

# Fluctuations in STAR

Gary D. Westfall

Michigan State University  
for the STAR Collaboration

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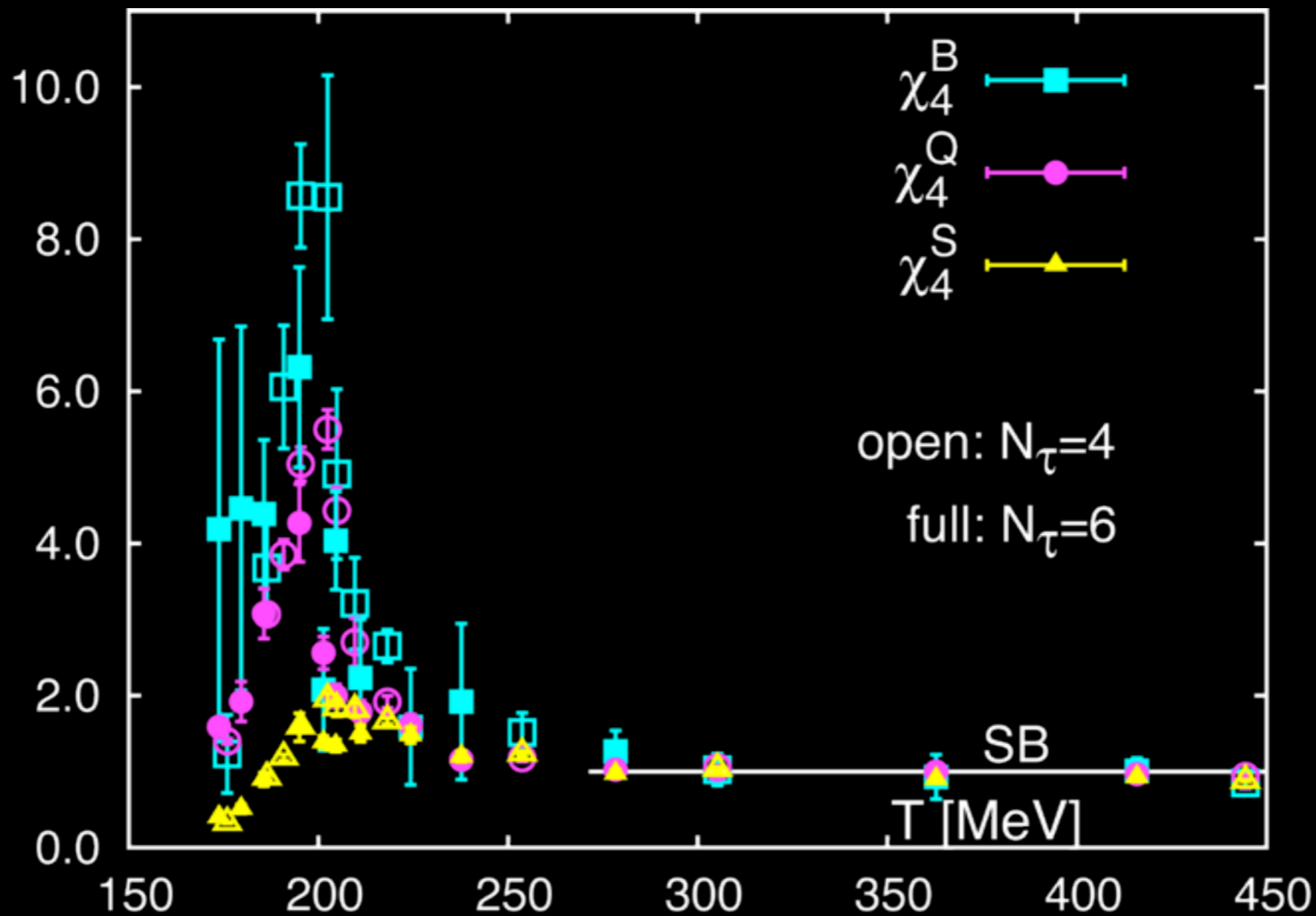
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  - Hadronic matter to quark gluon matter
- If we pass near a QCD critical point, we expect an increase in susceptibilities and a corresponding increase in particle number fluctuations
- Look for changes in fluctuations as a function of incident energy

# Lattice QCD Calculations

- Cheng et al., arXiv:0811.1006v2 [hep-th], quadratic and quartic fluctuations of baryon number, electric charge and strangeness, all quantities normalized to hadron gas

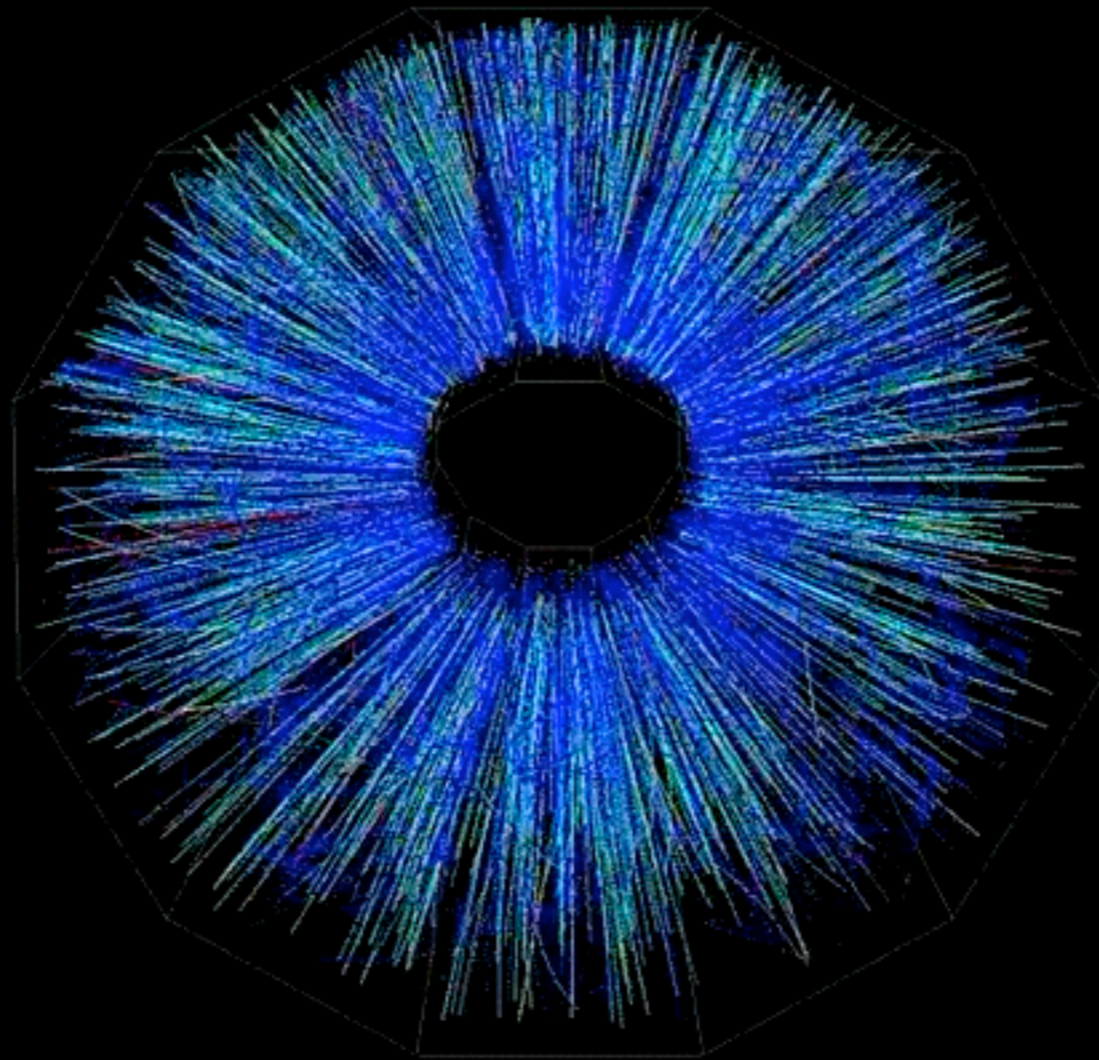
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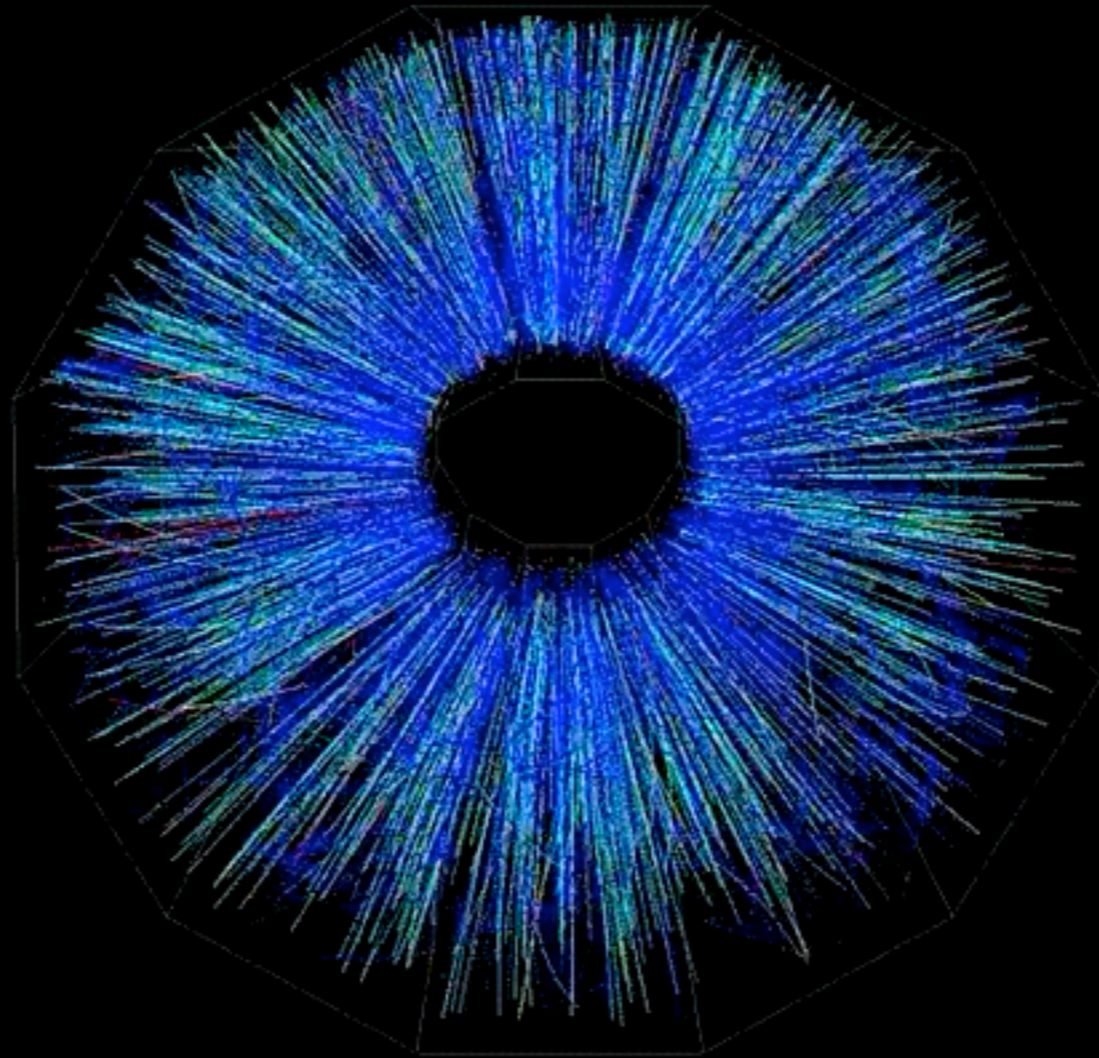


# Fluctuations



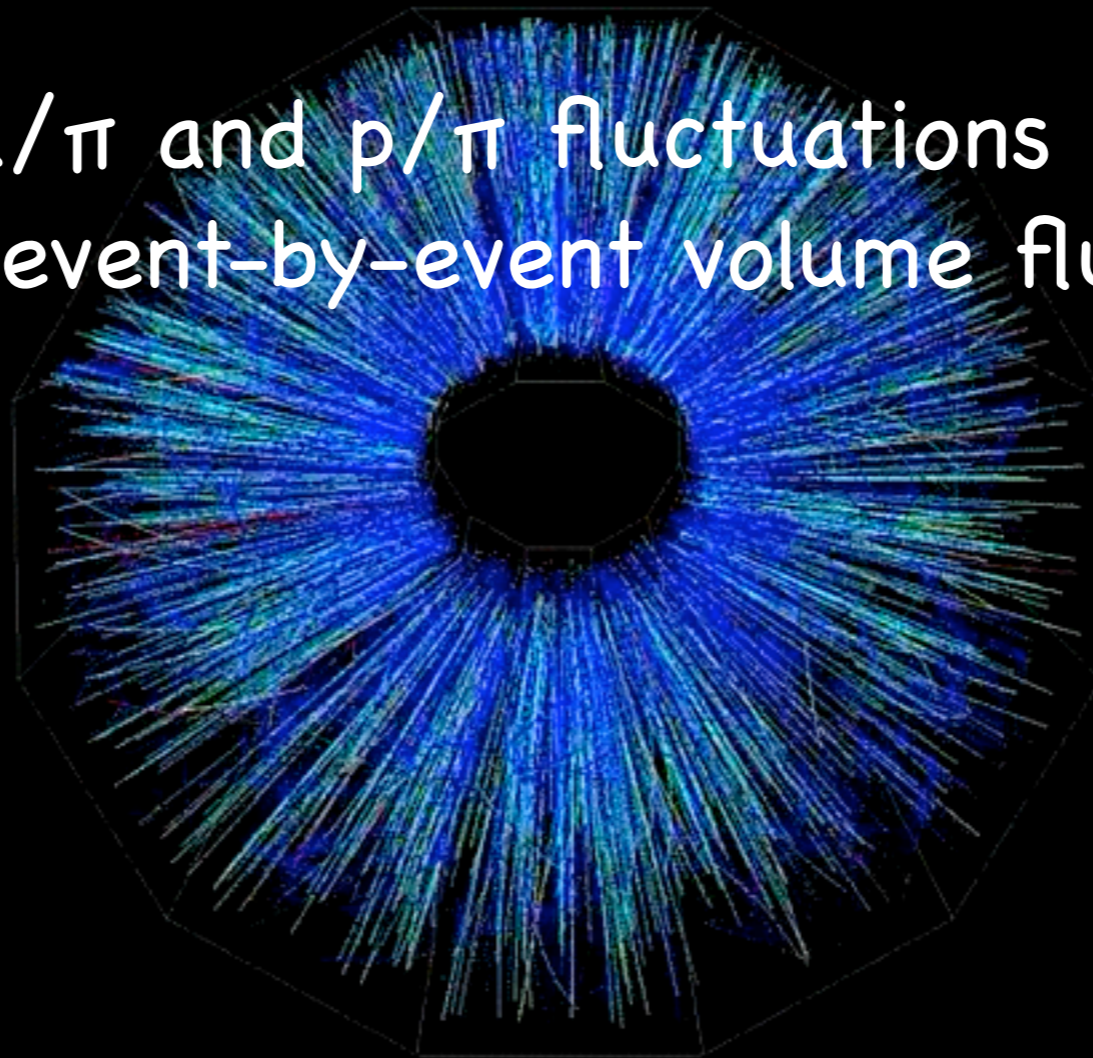
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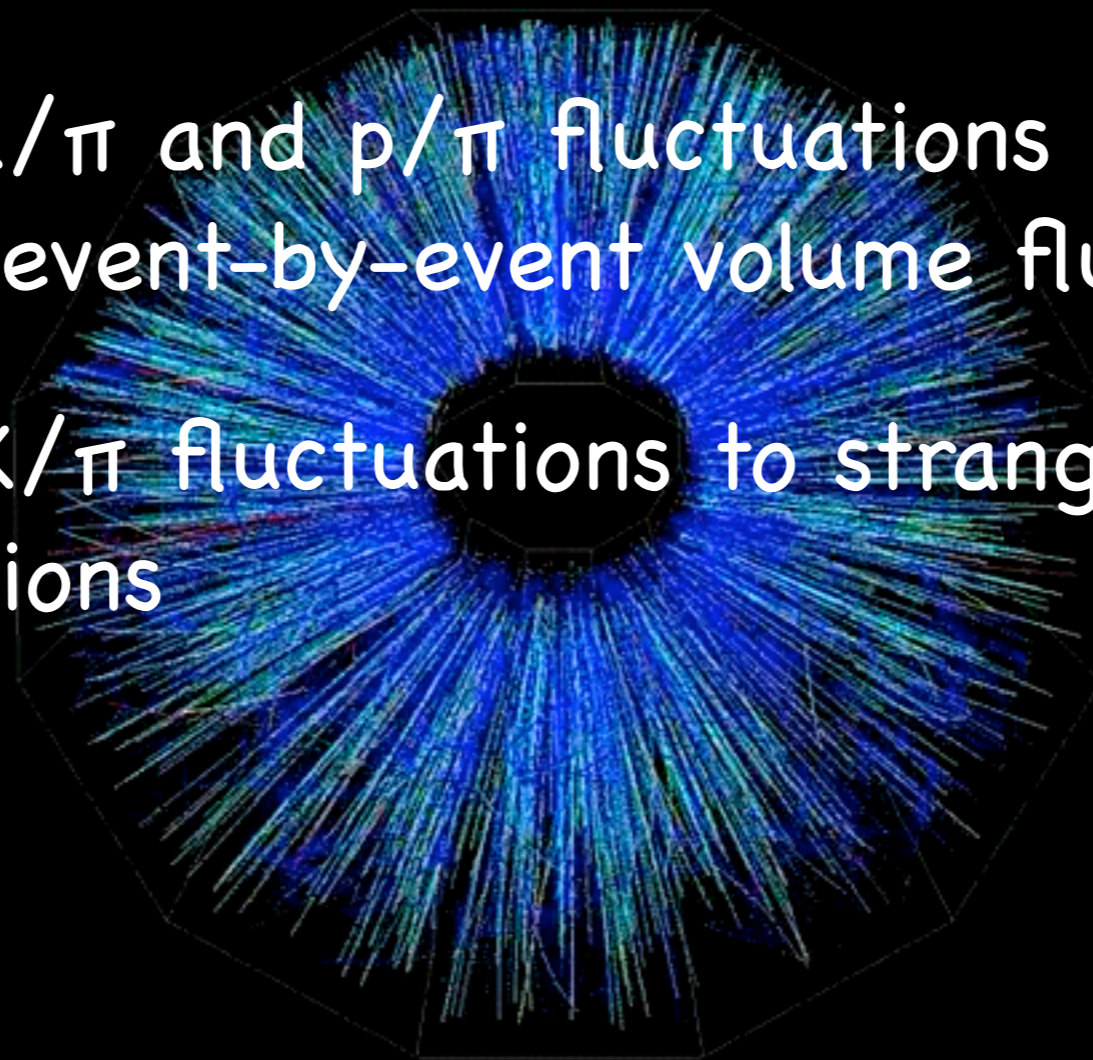
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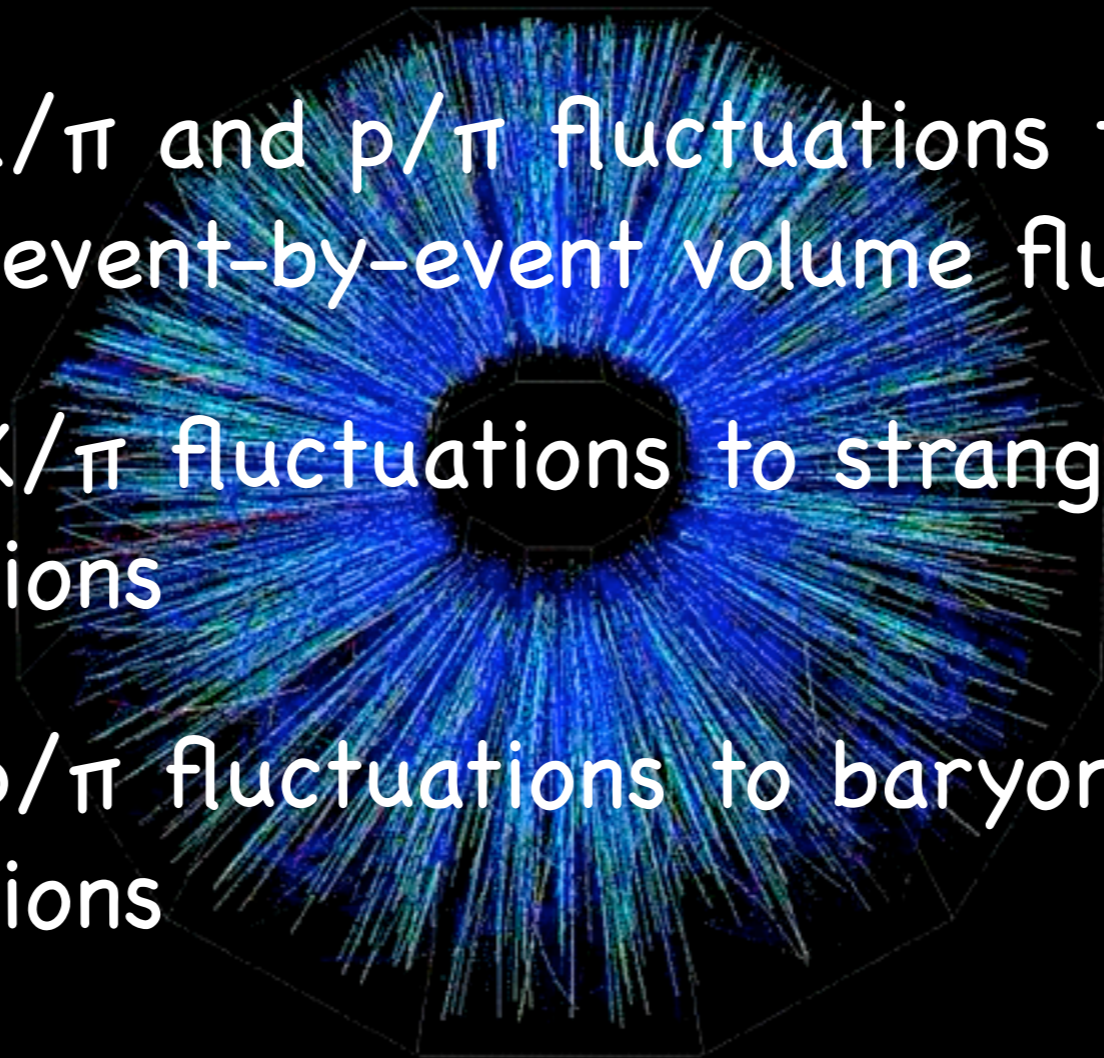
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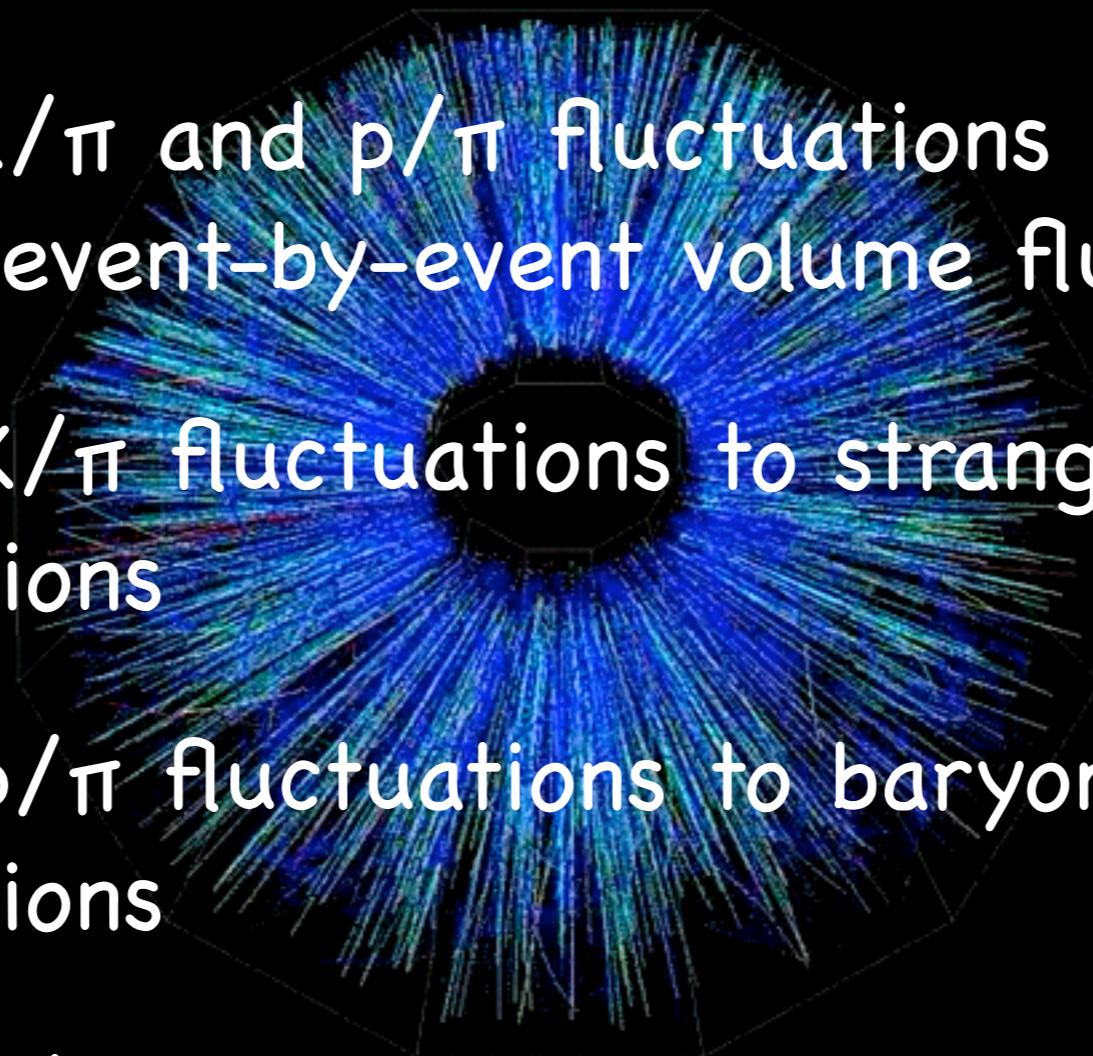
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- Relate  $p/K$  fluctuations to both strangeness and baryon fluctuations



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It turns out that

$$\sigma_{\text{dyn}}^2 = V_{\text{dyn}}$$

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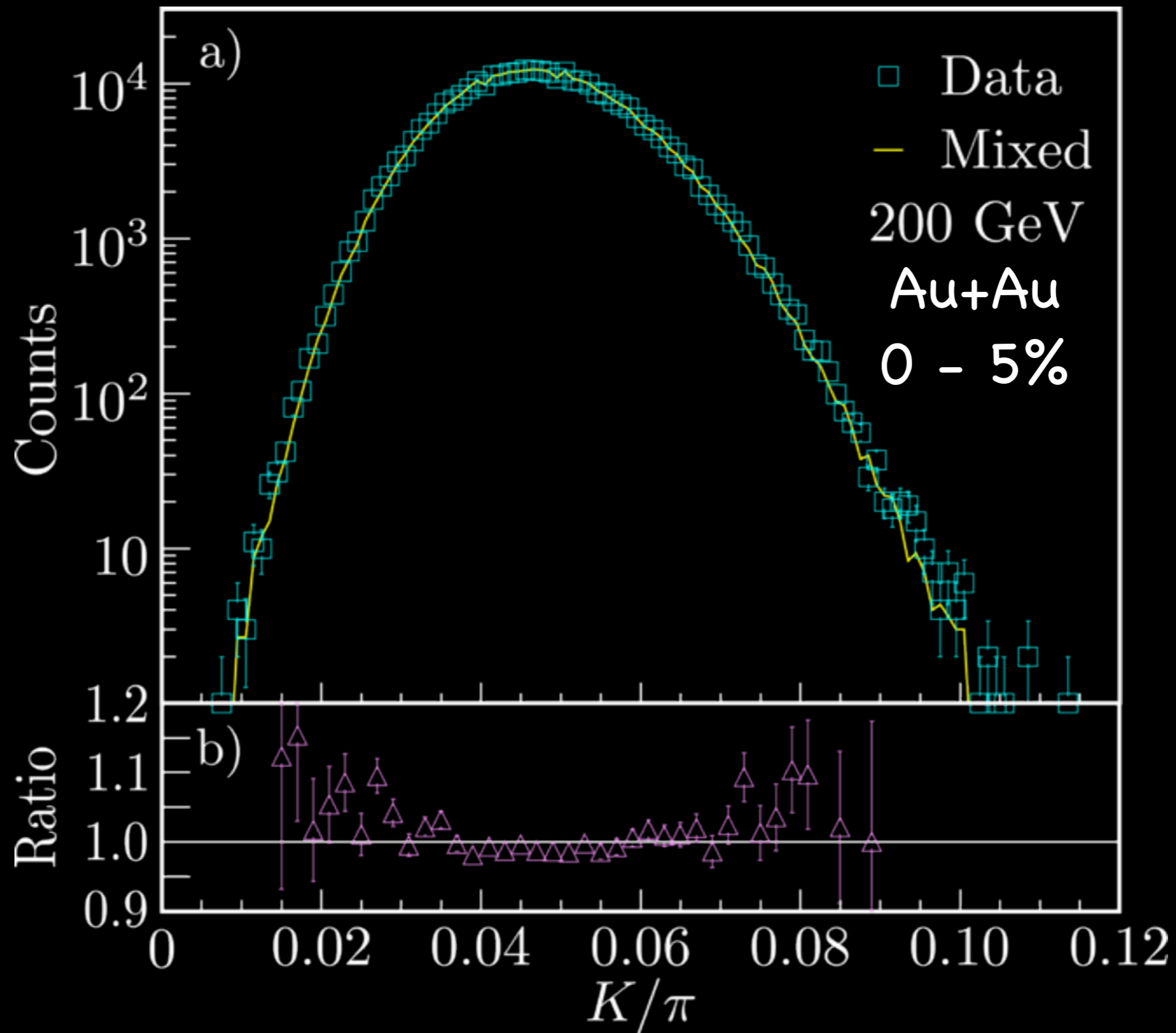
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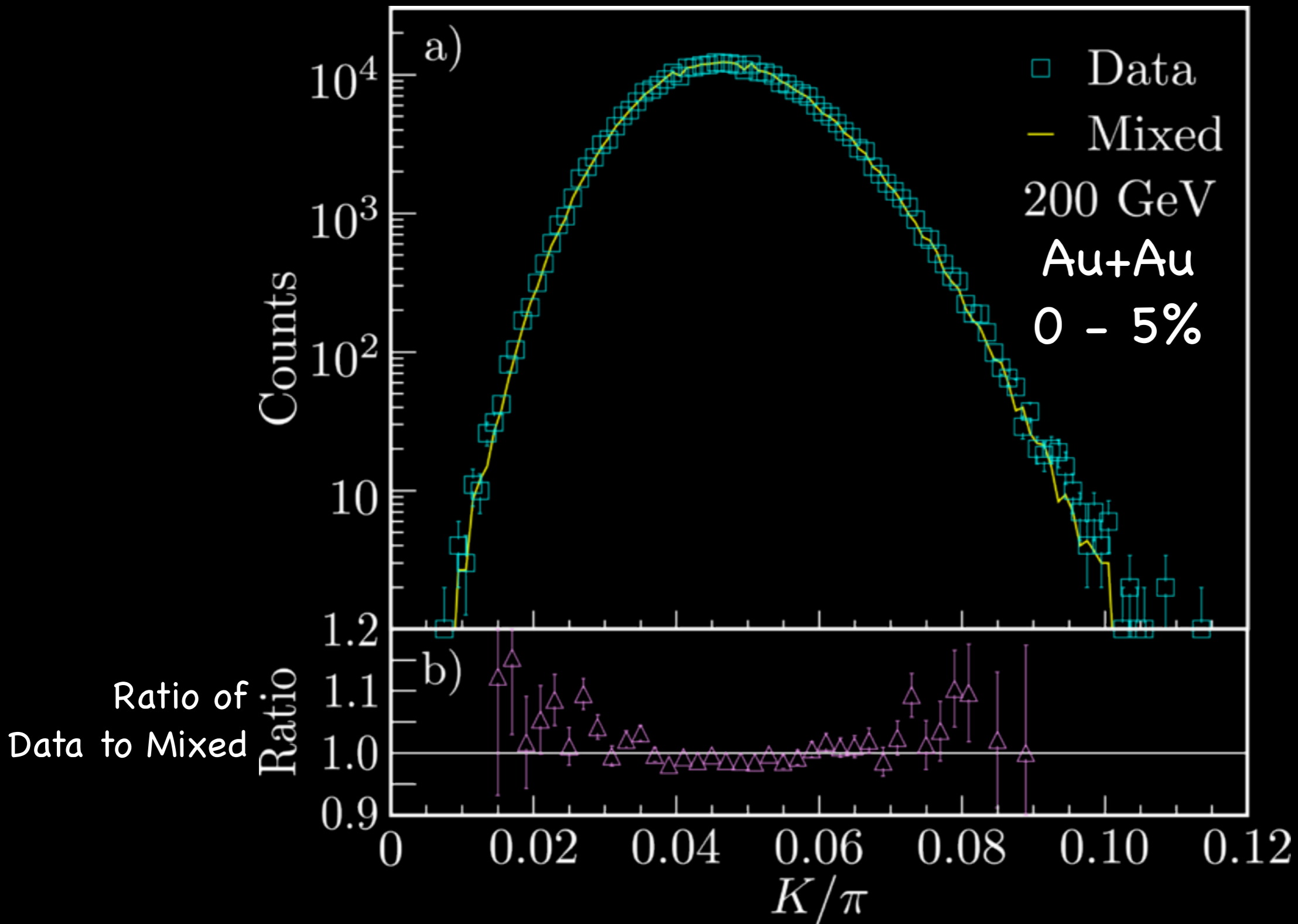
# K/π Fluctuations

# $K/\pi$ Distribution

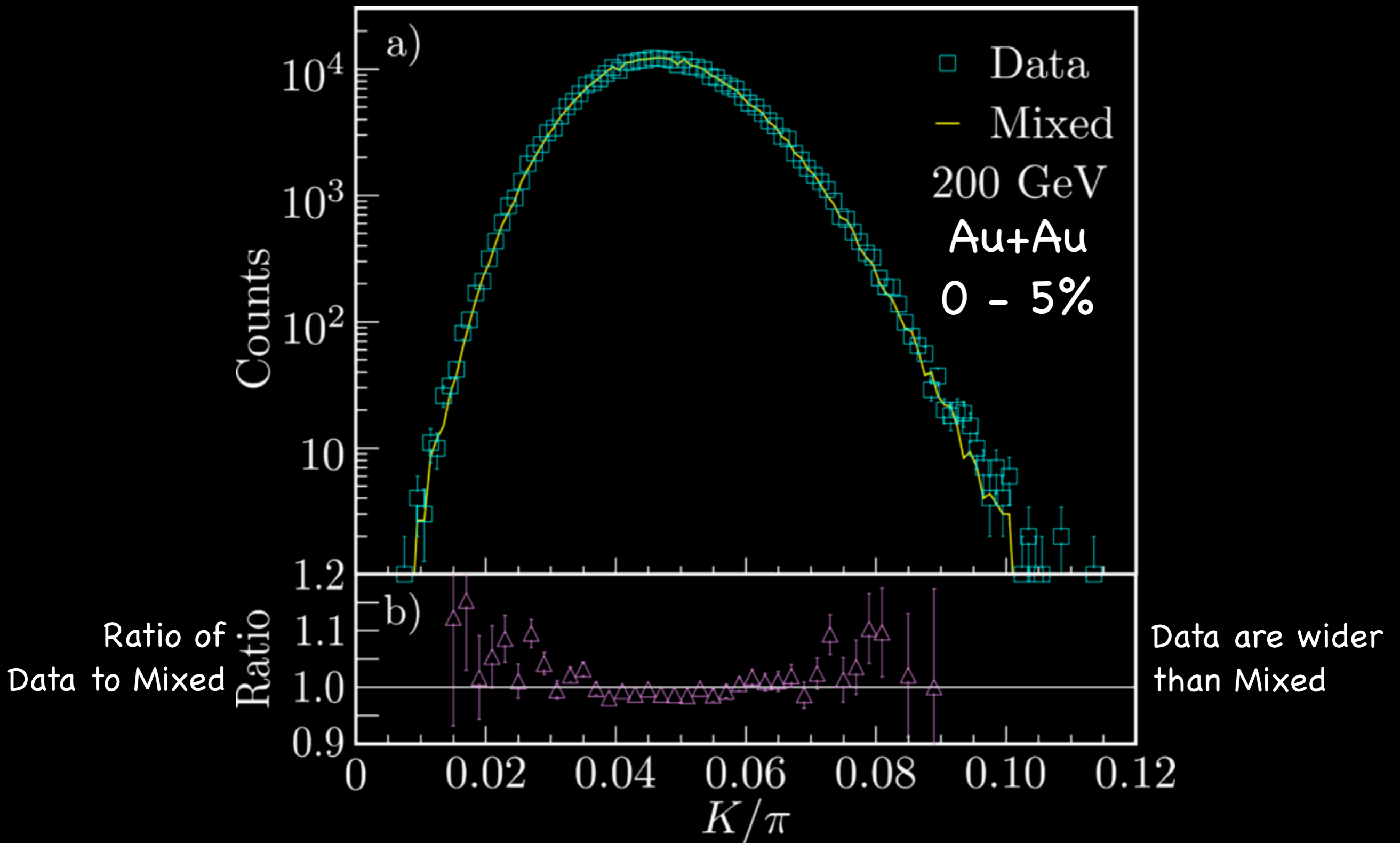
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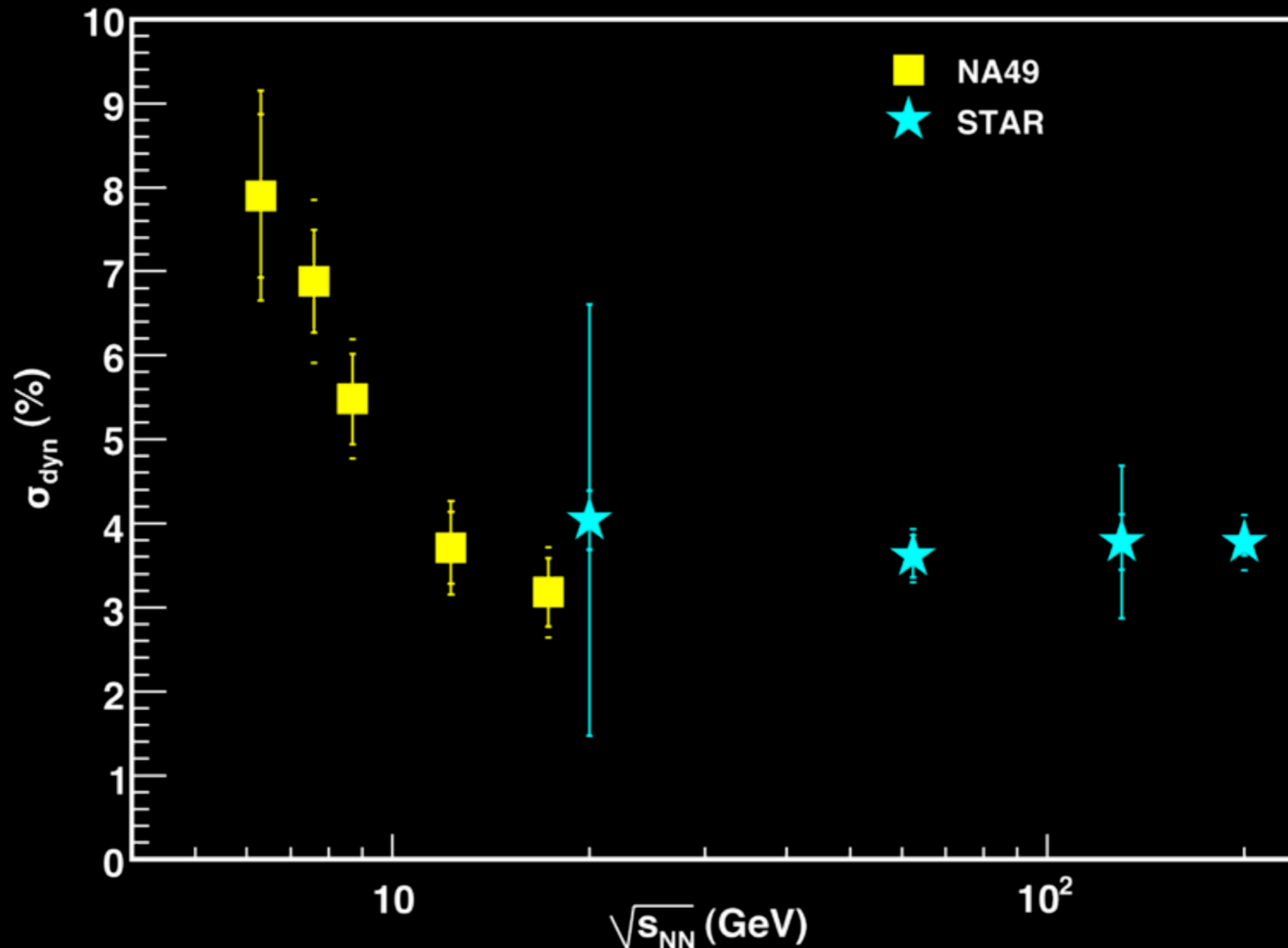
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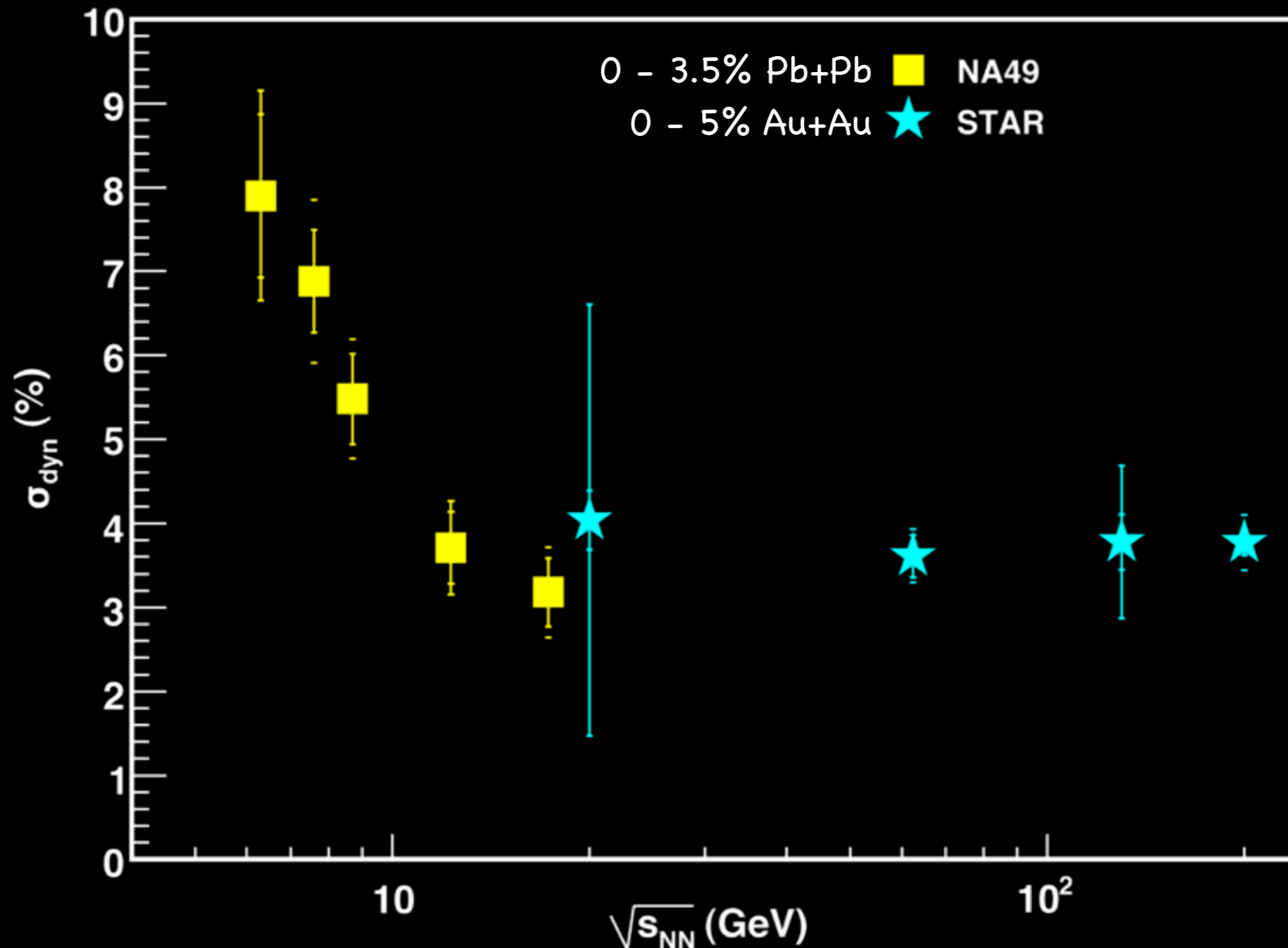
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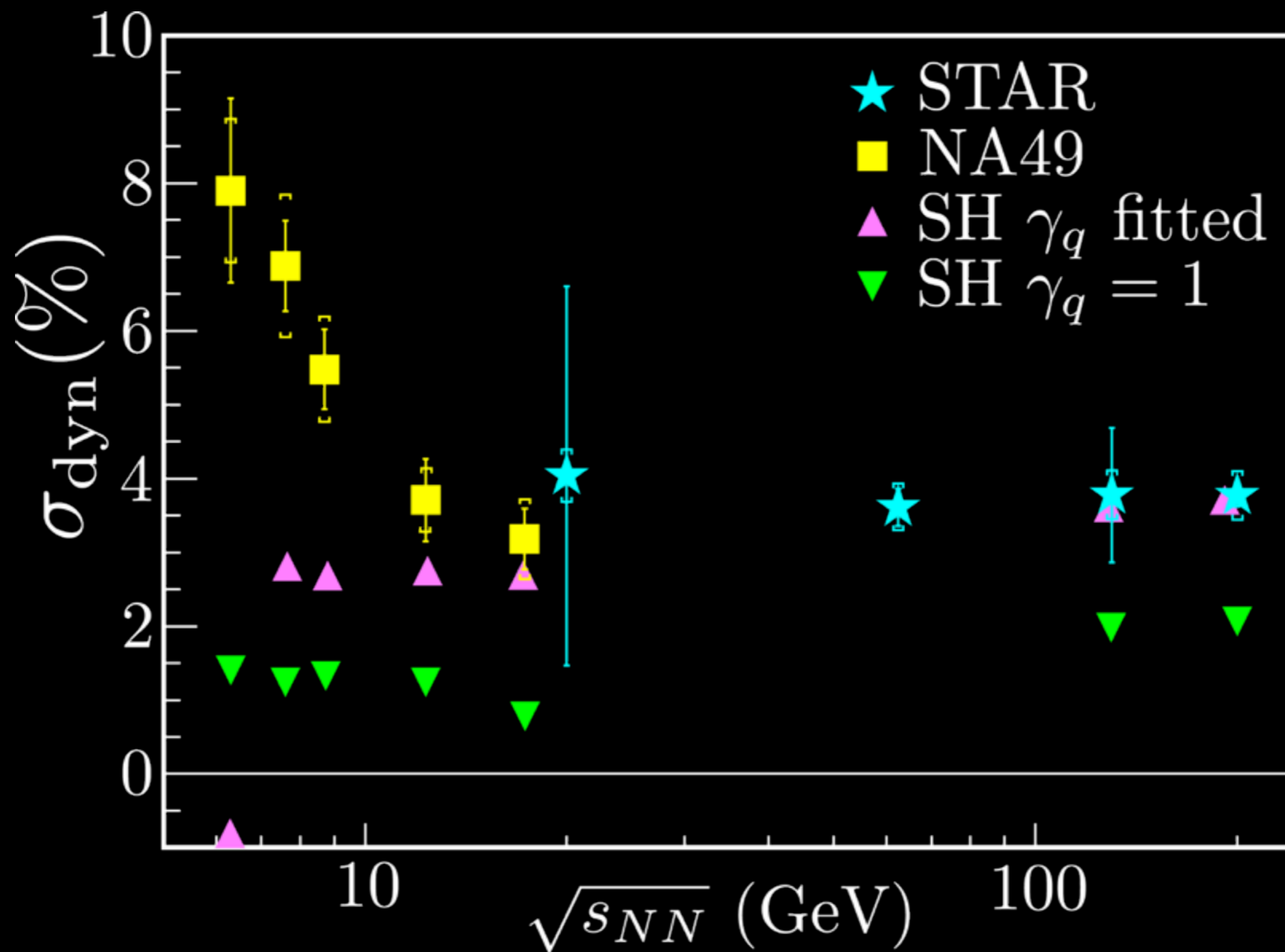


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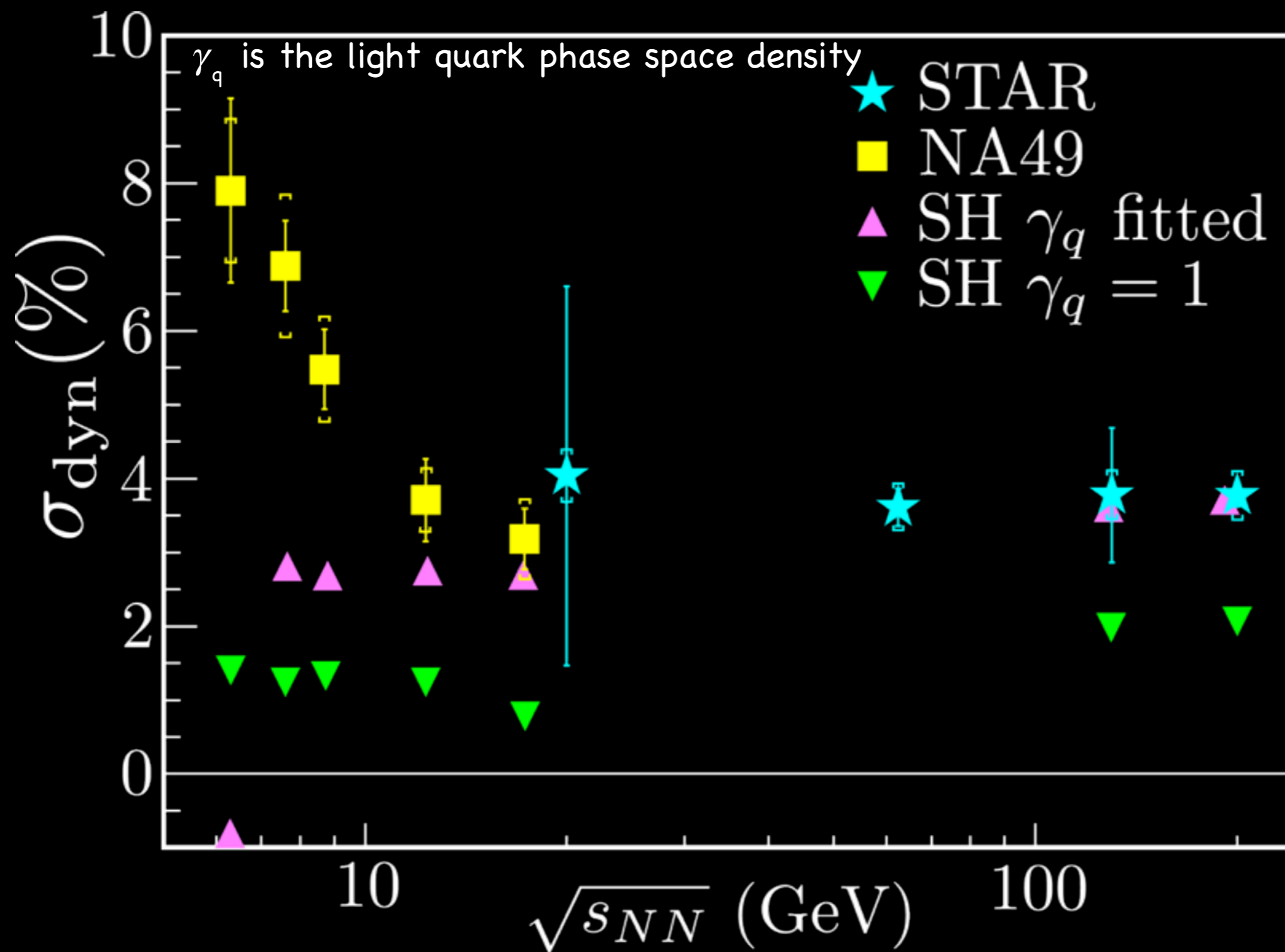


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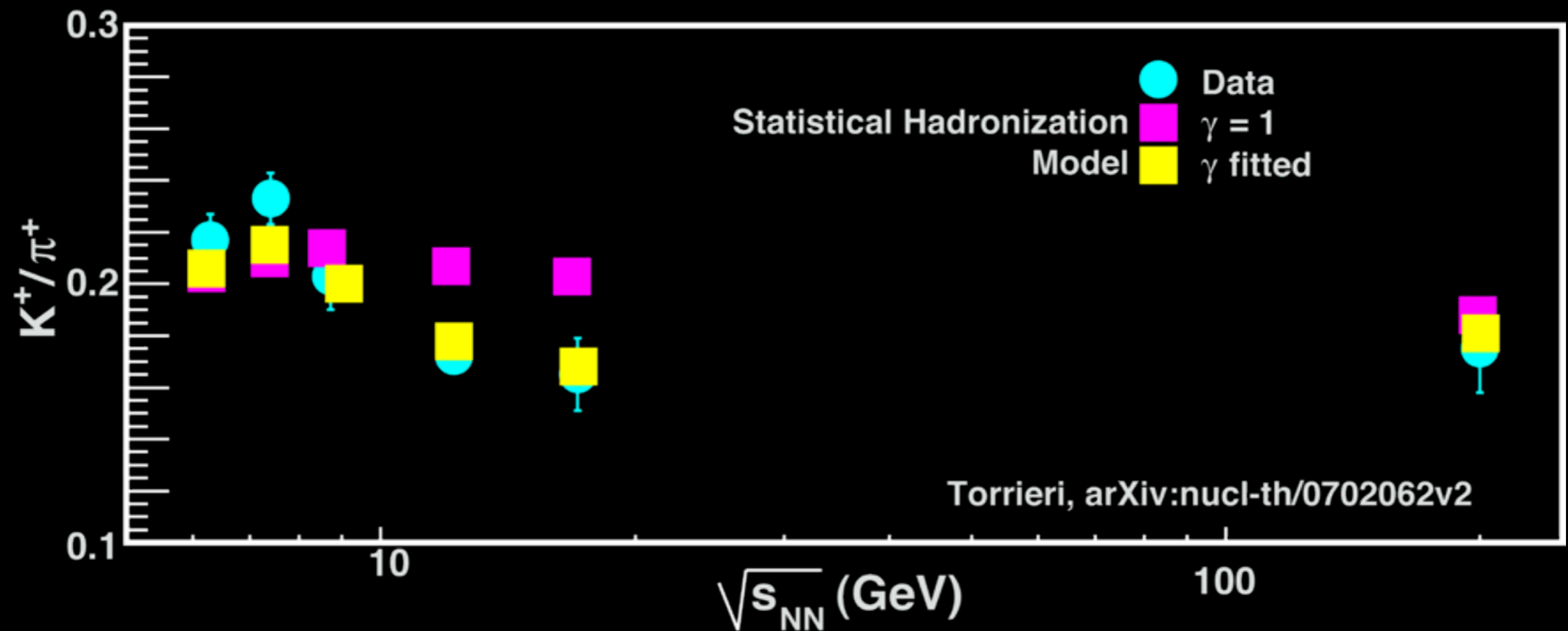
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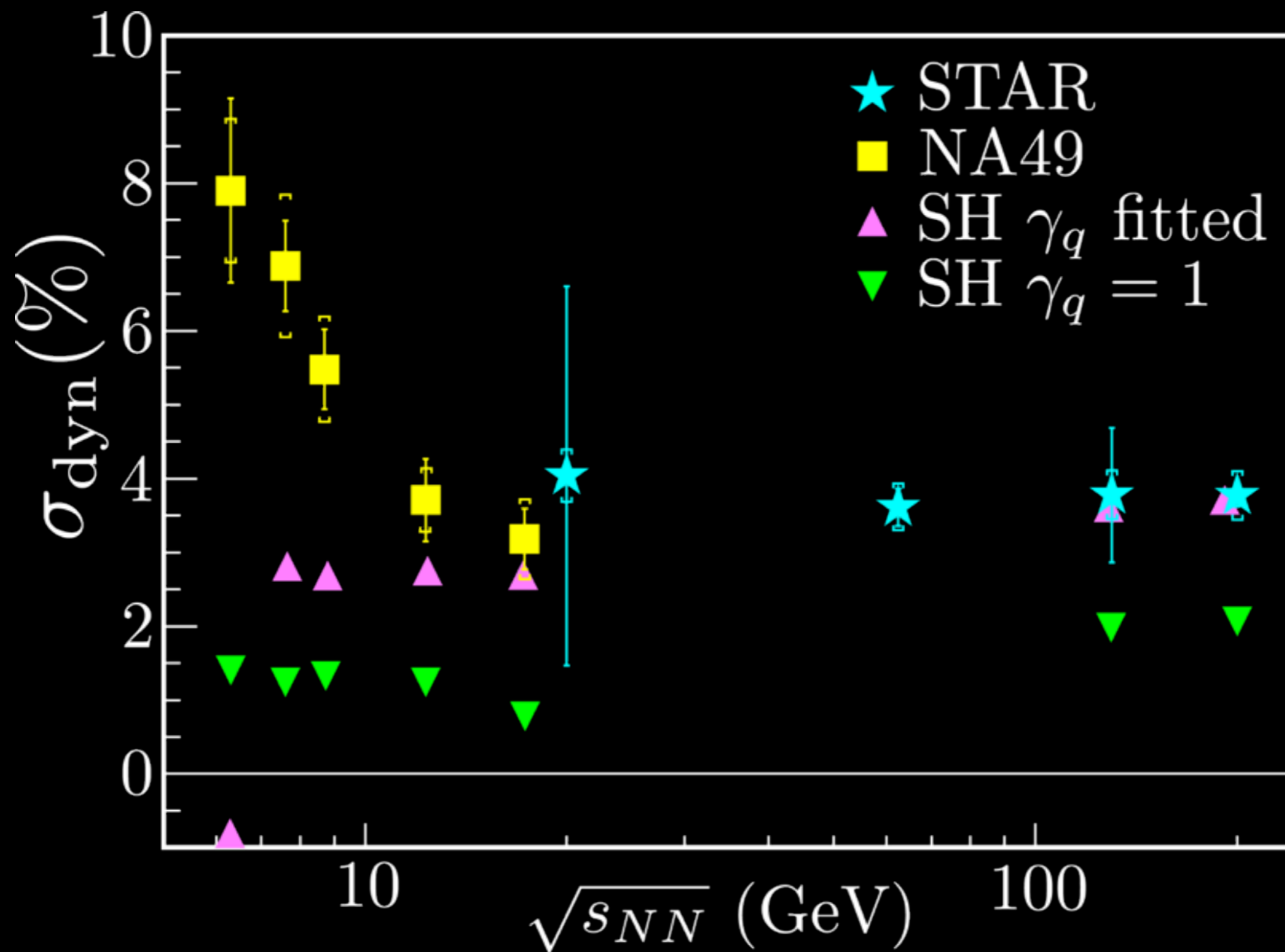
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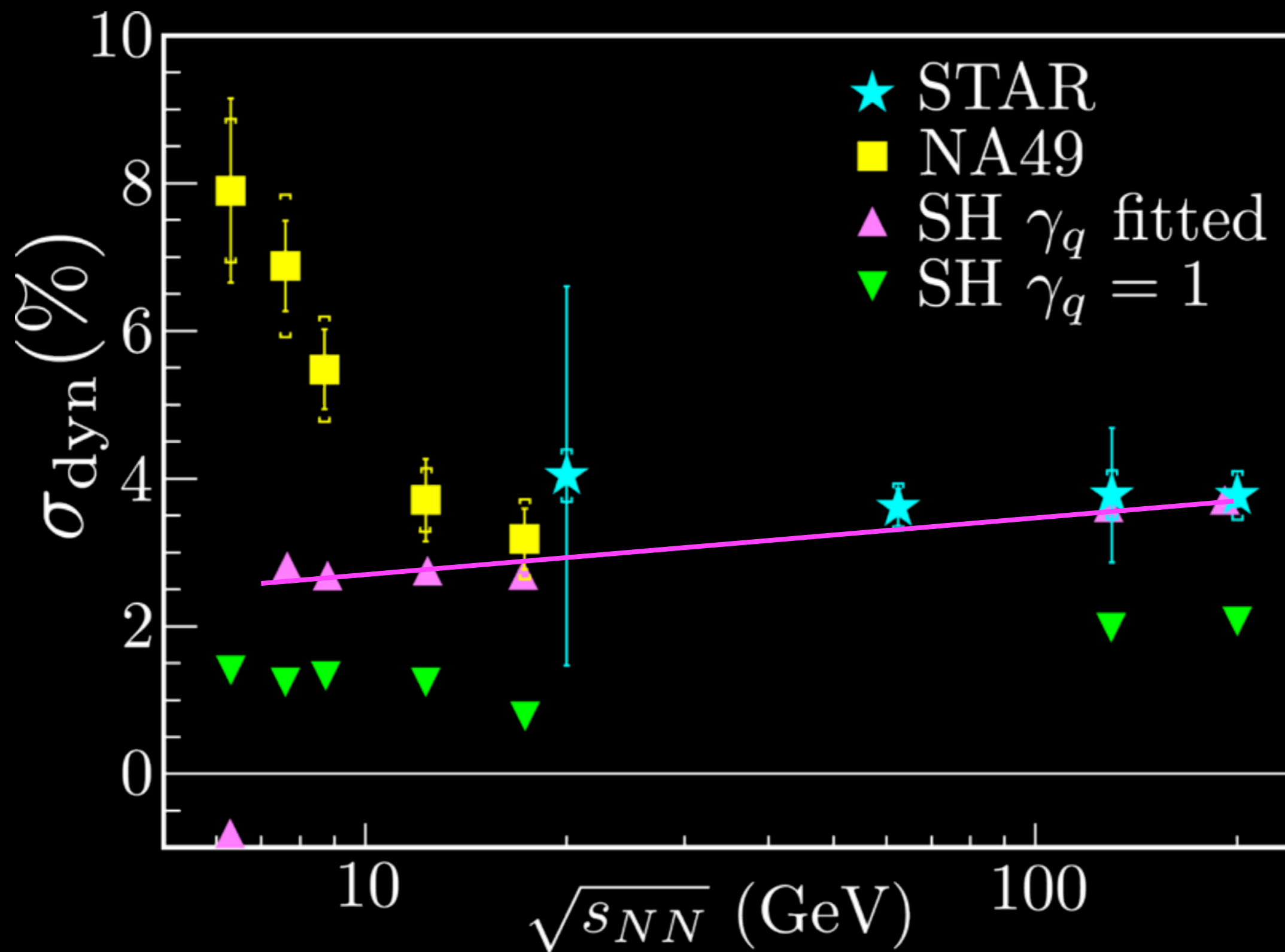
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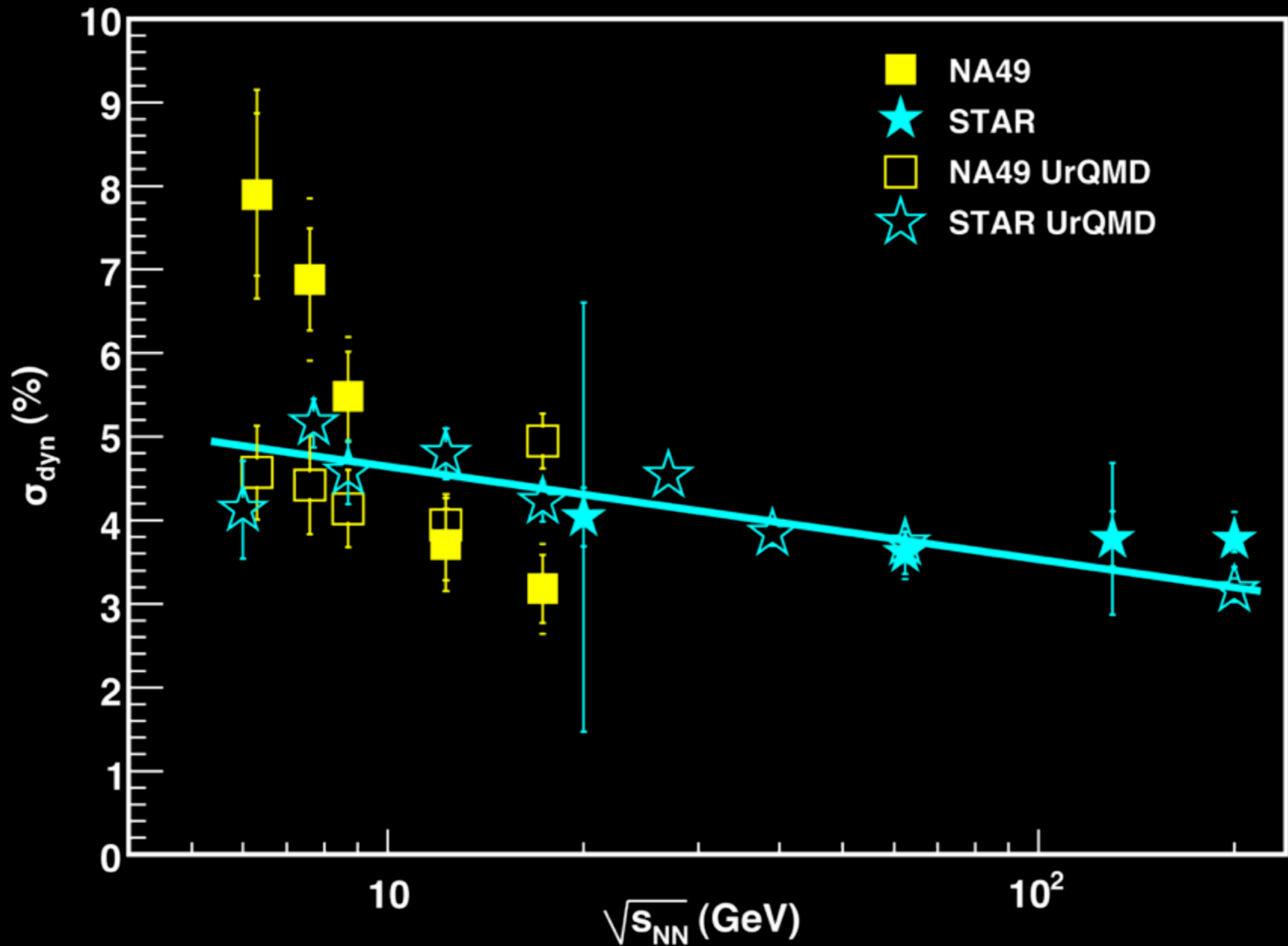
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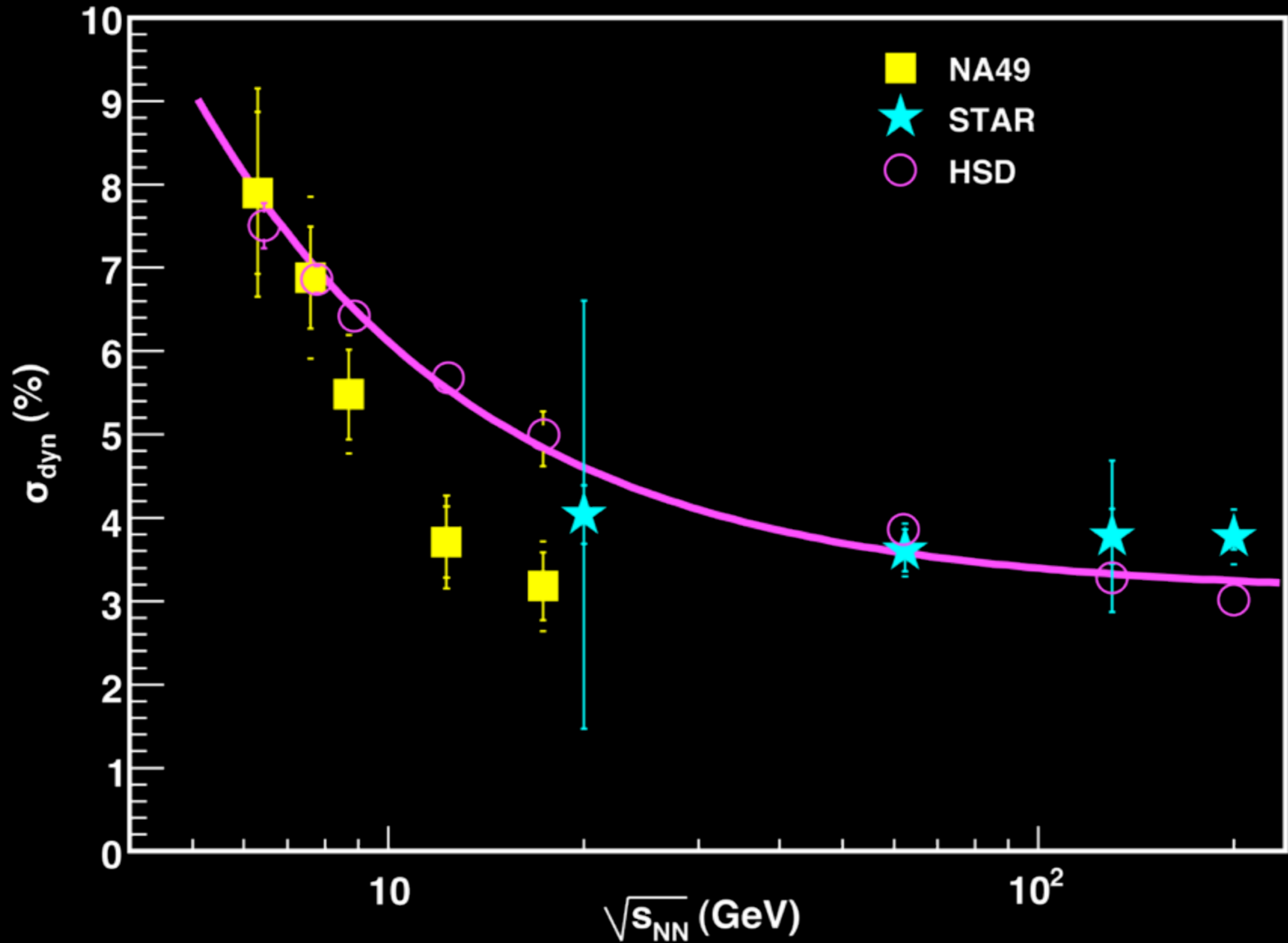
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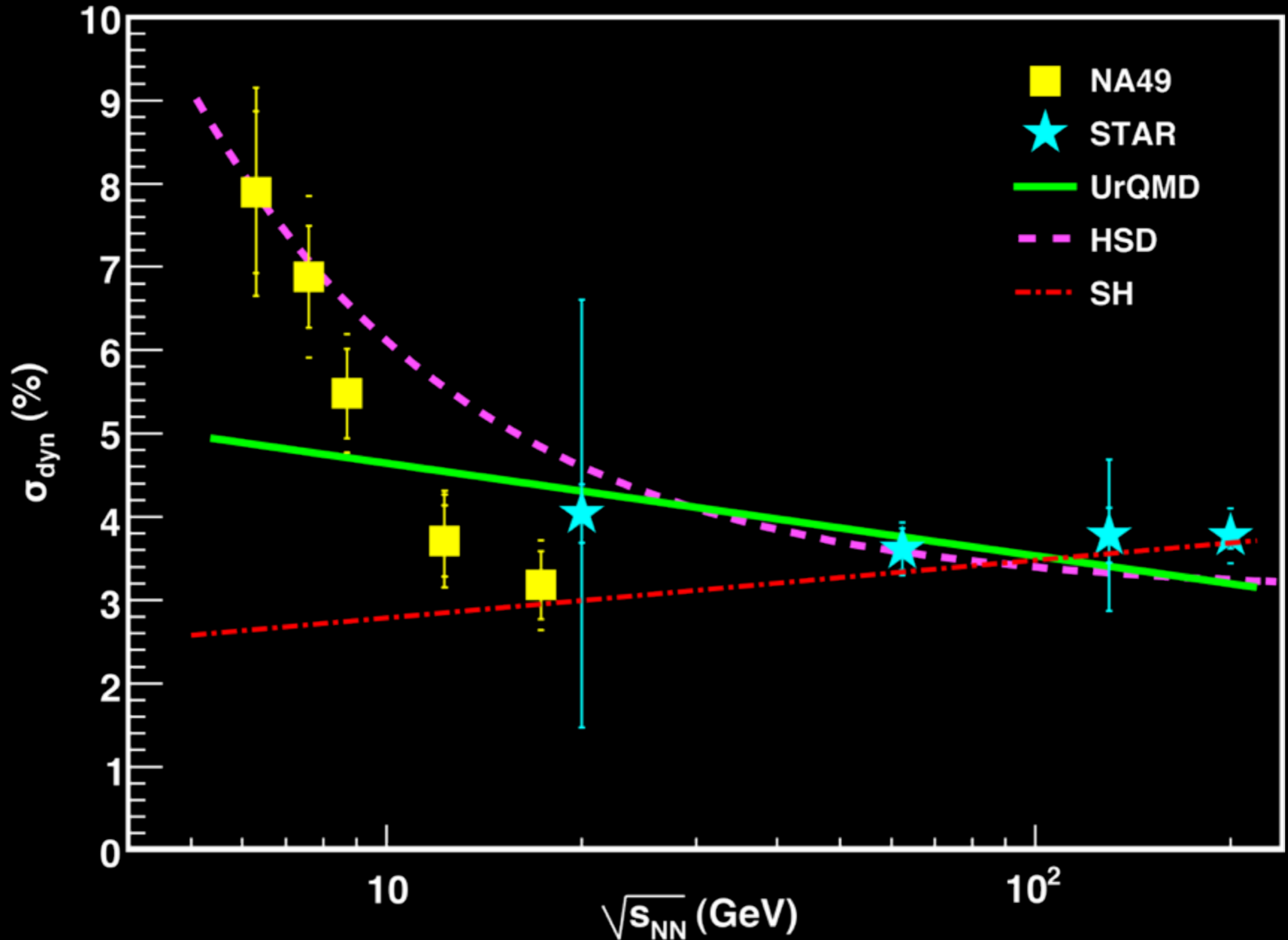
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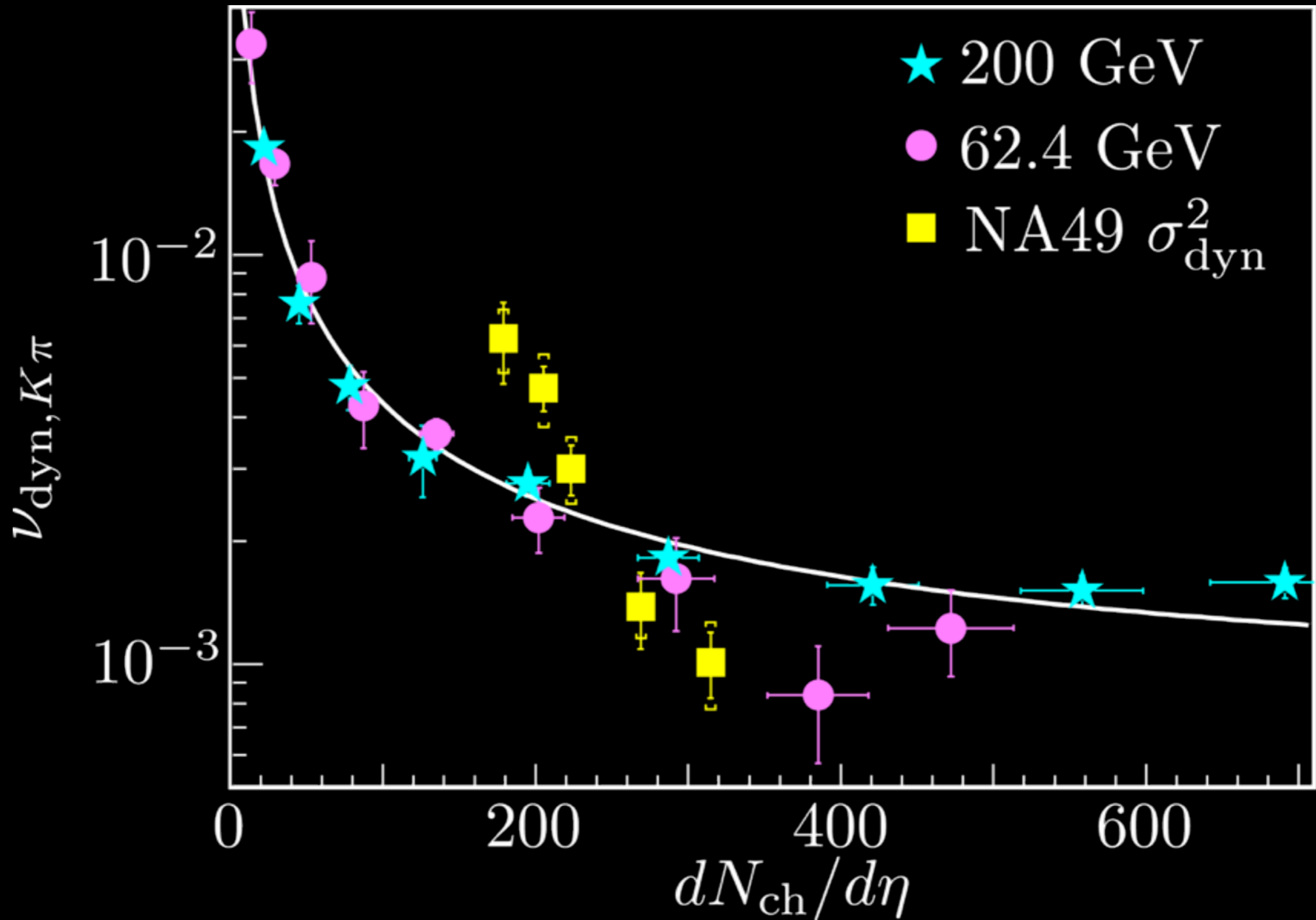
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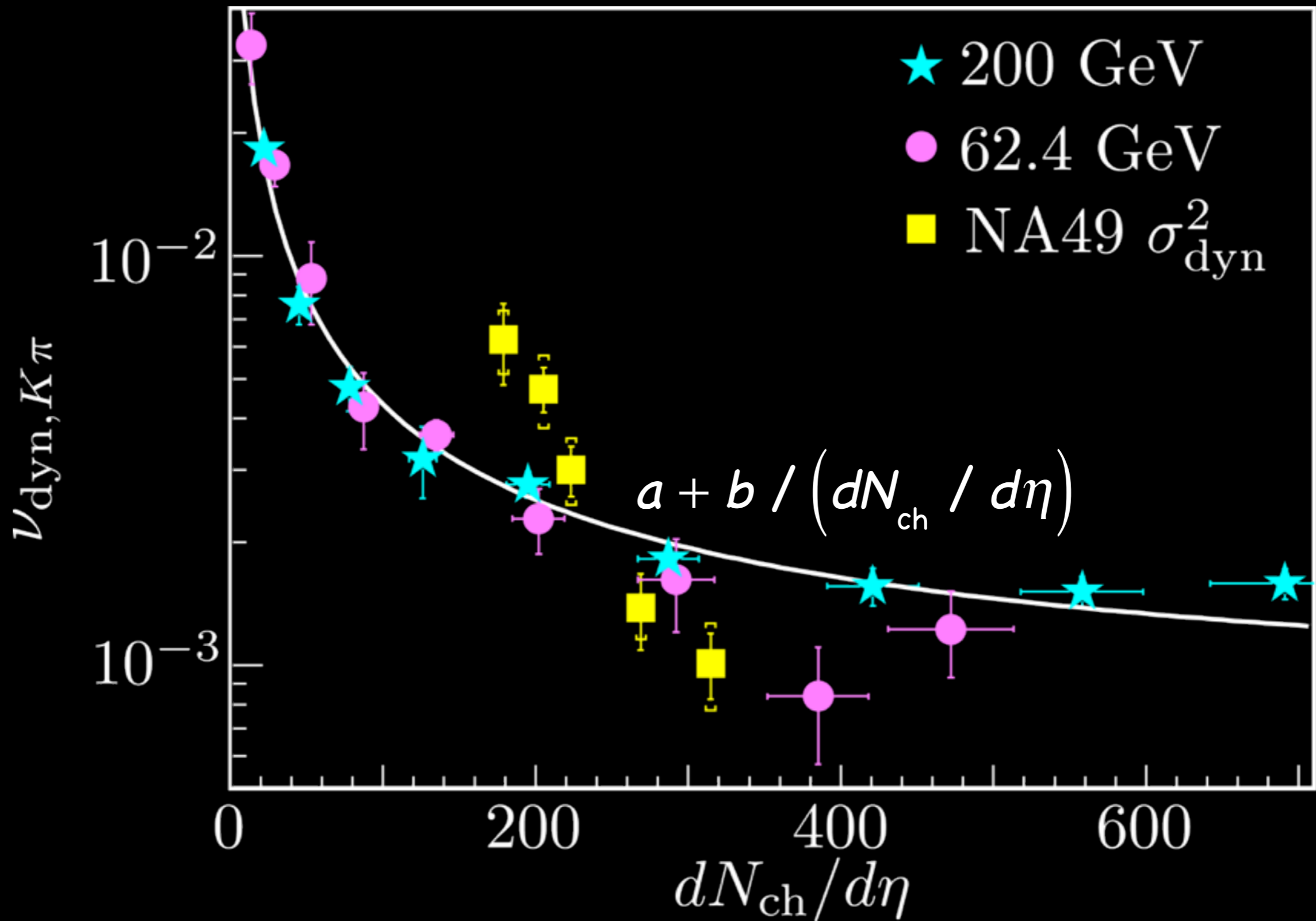
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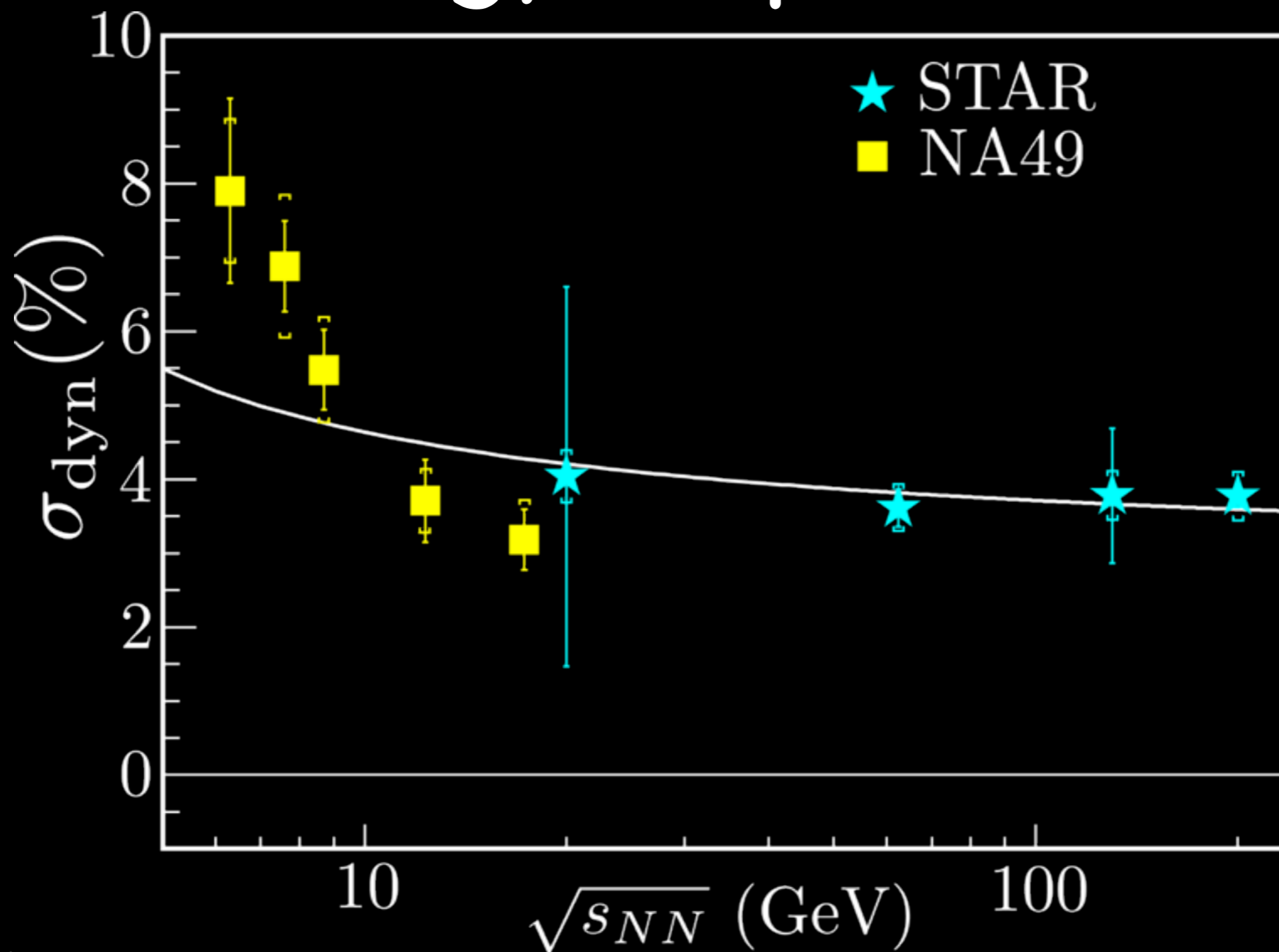


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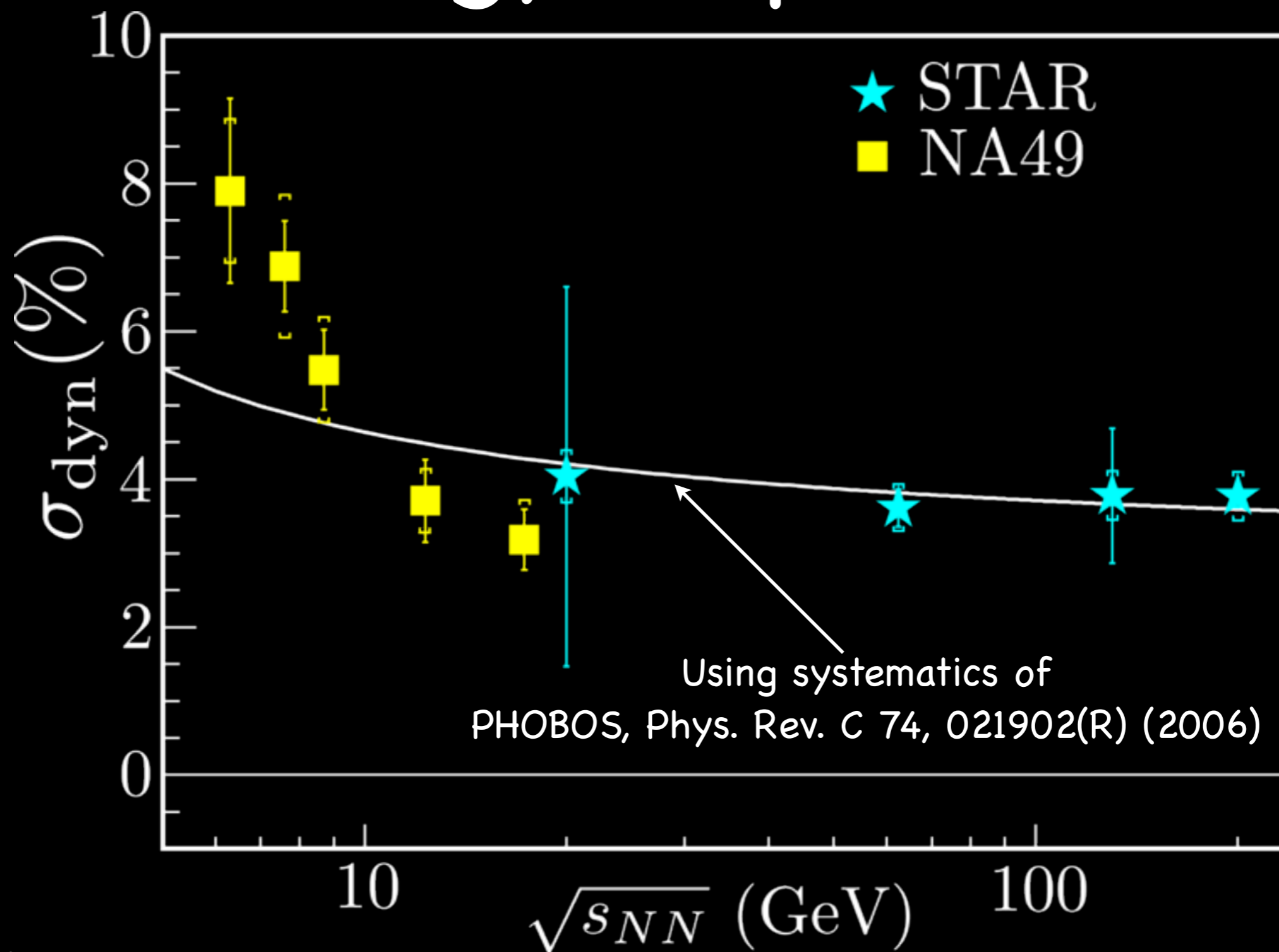


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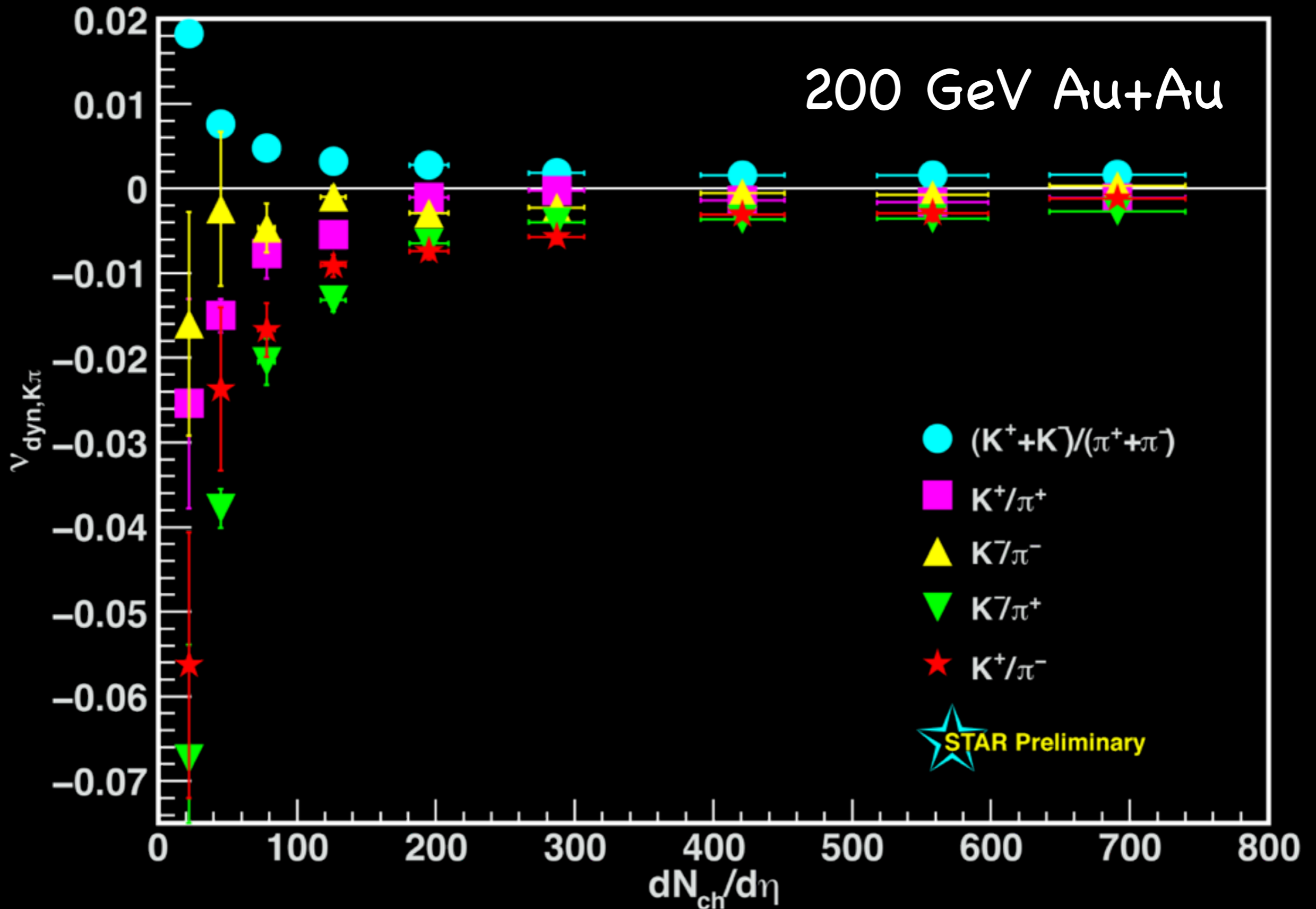


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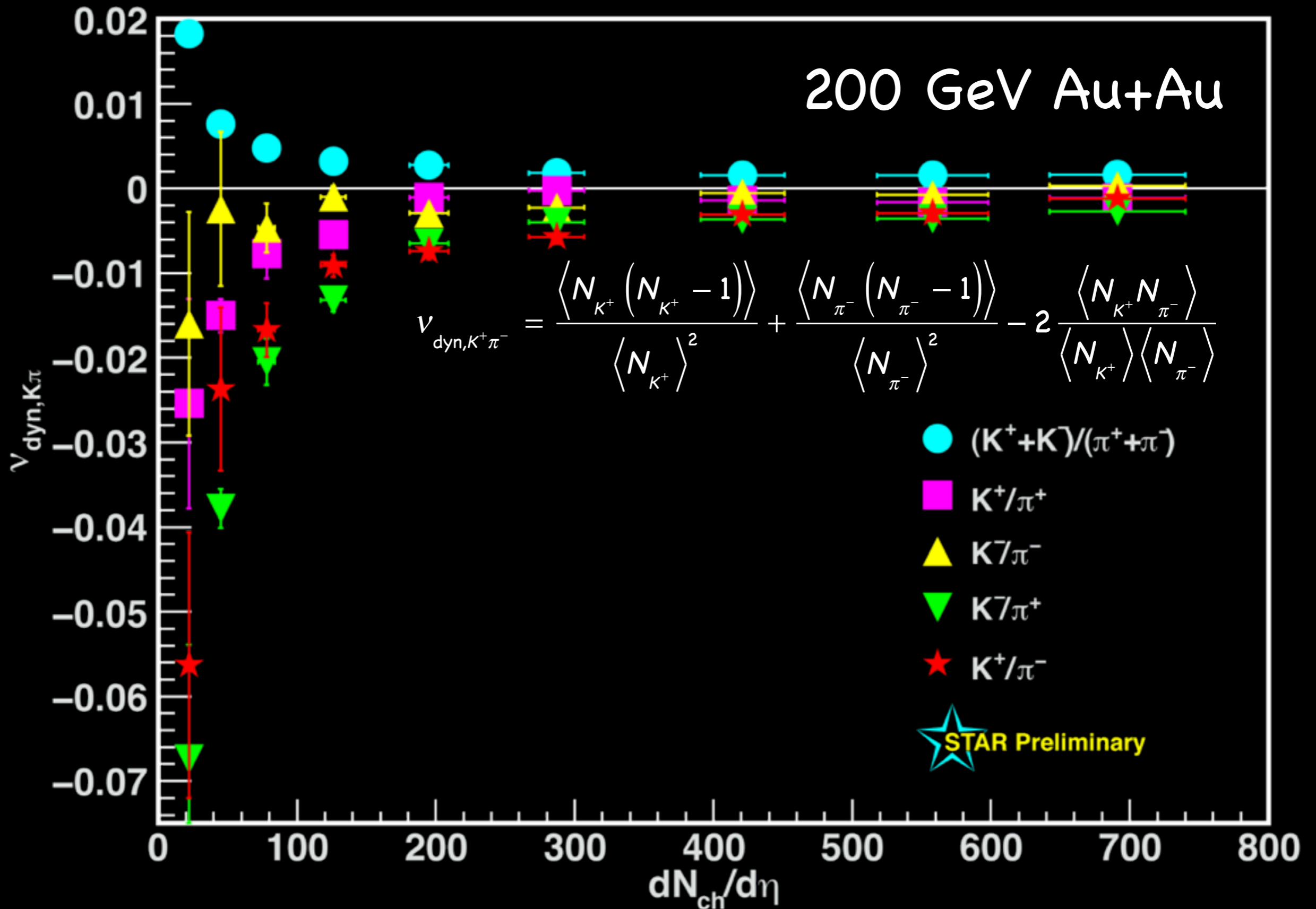


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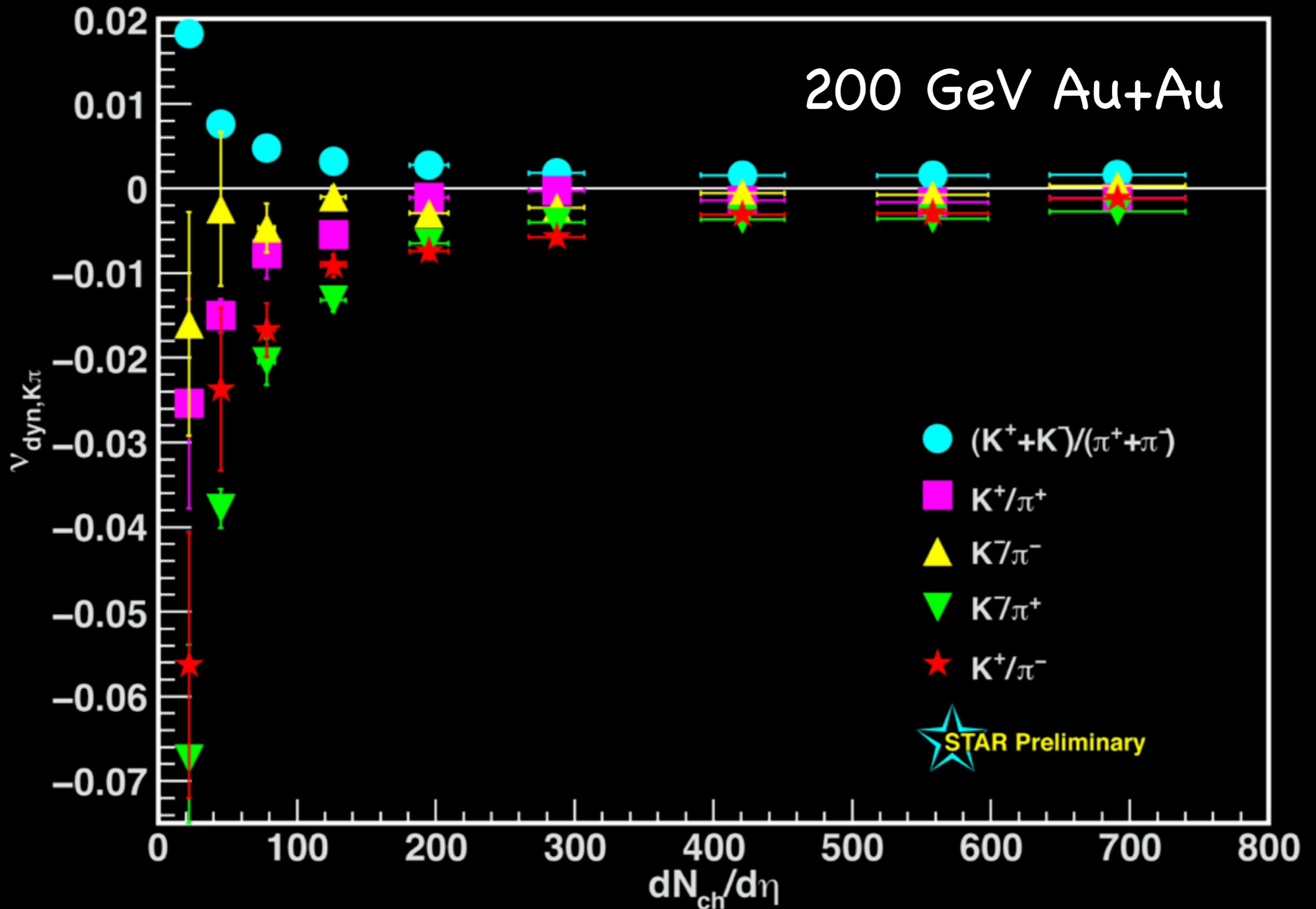
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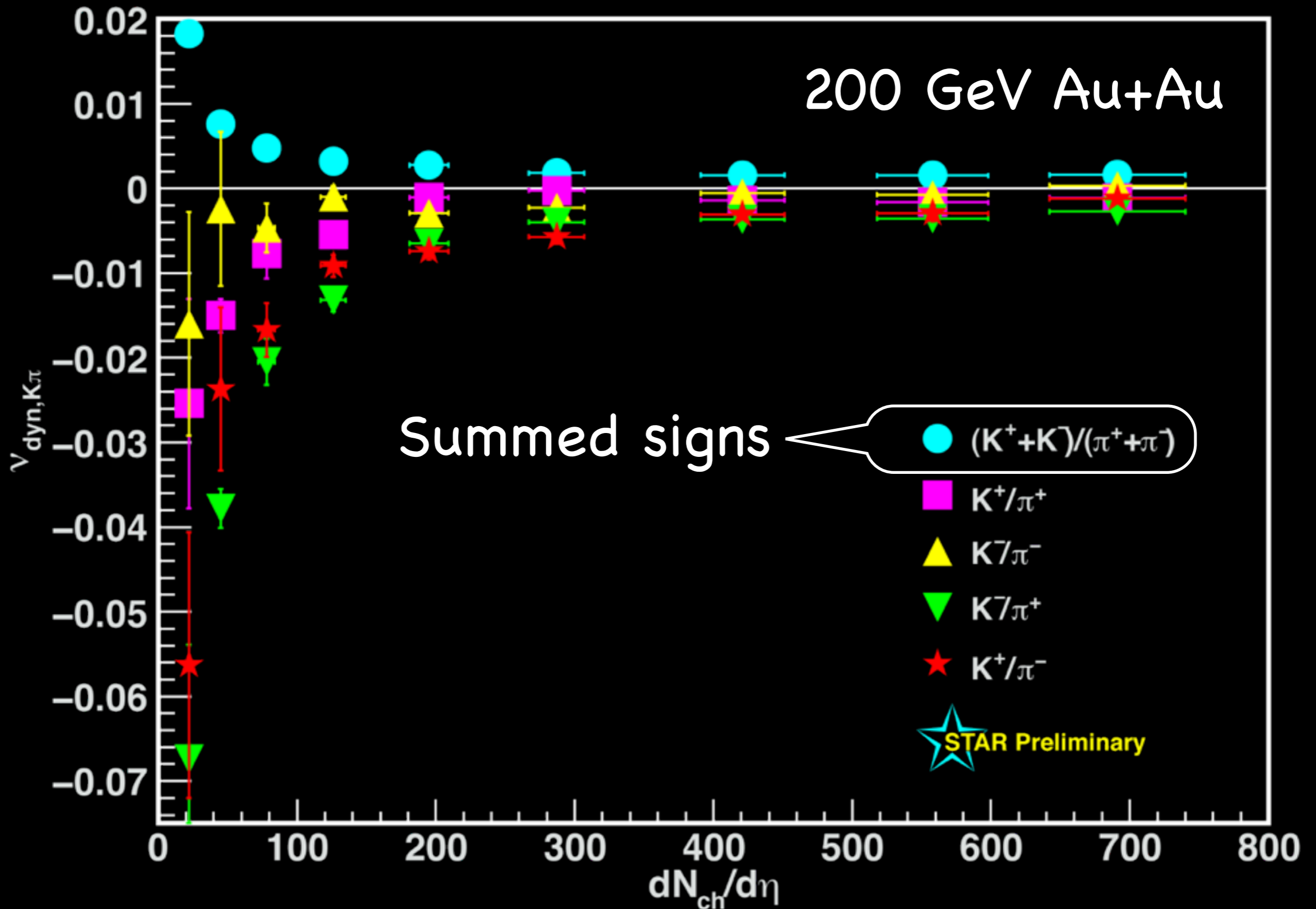


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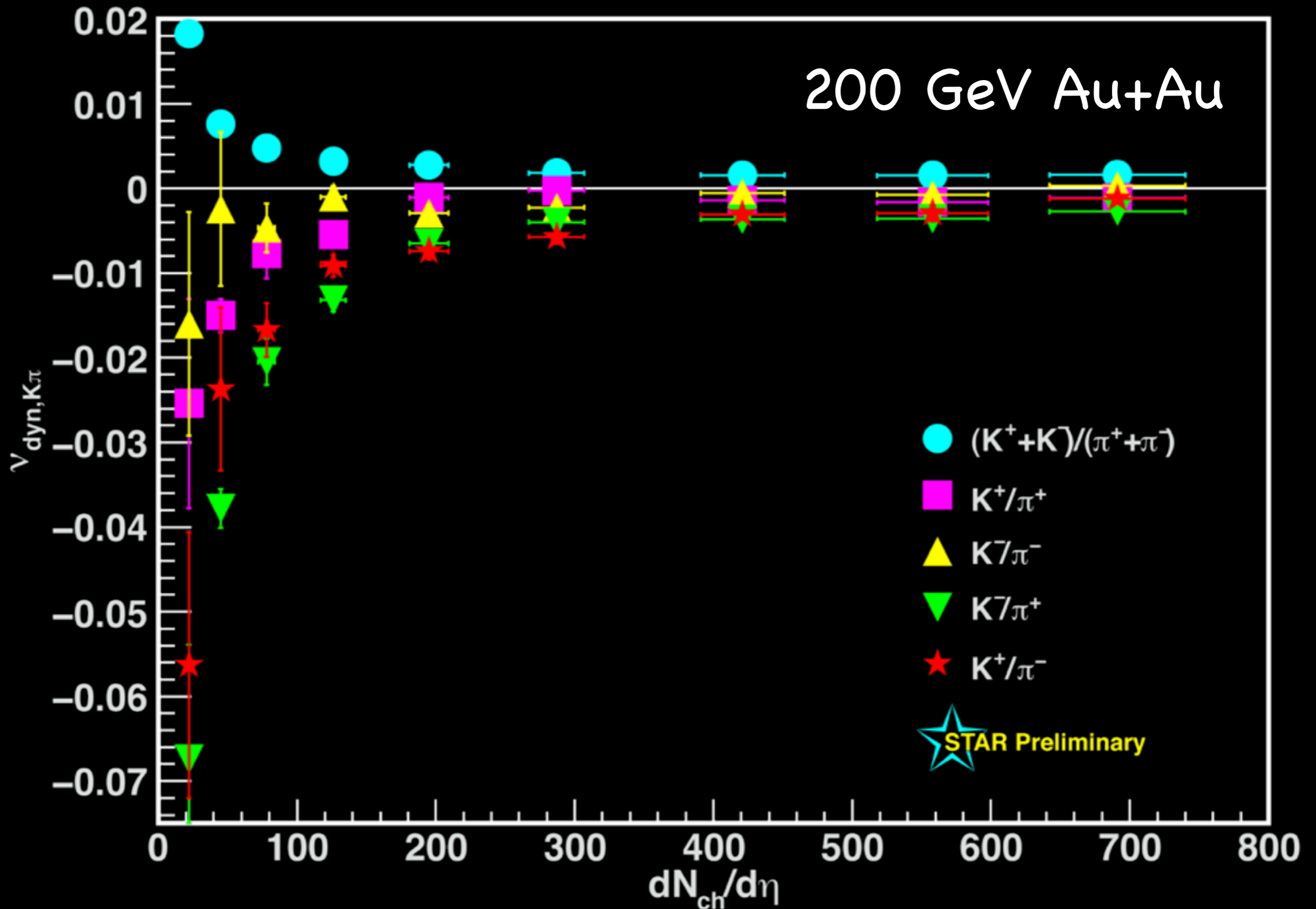




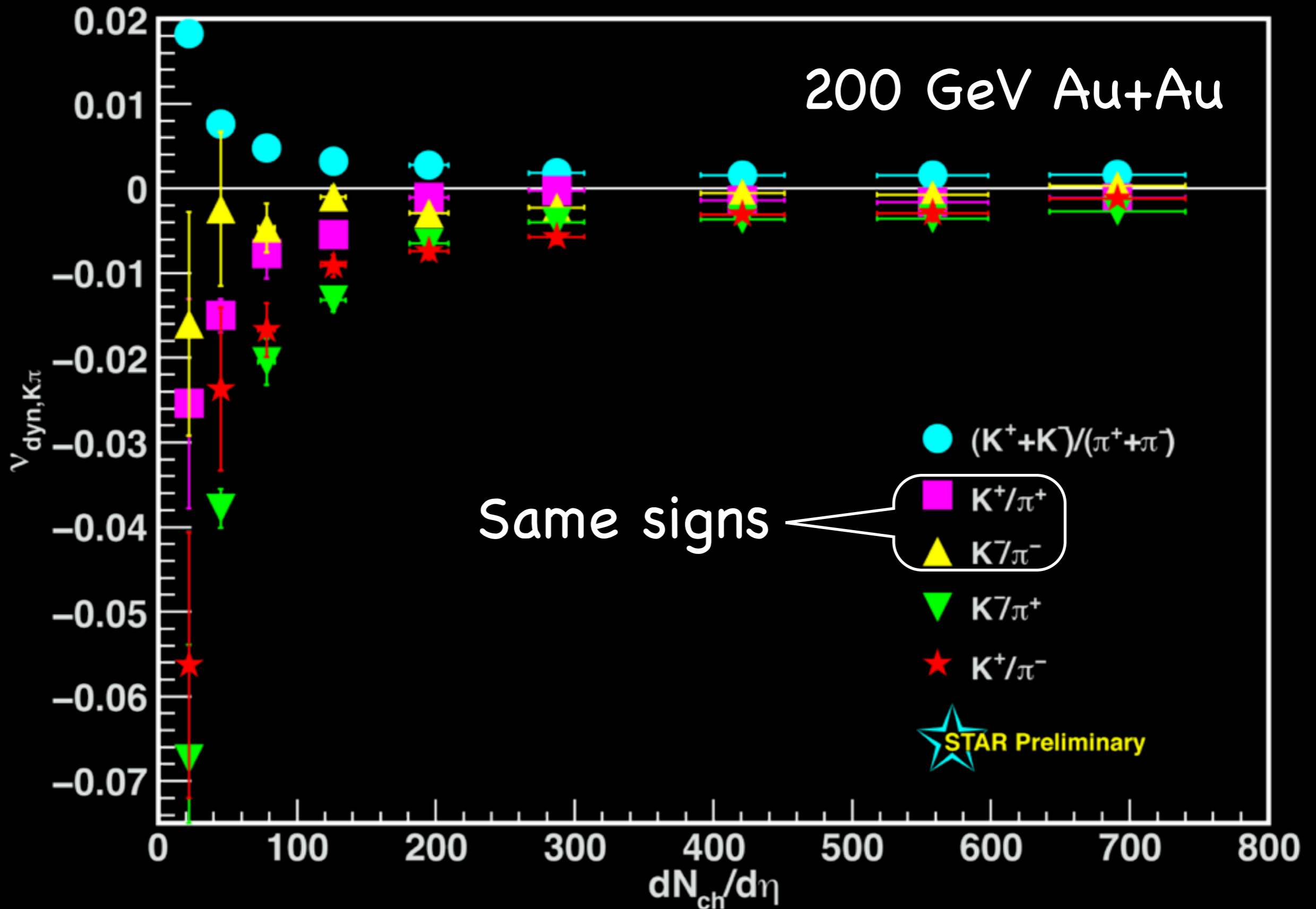
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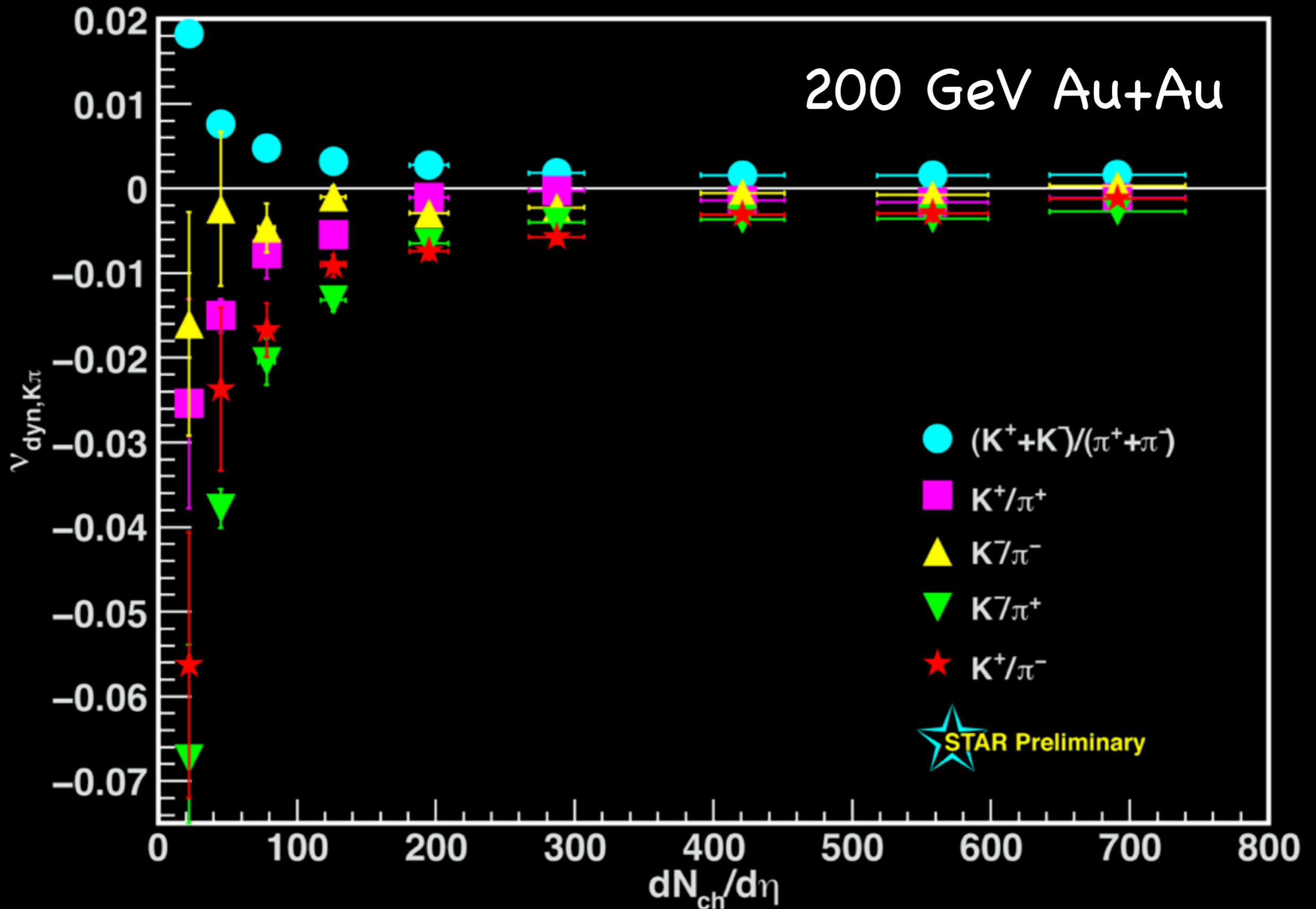
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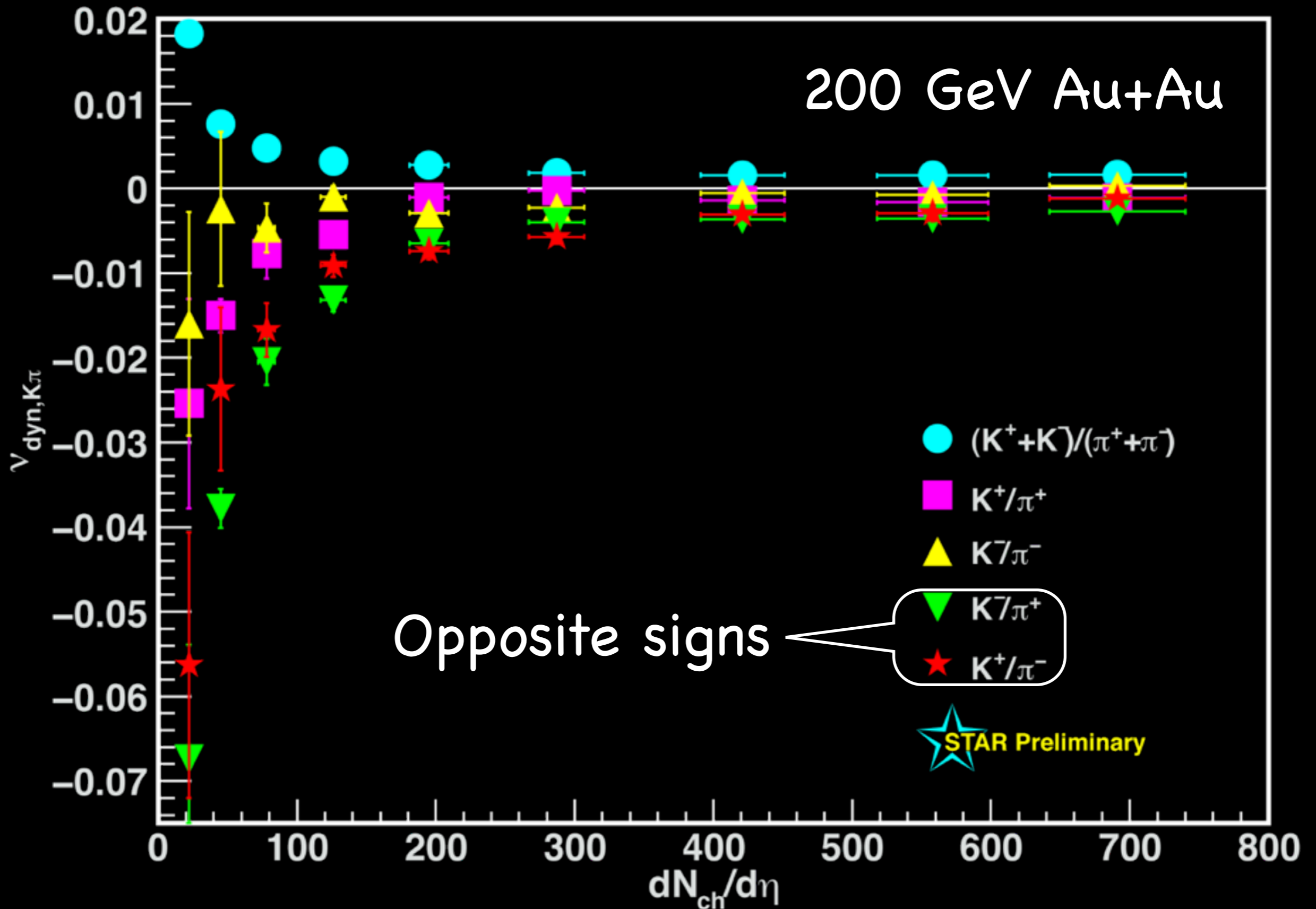
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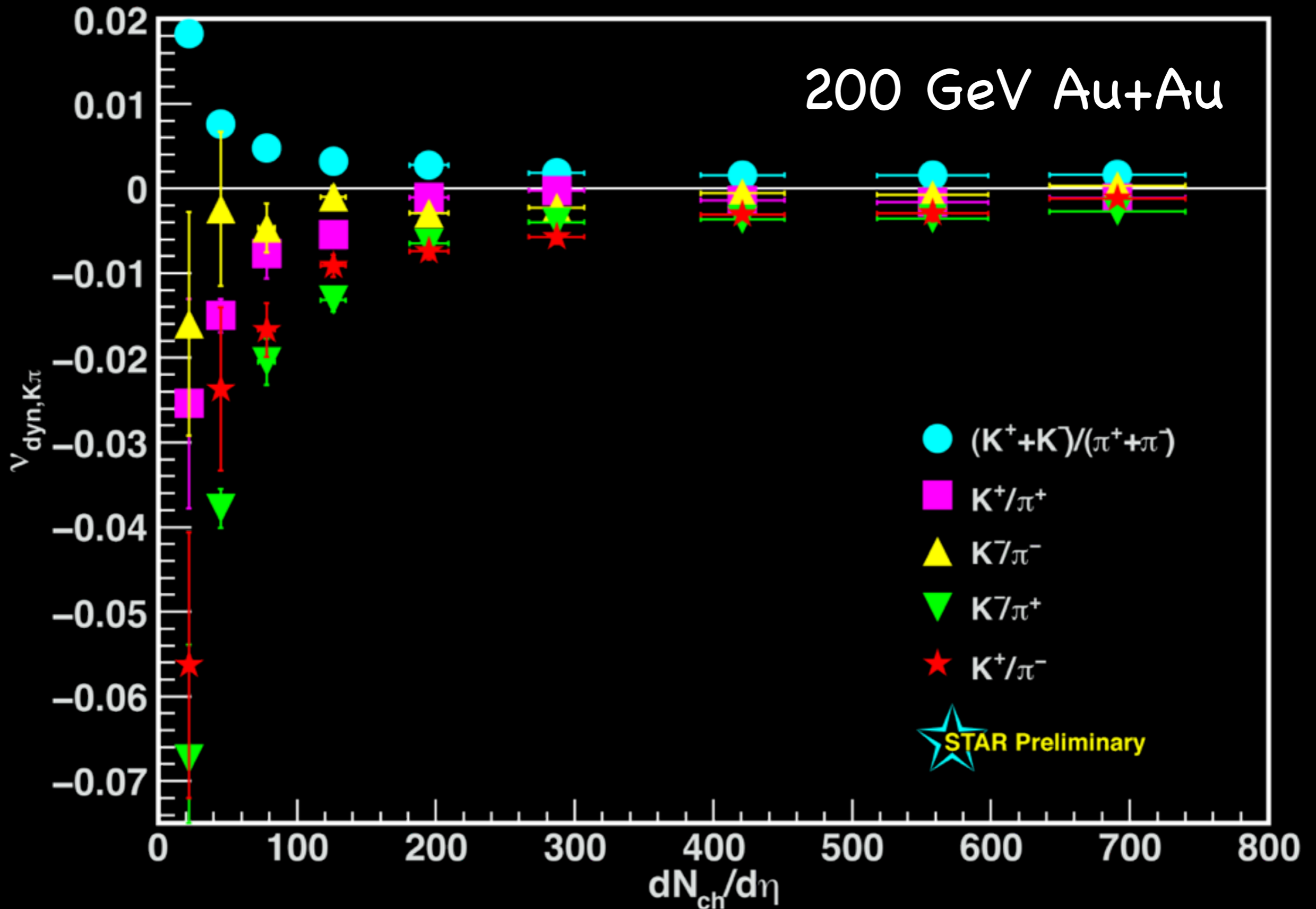
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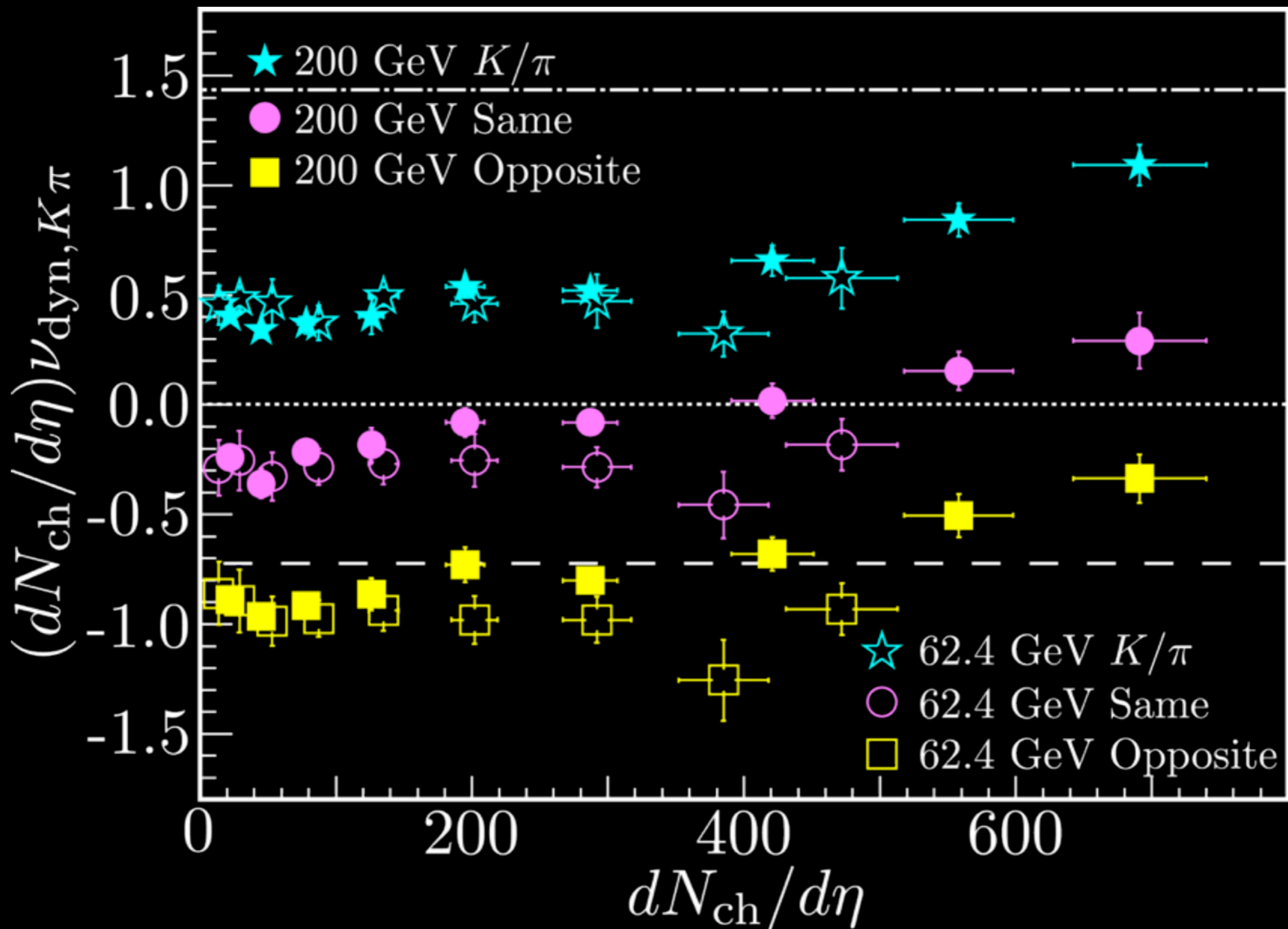


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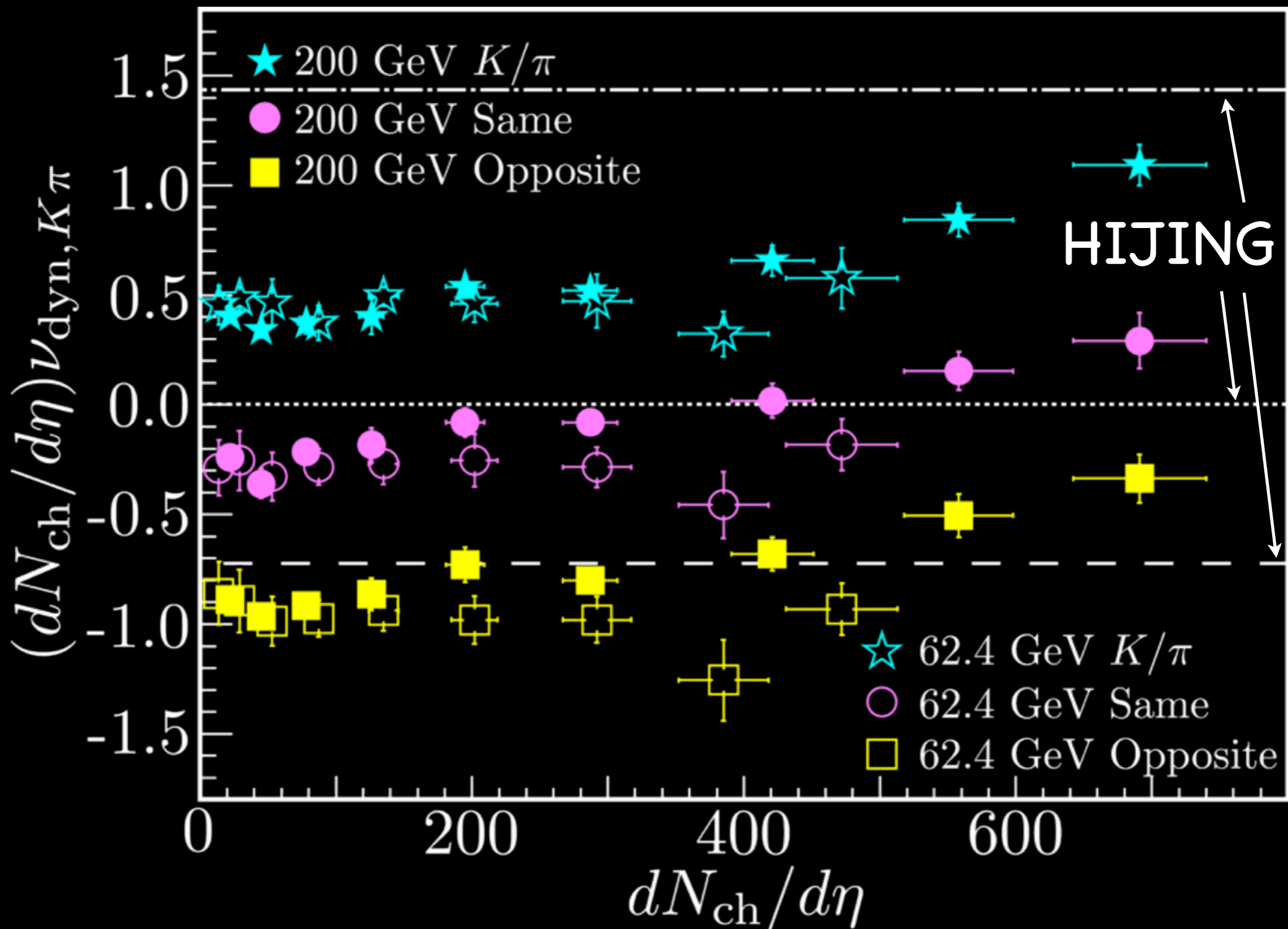
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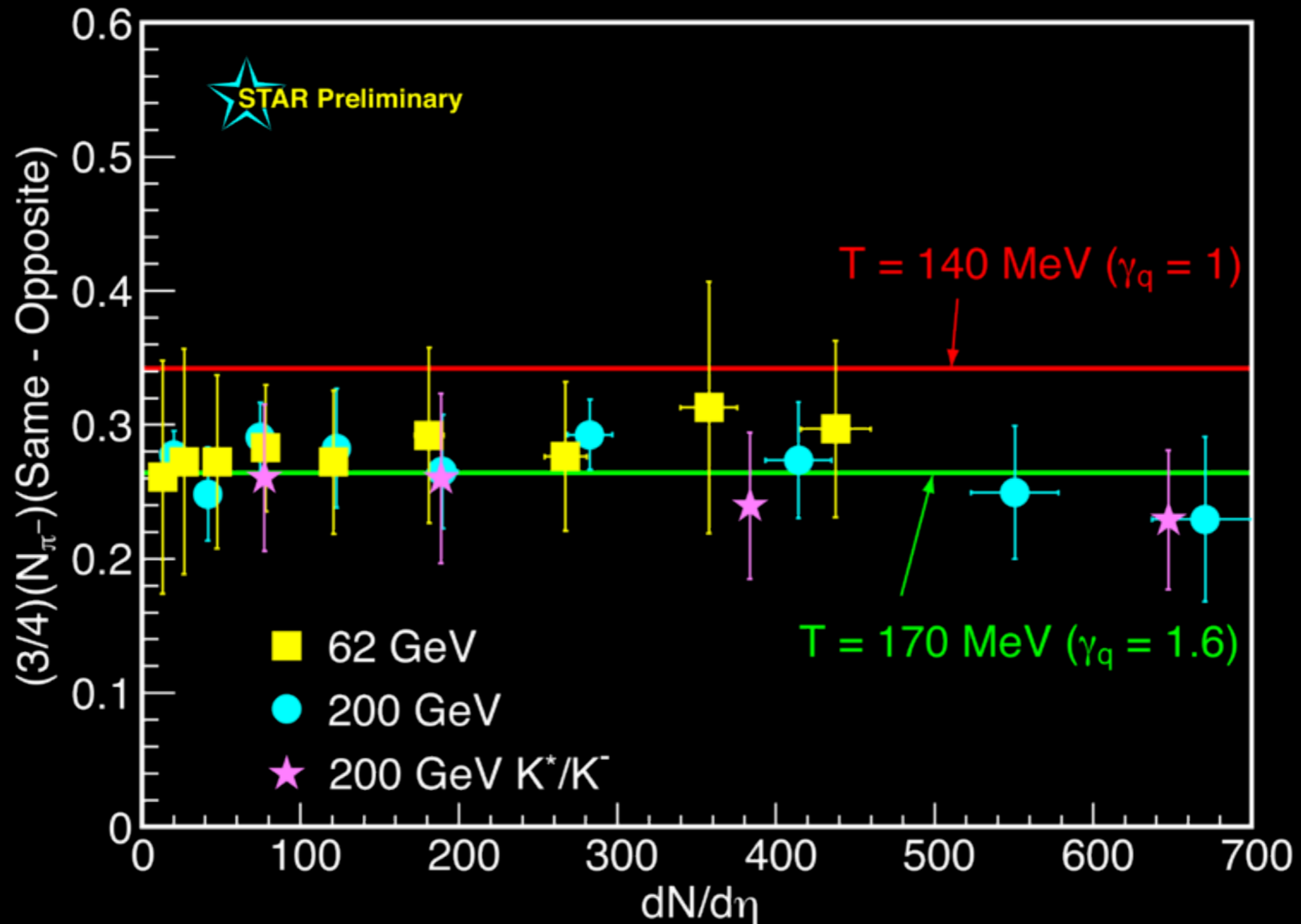
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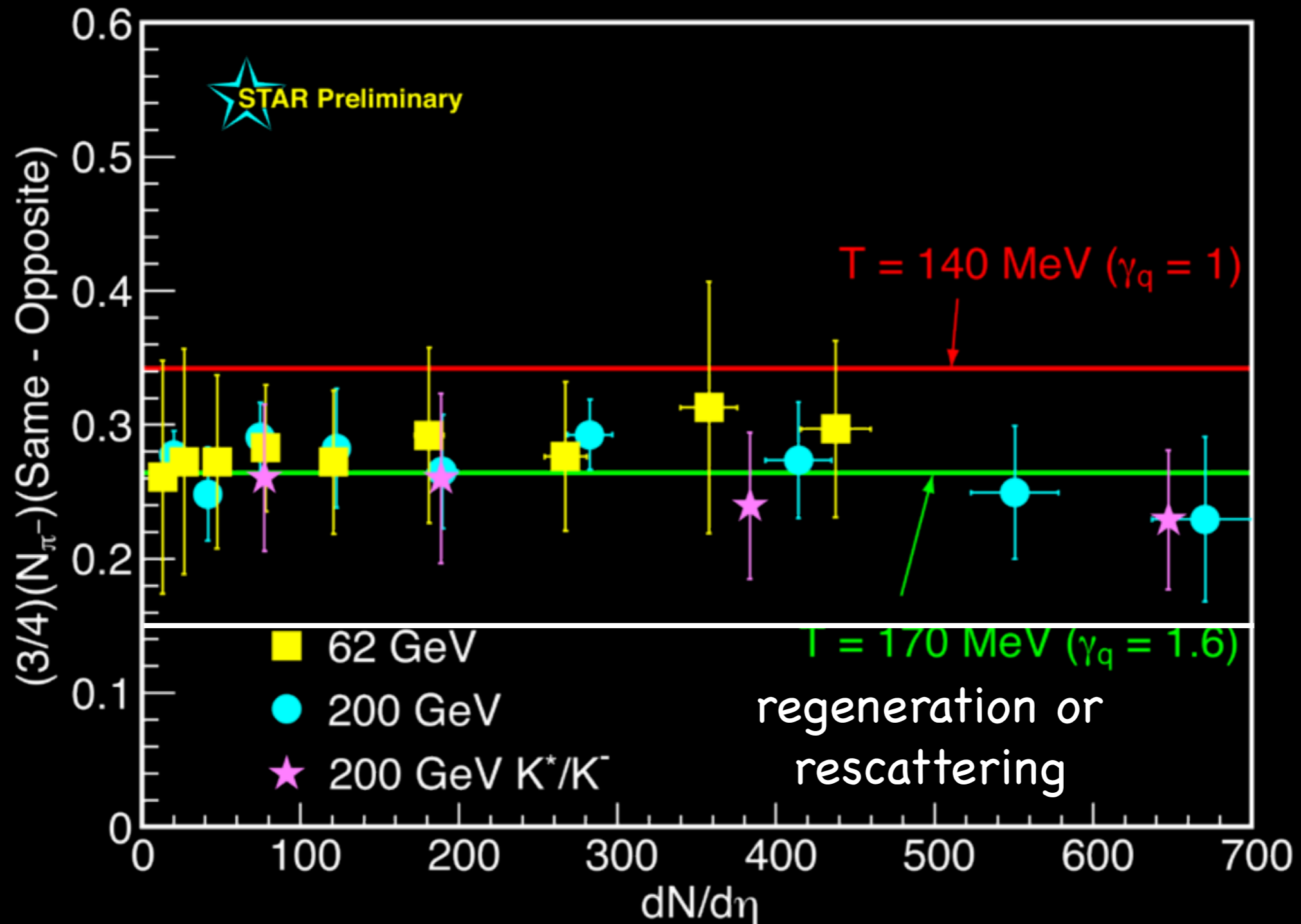


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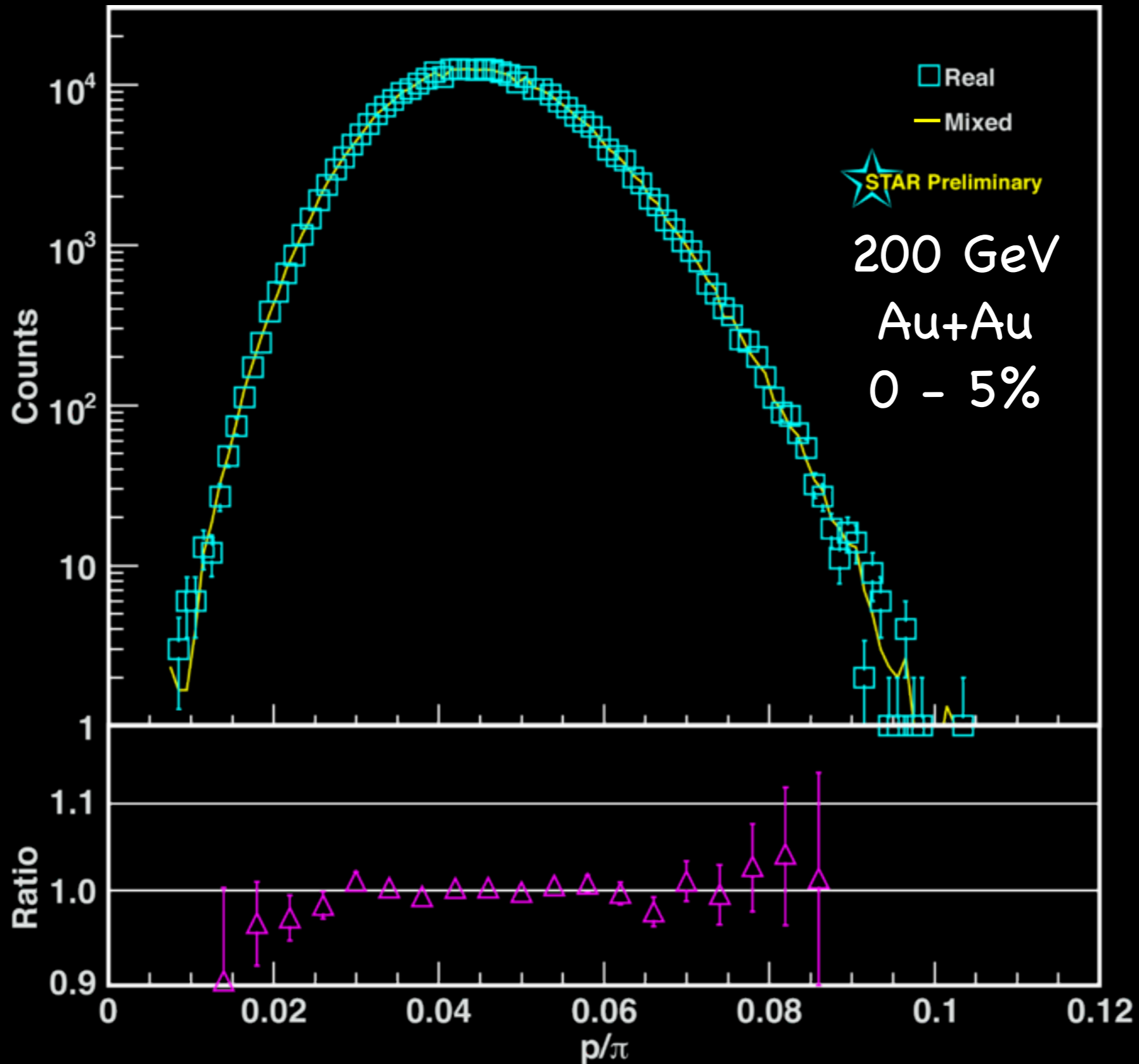
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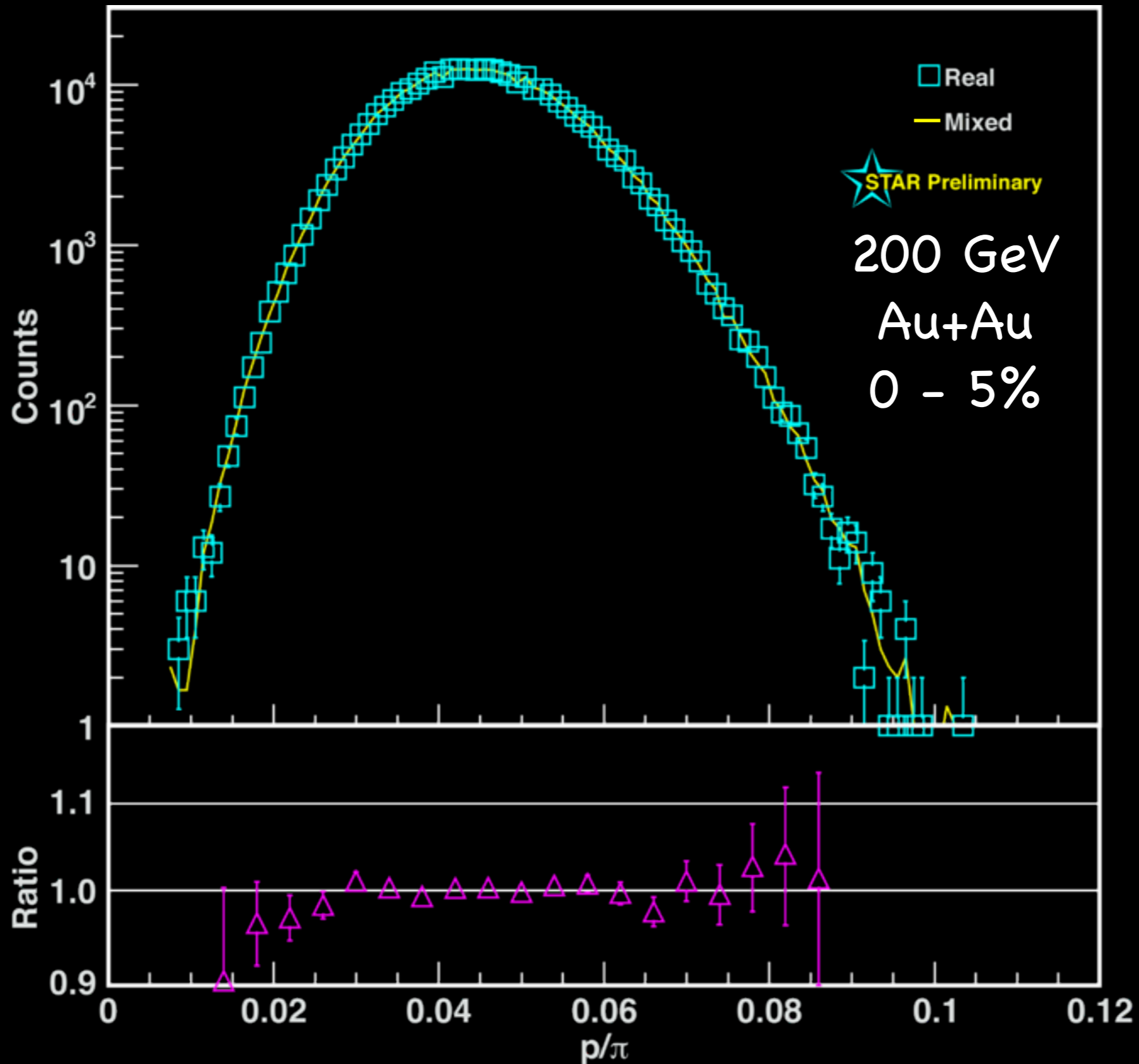
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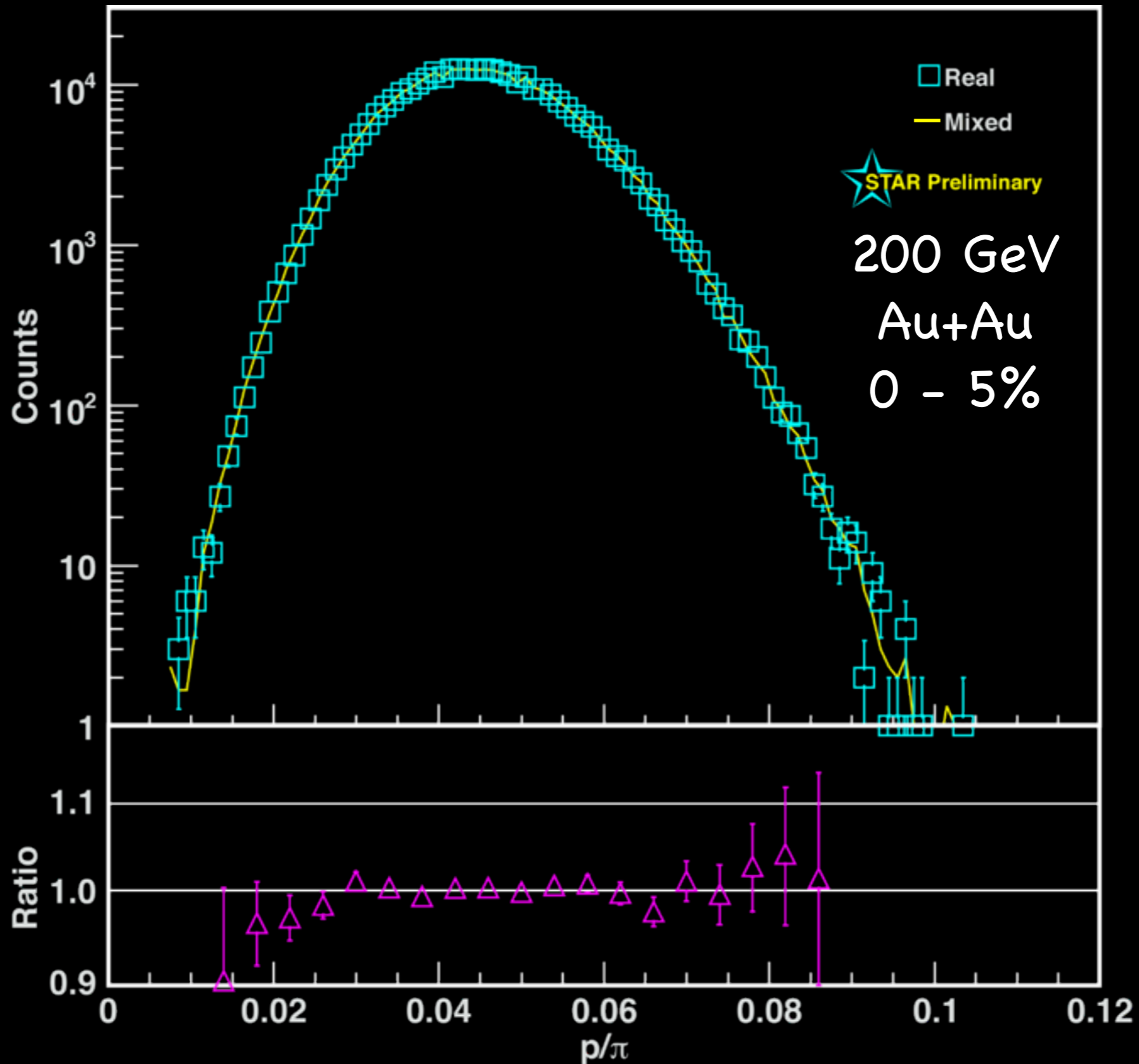
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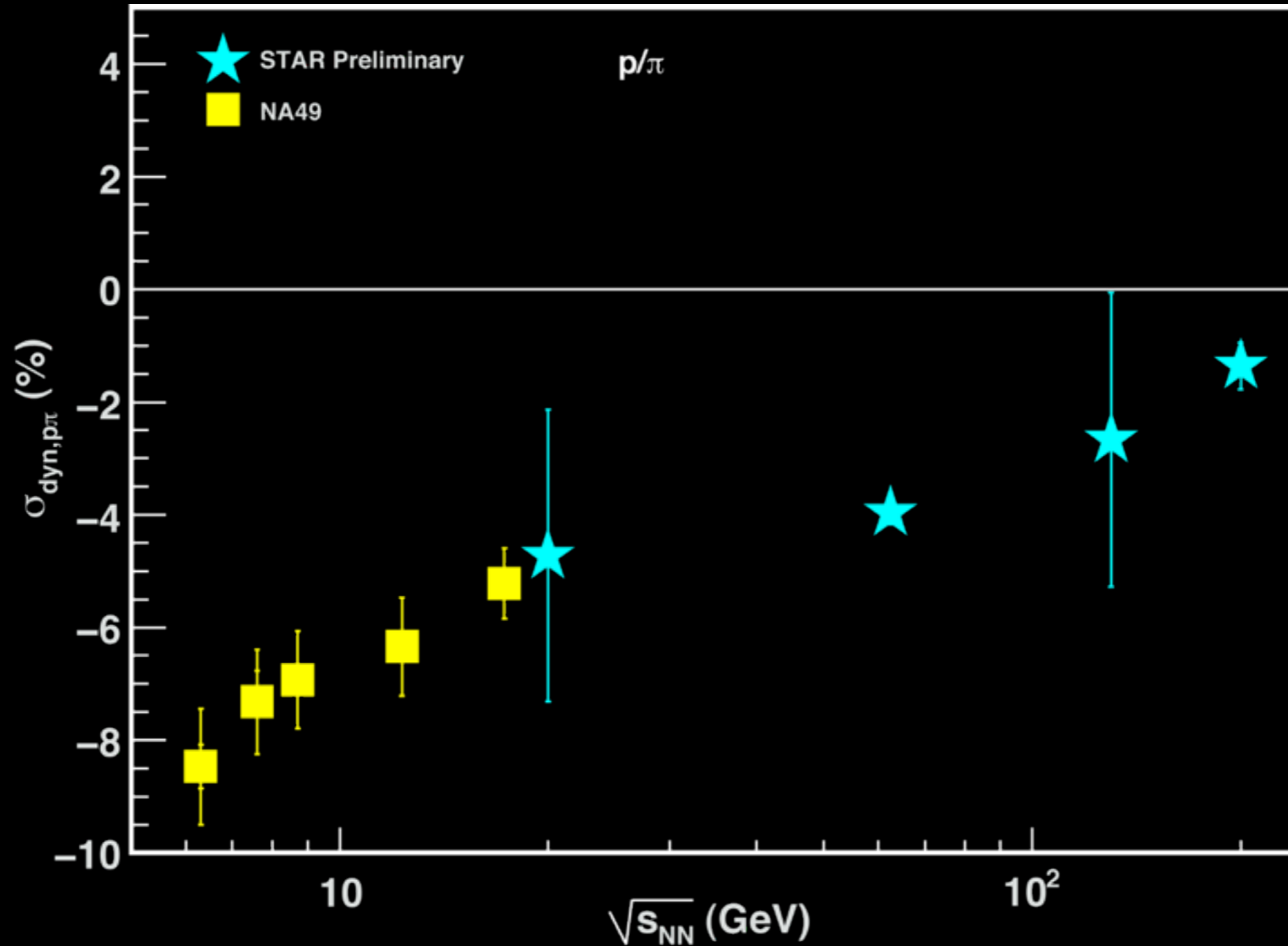
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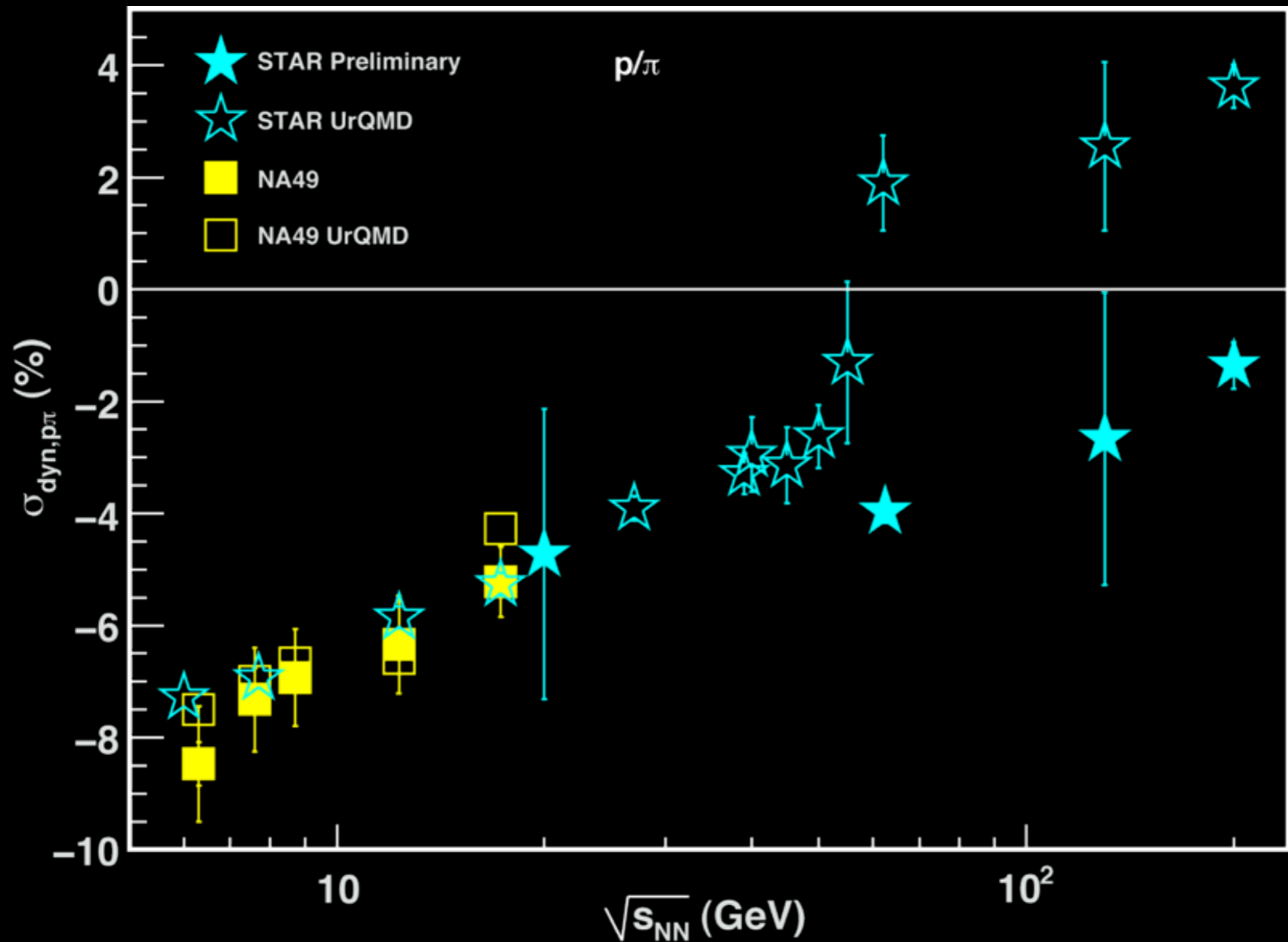
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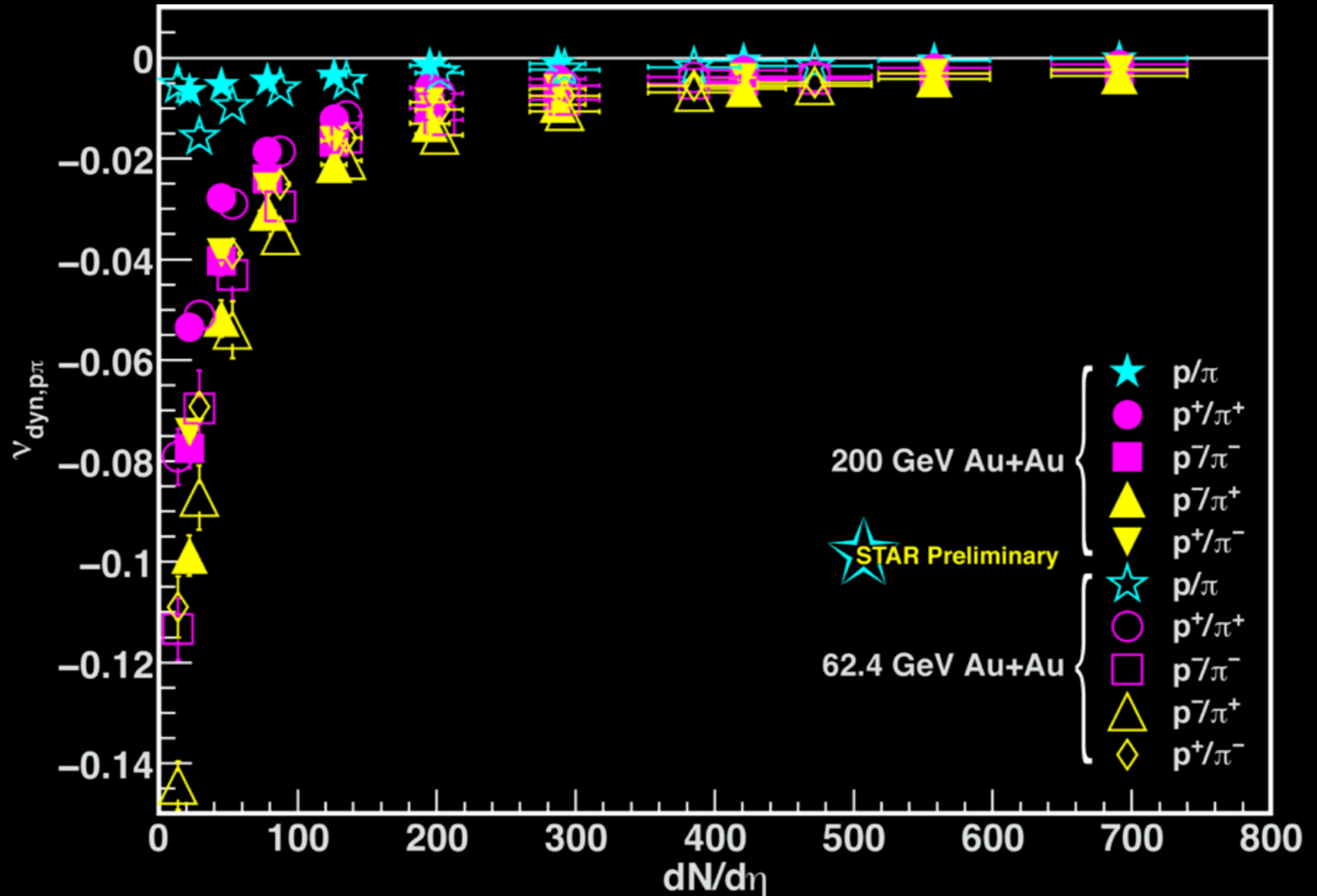


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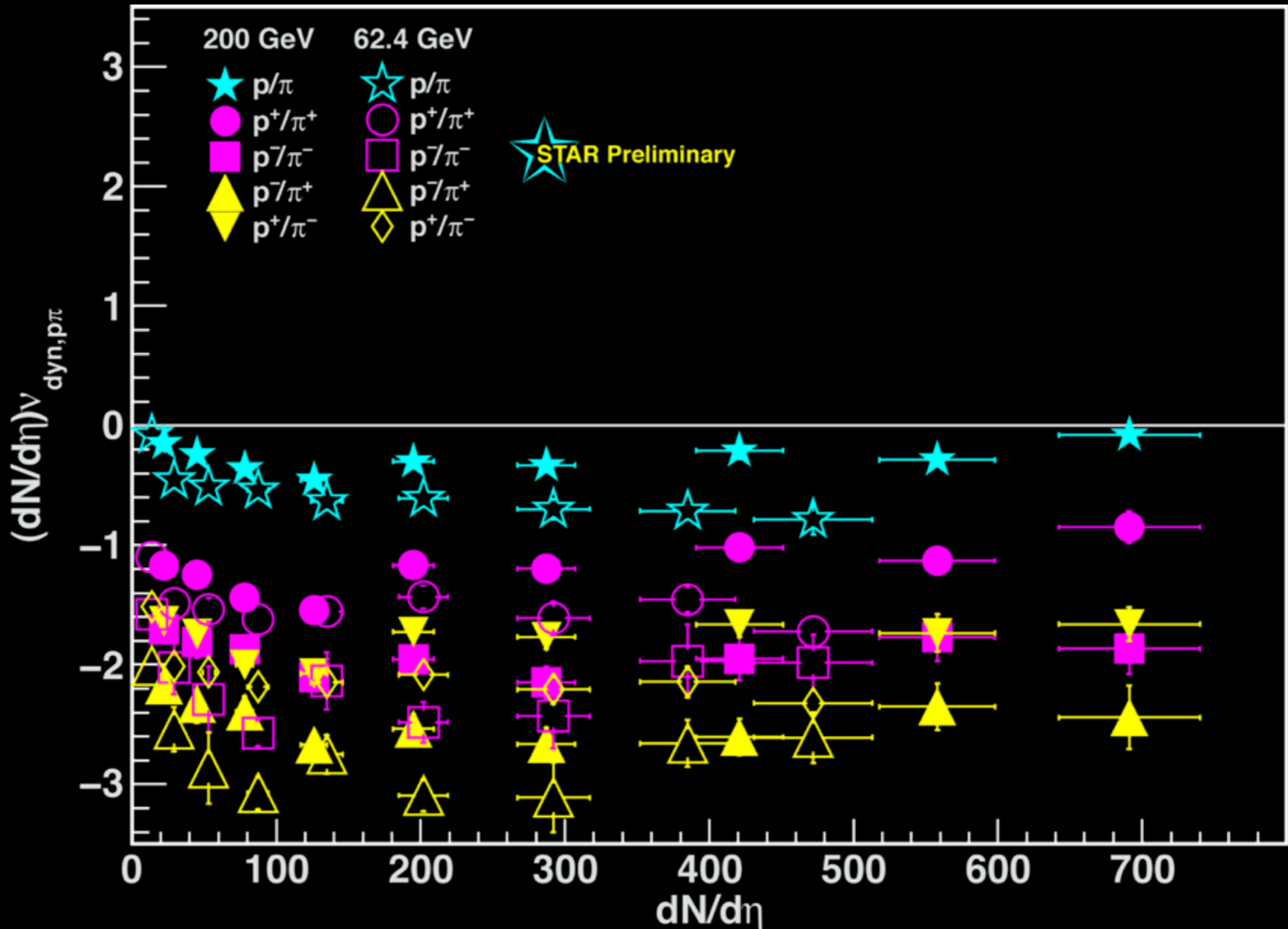


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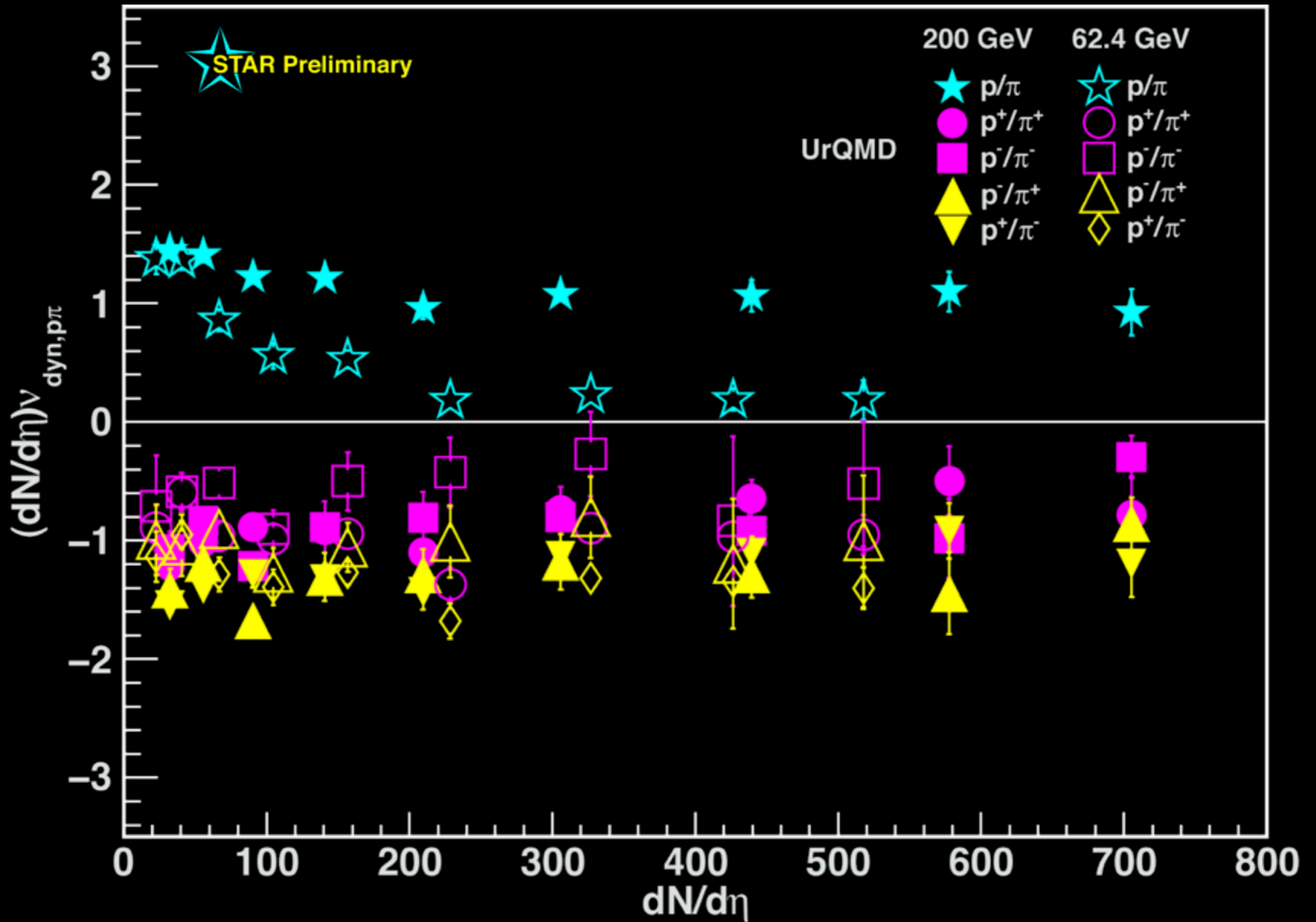
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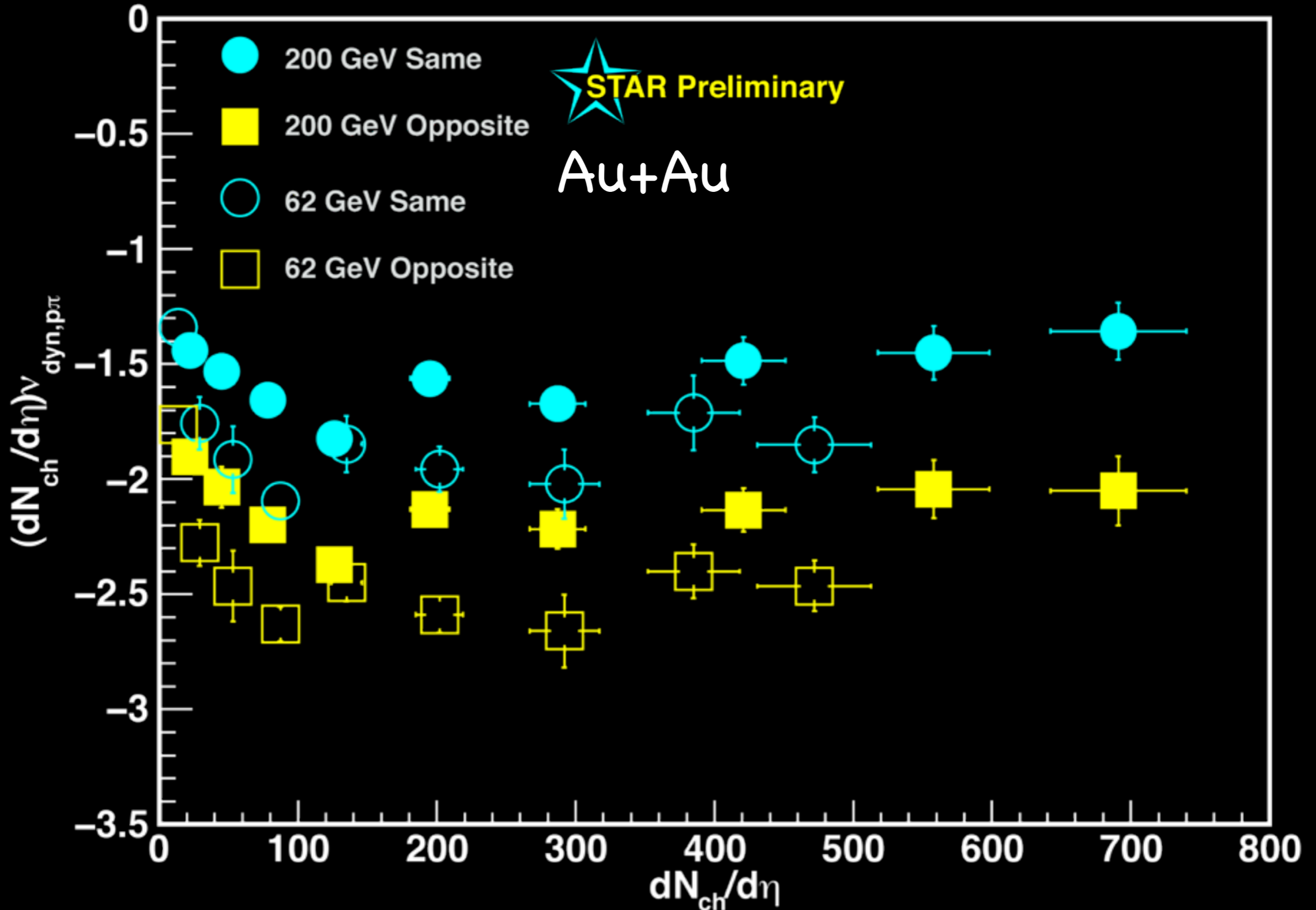


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# Same and Opposite Signs

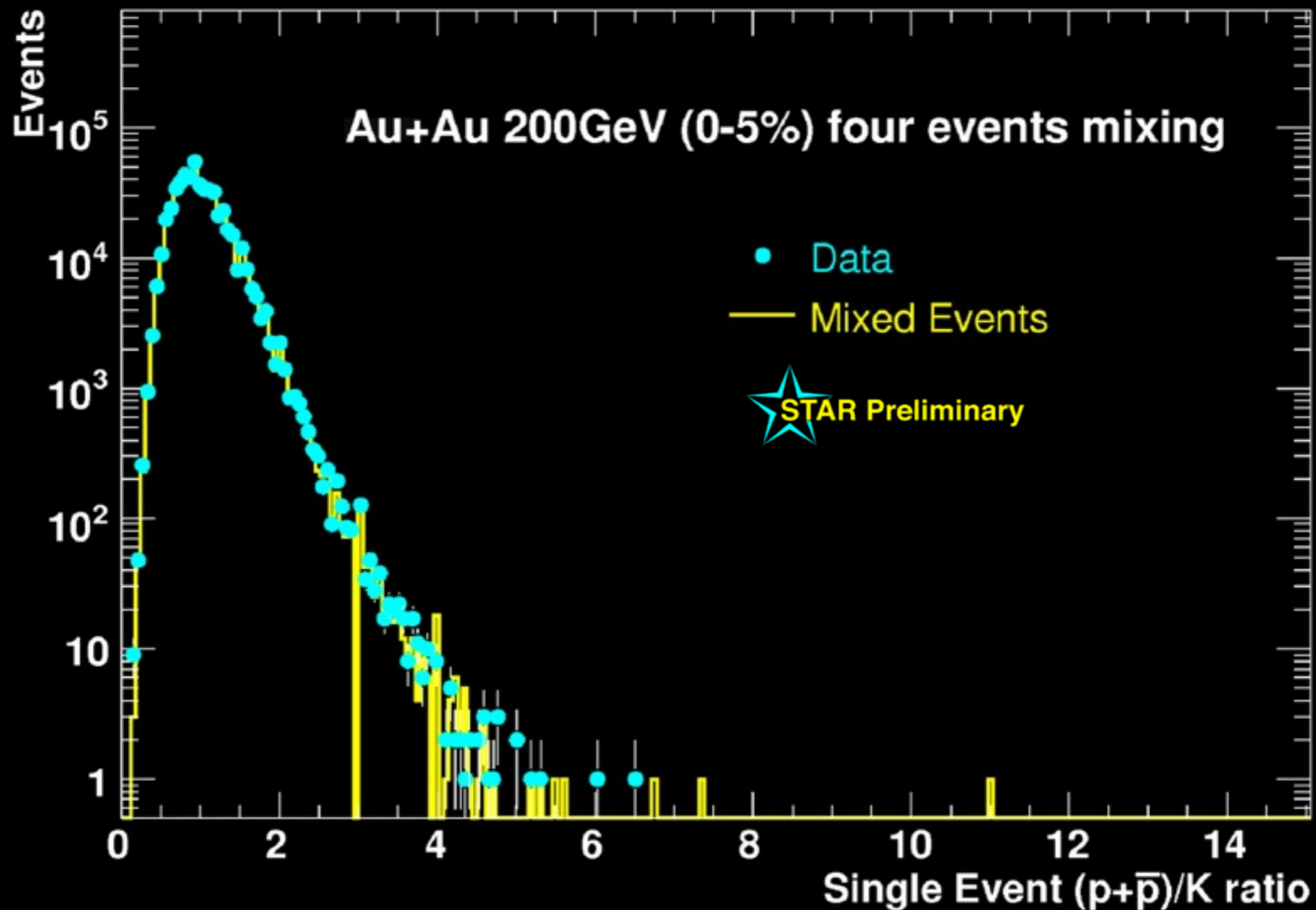
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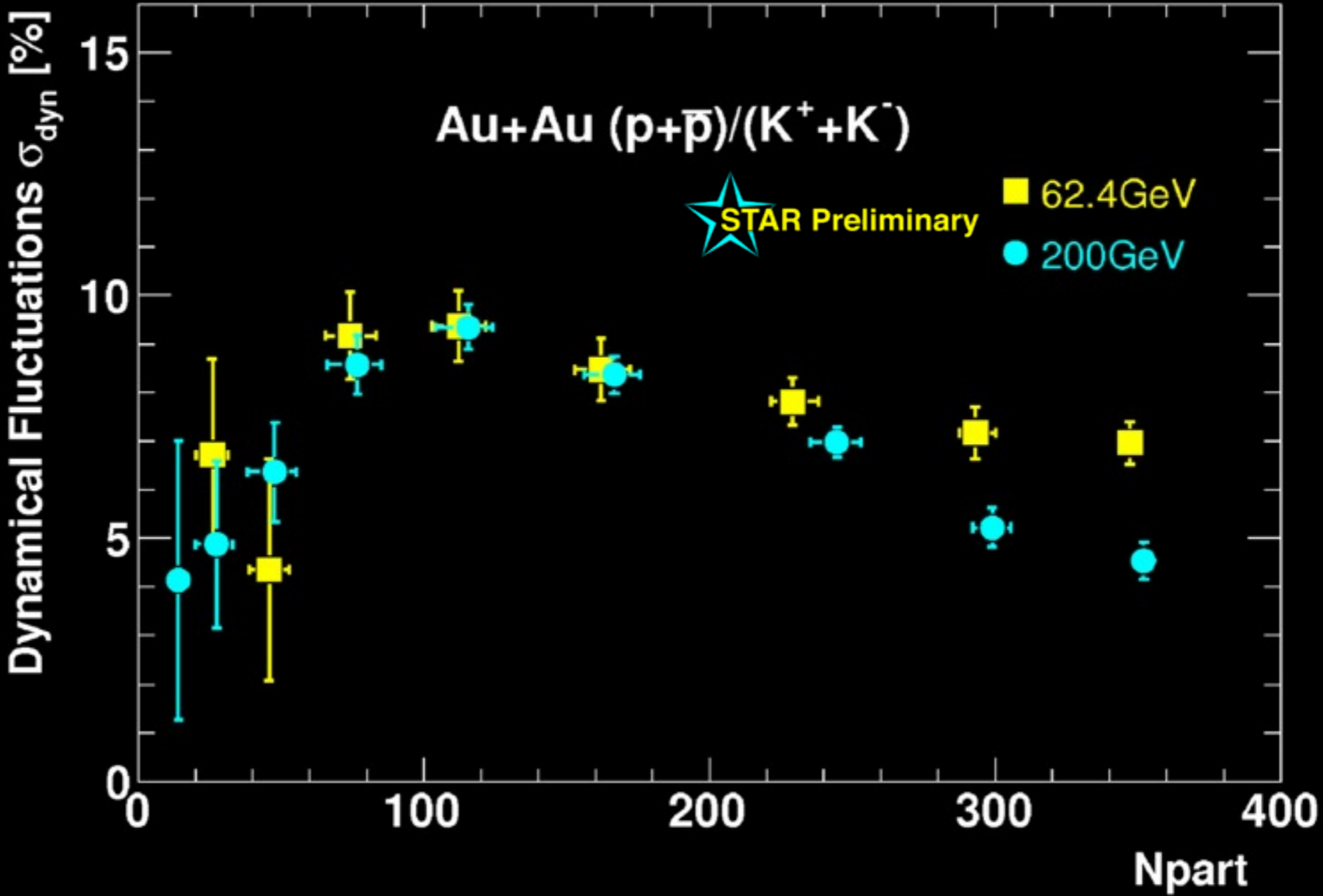
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# Centrality Dependence of p/K Fluctuations

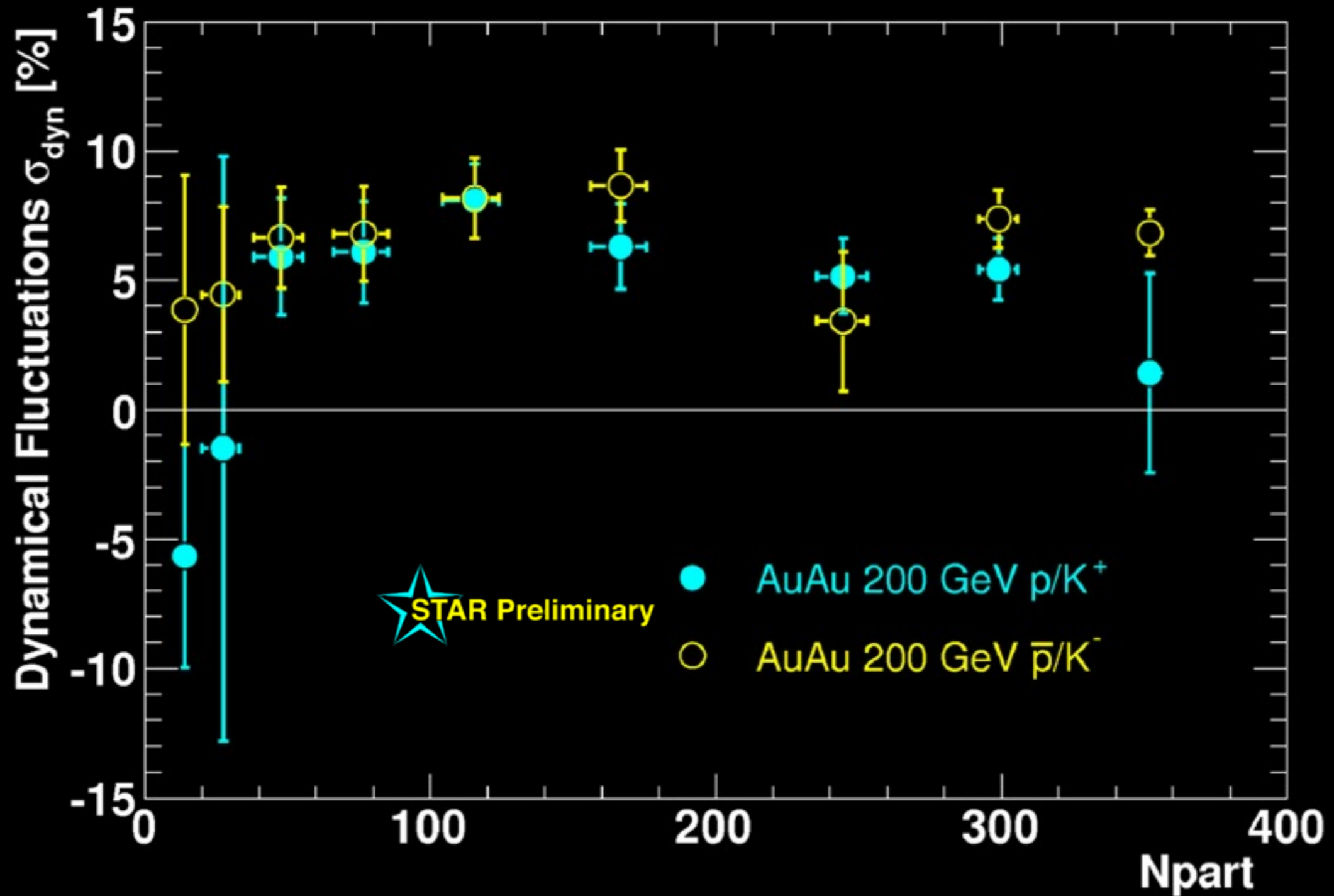
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# Future

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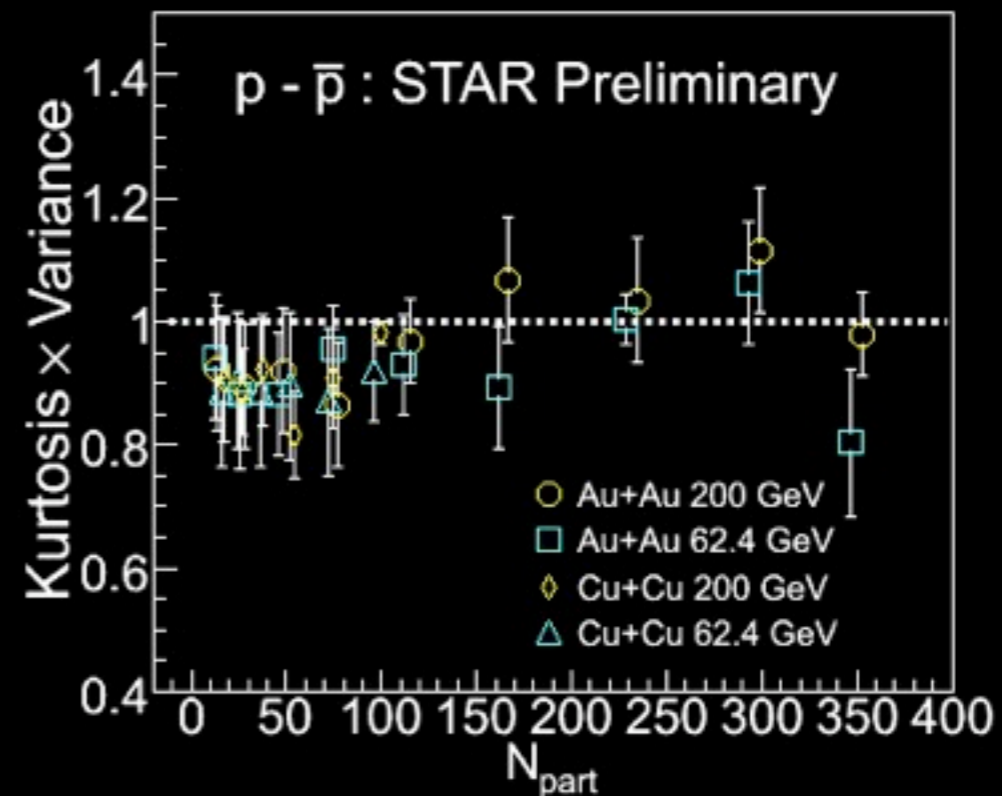
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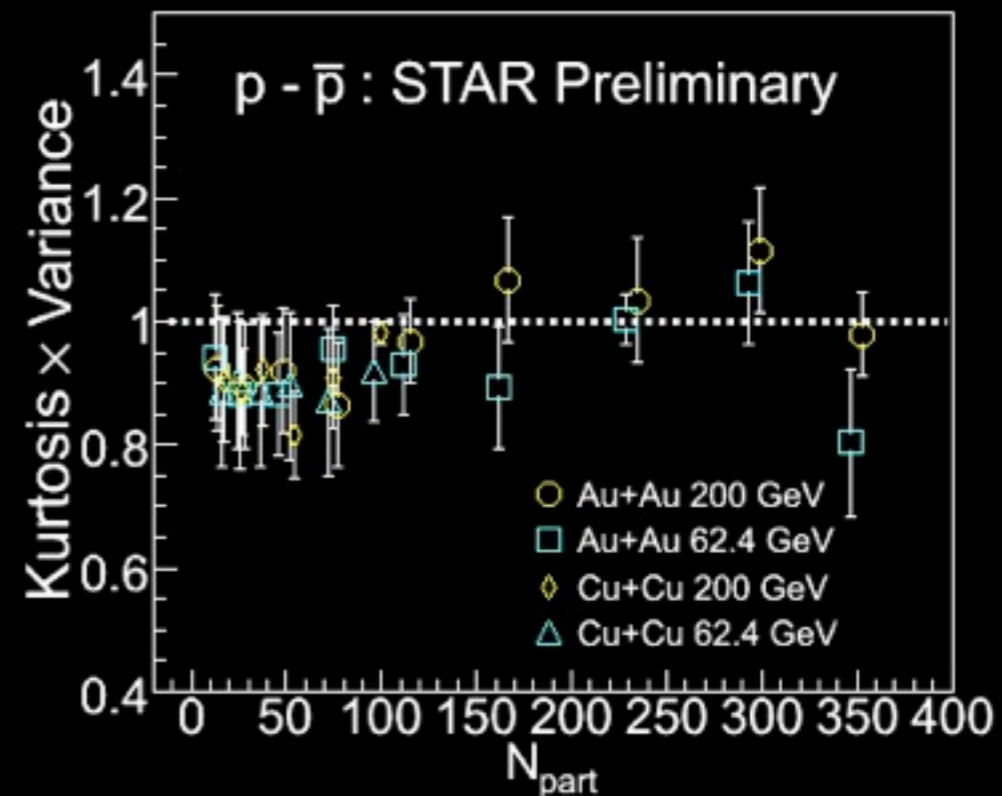
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- Complementary programs will be carried out at the SPS and at GSI/FAIR

