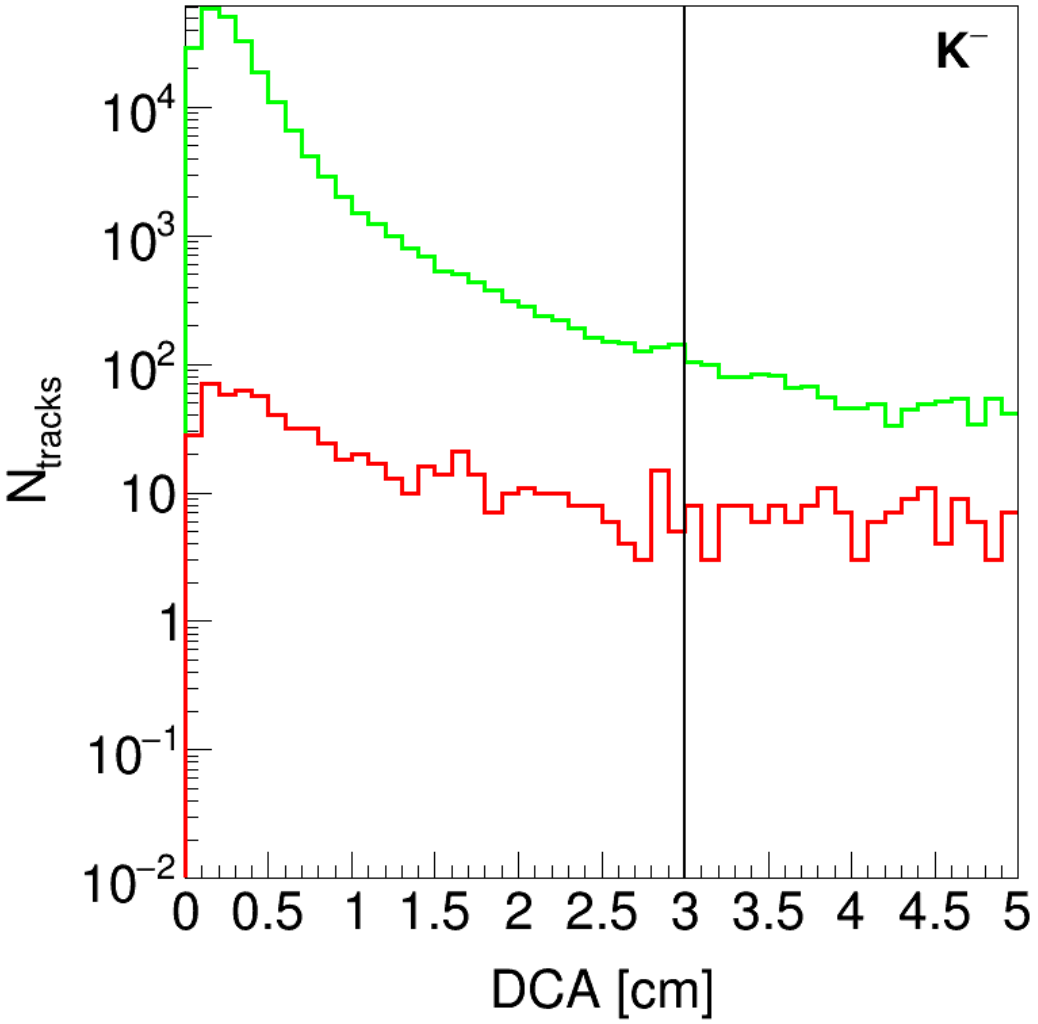
# DCA cut

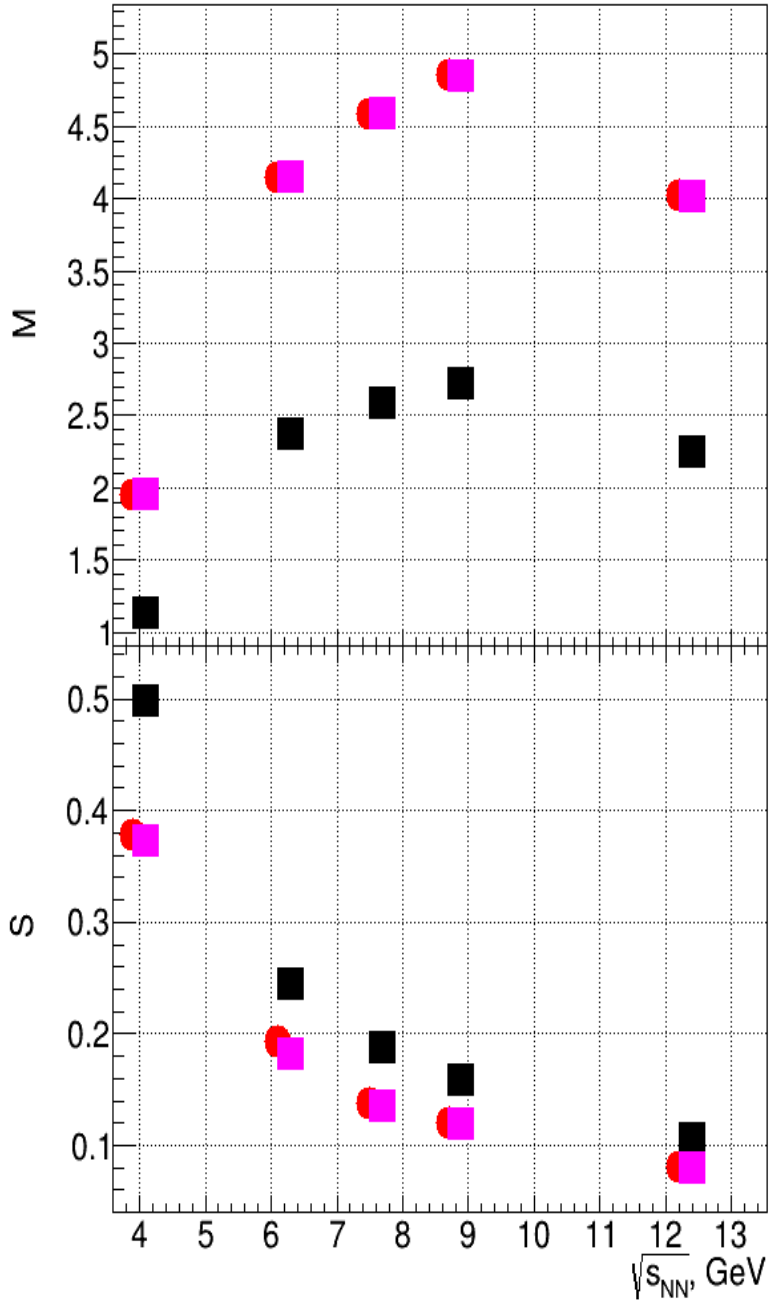


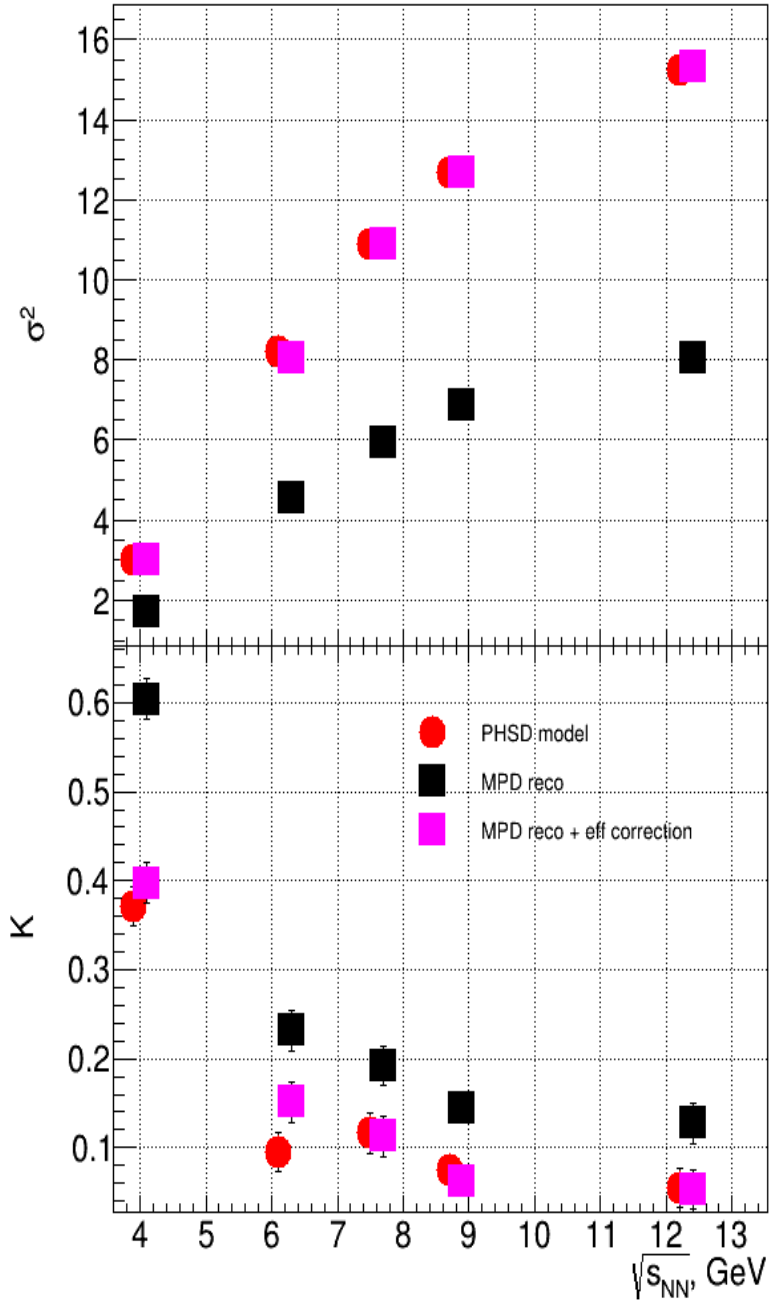




$$DCA = \sqrt{DCA_x^2 + DCA_y^2 + DCA_z^2}$$

**Criterion:** DCA < 3 cm

# Moments of net-K distributions

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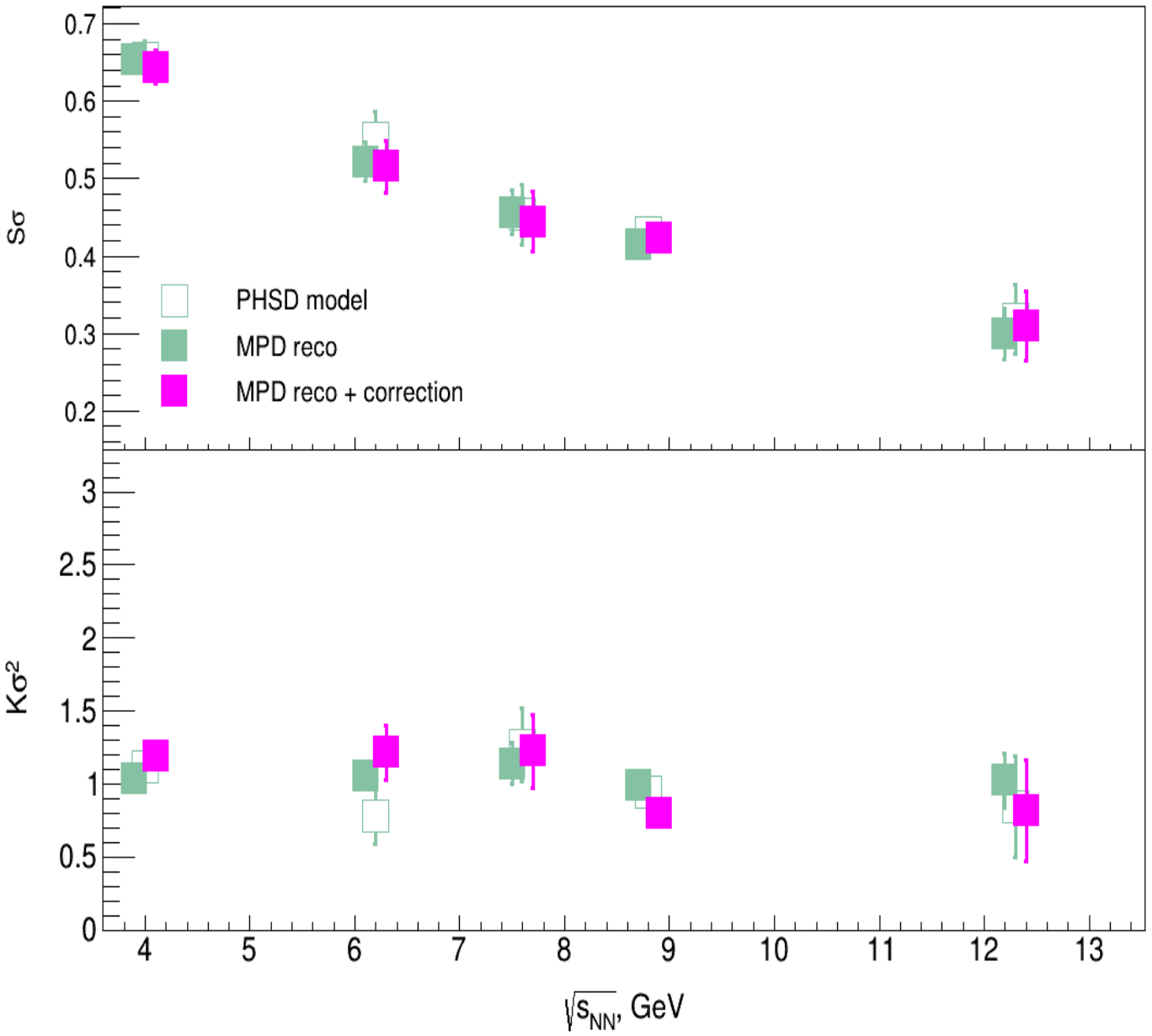


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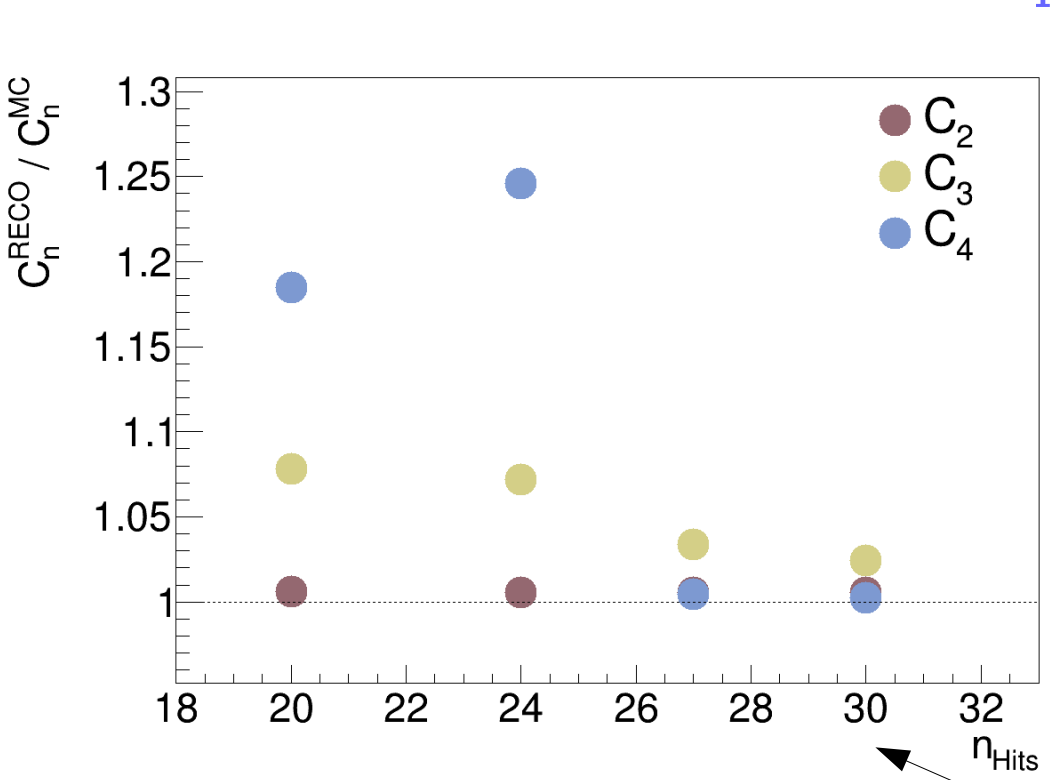
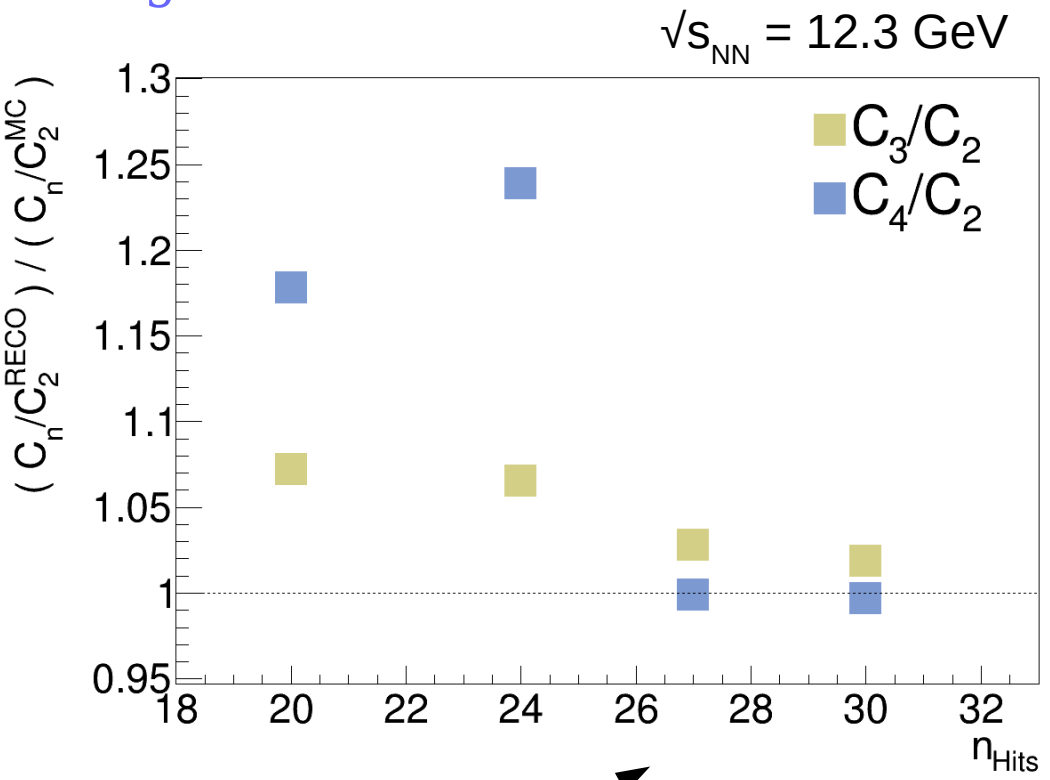
# Table of cumulants

| | 4 GeV | 6.2 GeV | 7.6 GeV | 8.8 GeV | 12.3 GeV |
|---|---|---|---|---|---|
| $C_2$ (Monte Carlo) | 3.004 | 8.221 | 10.901 | 12.665 | 15.252 |
| $C_2$ (motherId = -1) | 3.000 | 8.068 | 10.893 | 12.680 | 15.335 |
| $C_2$ (DCA < 3 cm) | 2.994 | 8.054 | 10.896 | 12.694 | 15.335 |
| $C_3$ (Monte Carlo) | 1.971 | 4.540 | 4.944 | 5.456 | 4.846 |
| $C_3$ (motherId = -1) | 1.941 | 4.288 | 4.856 | 5.264 | 4.788 |
| $C_3$ (DCA < 3 cm) | 1.928 | 4.150 | 4.844 | 5.369 | 4.761 |
| $C_4$ (Monte Carlo) | 3.348 | 6.419 | 13.803 | 11.917 | 12.830 |
| $C_4$ (motherId = -1) | 3.627 | 9.807 | 13.739 | 10.513 | 14.601 |
| $C_4$ (DCA < 3 cm) | 3.566 | 9.806 | 13.360 | 10.156 | 12.556 |

# Track splitting



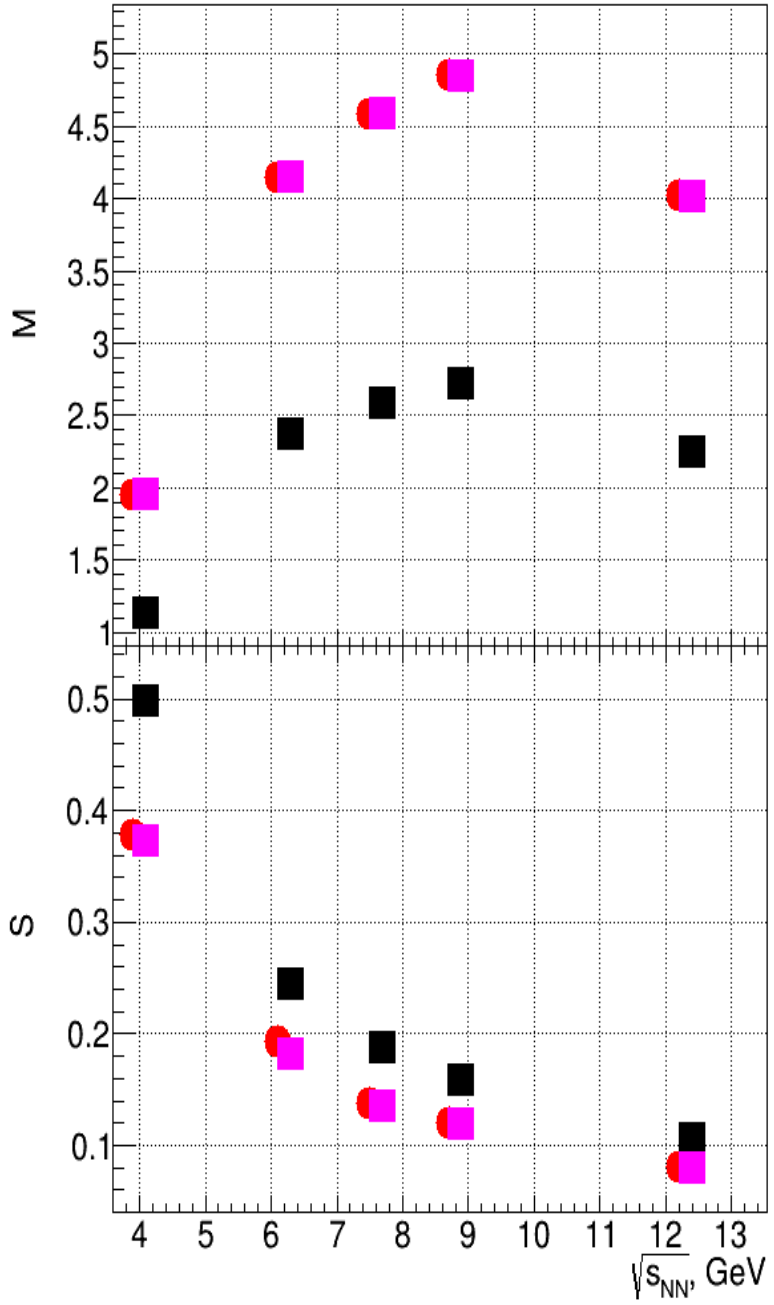

Monte Carlo cut:

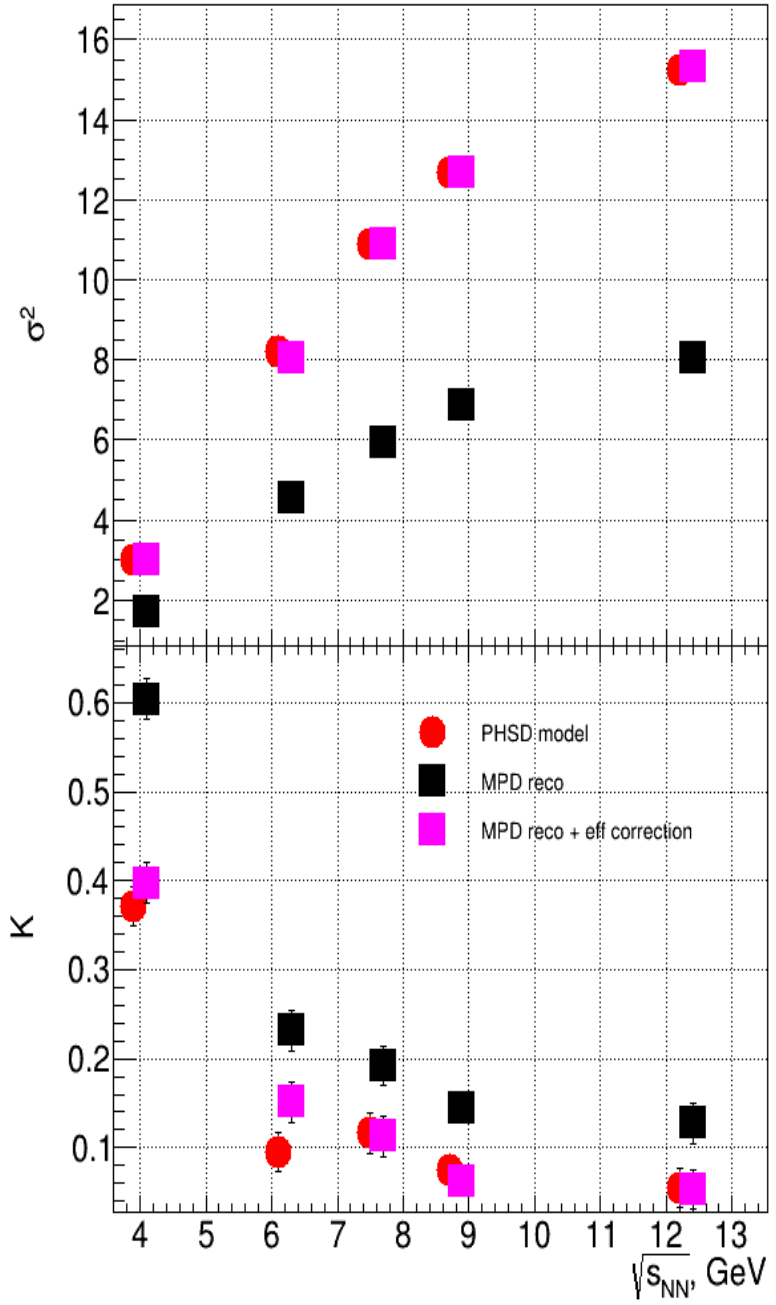
If several reconstructed tracks correspond to one MC track, first RECO track is considered, other are ignored.

$n_{Hits}$ cut at Ev-by-Ev study:

Minimum number of hits in reconstructed track is suggested to increase from **20** to **27**.

# Moments of net-K distributions

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Point at $\sqrt{s_{NN}}$ = 8.8 GeV is not ready yet

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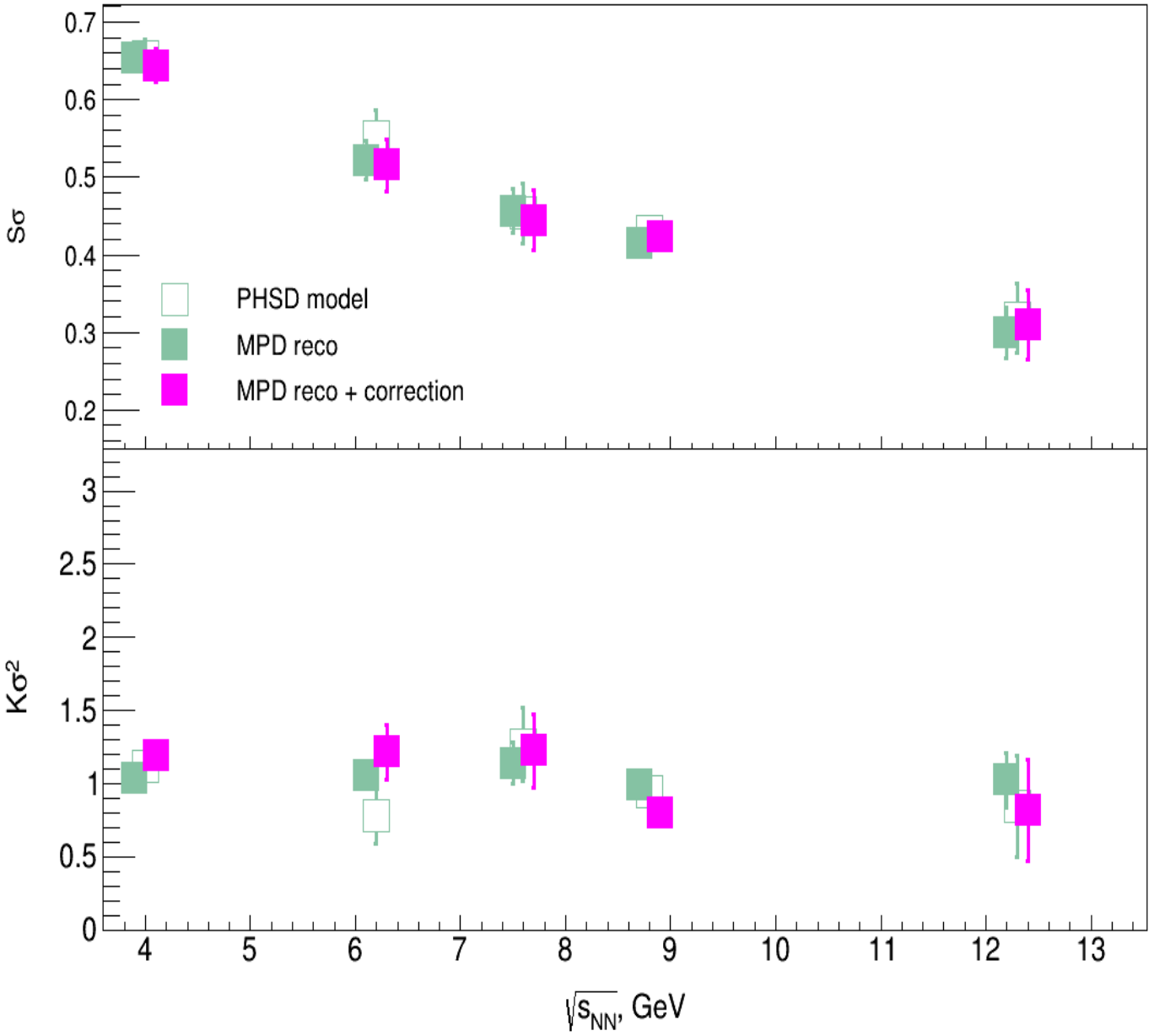


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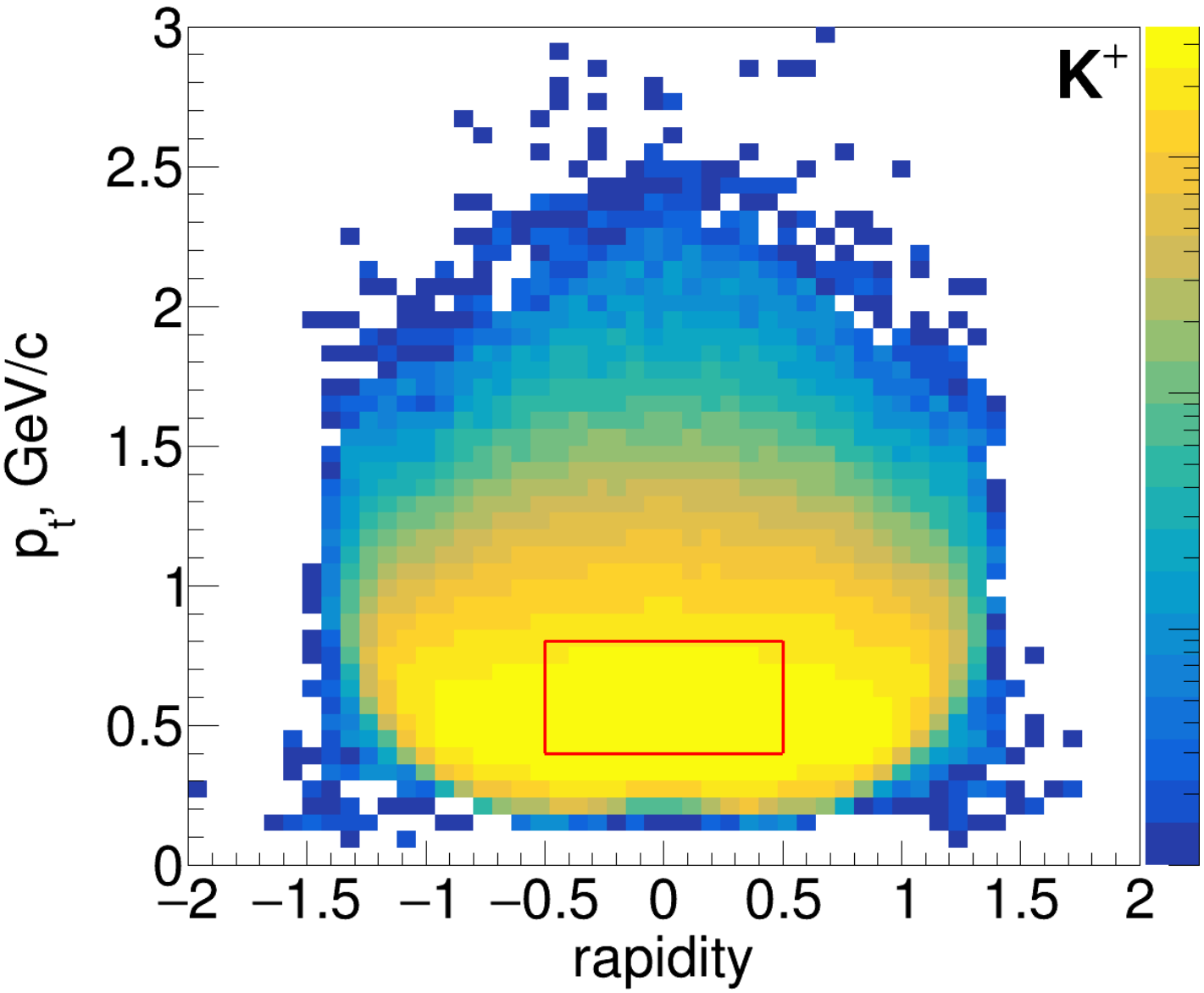
# Phase space region




$p_t^{MC} \rightarrow p_t^{RECO}$

$y^{MC} \rightarrow y^{RECO}$

Efficiency is denoted as:

$$\epsilon = \epsilon_{tracking} \times \epsilon_{matching} \times \epsilon_{PID}$$

where

$$\epsilon_{Tracking} = \frac{N_{RECO\,tracks}}{N_{MC\,tracks}}$$