Study of the feasibility of the SPD setup for measuring SSA

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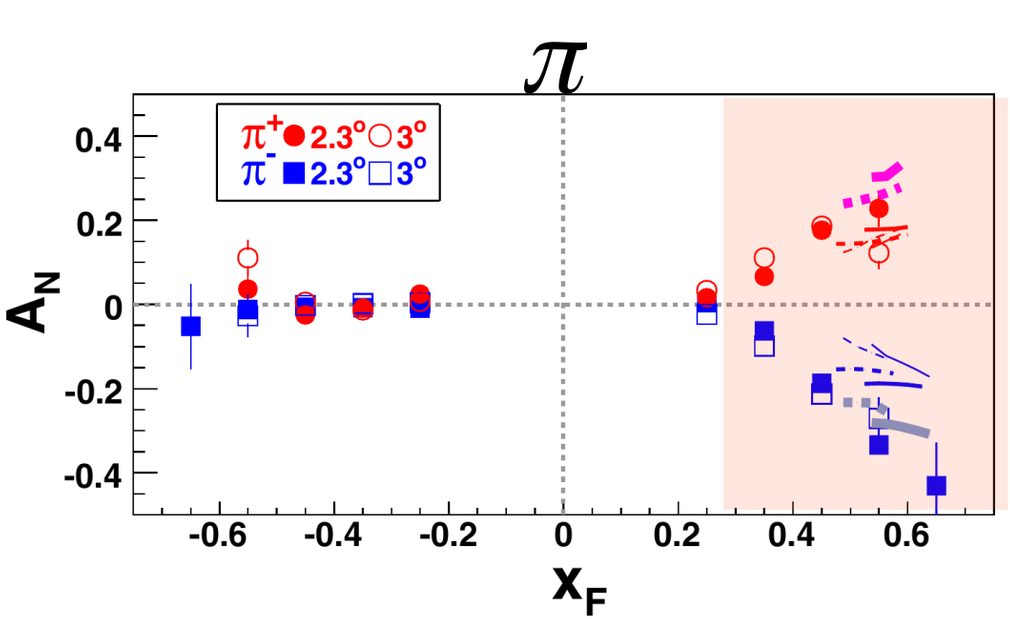
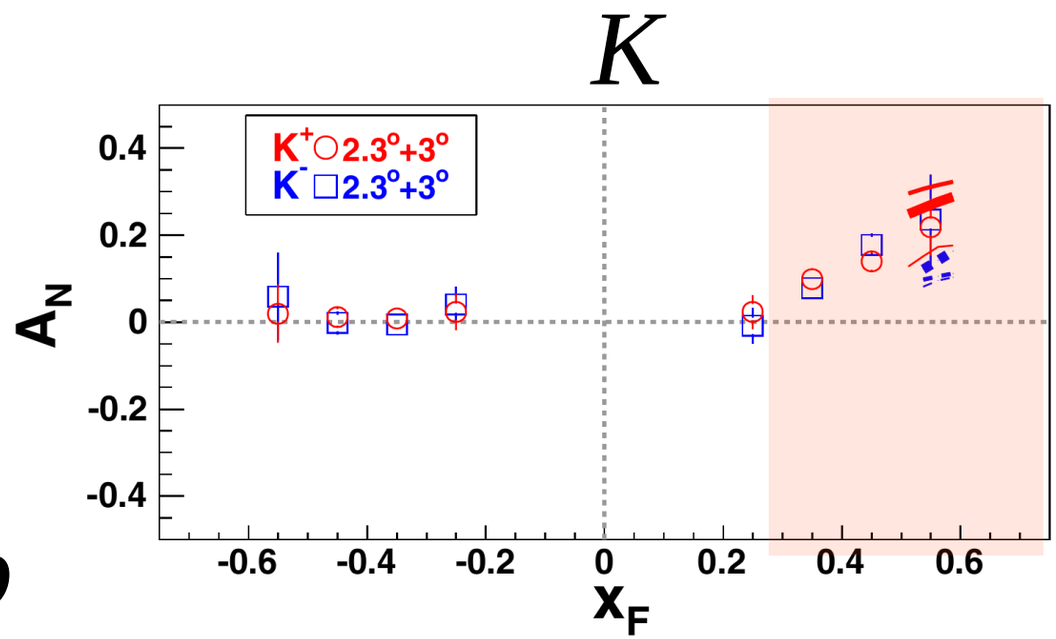
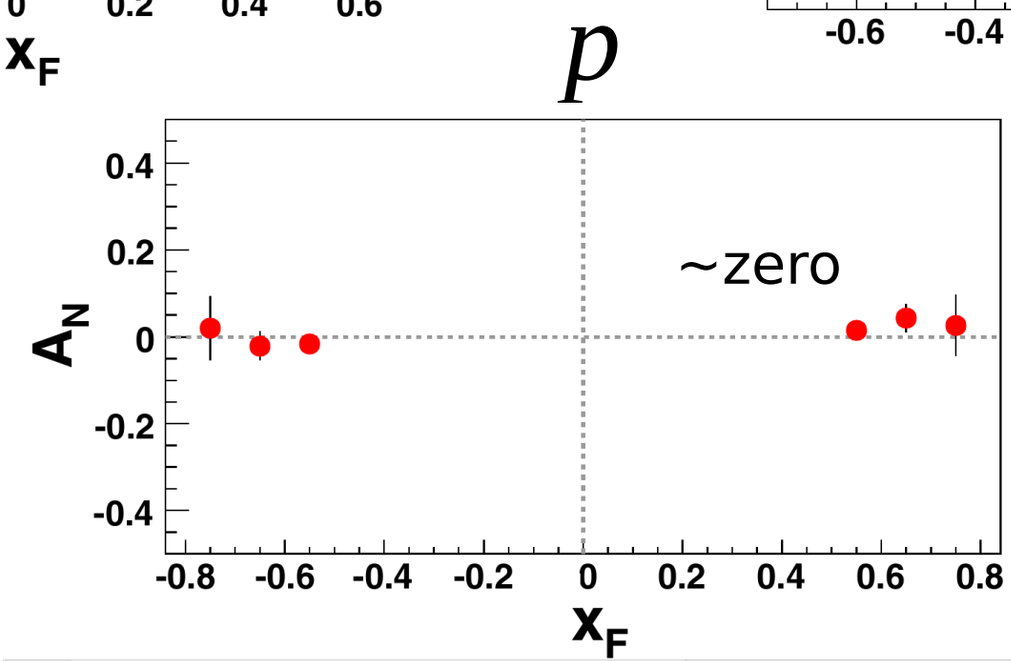
29.12.2022

SSA for π, K, p

Single Transverse Spin Asymmetries of Identified. Charged Hadrons in Polarized p + p Collisions at √s = 62.4 GeV, Phys. Rev. Lett. 2008. V. 101. (BRAHMS Collaboration)





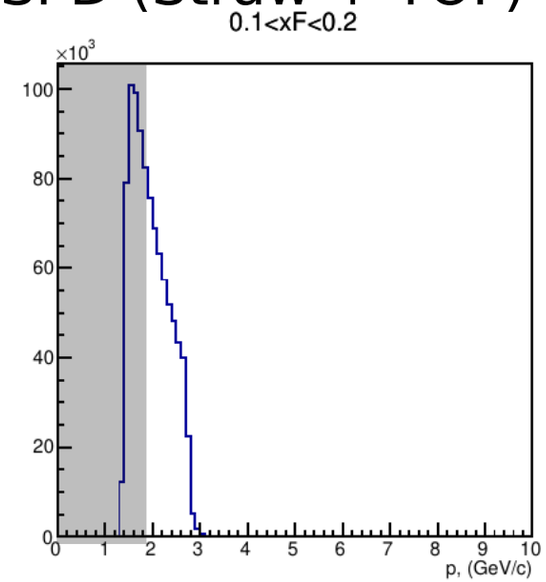


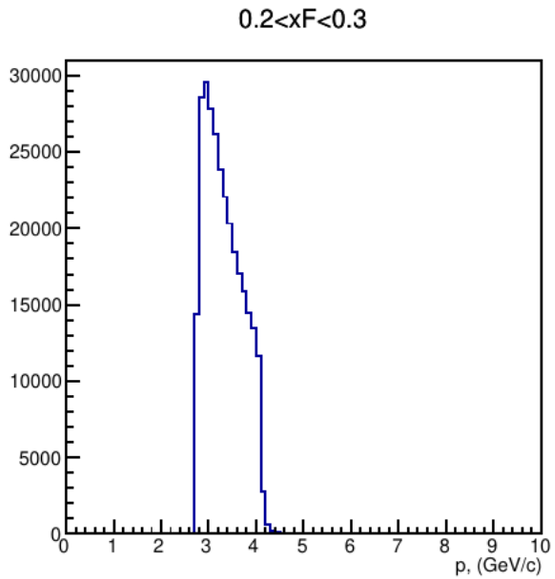
Momentum in bin xF

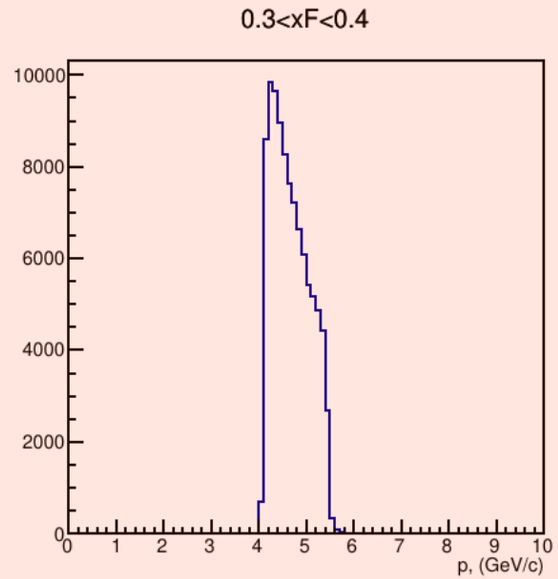
Made by Elena

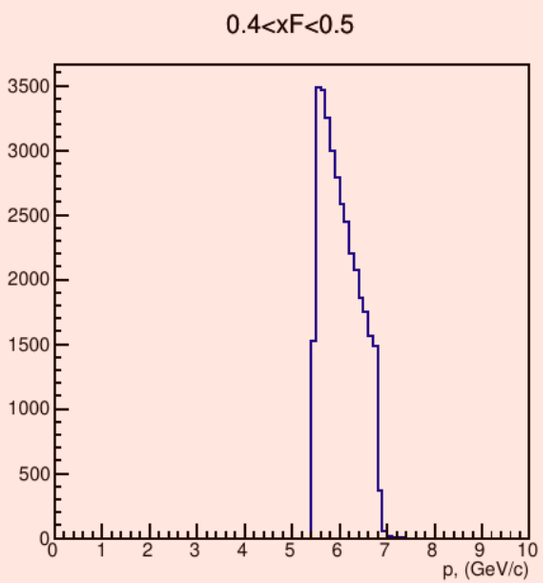
SoftQCD:all

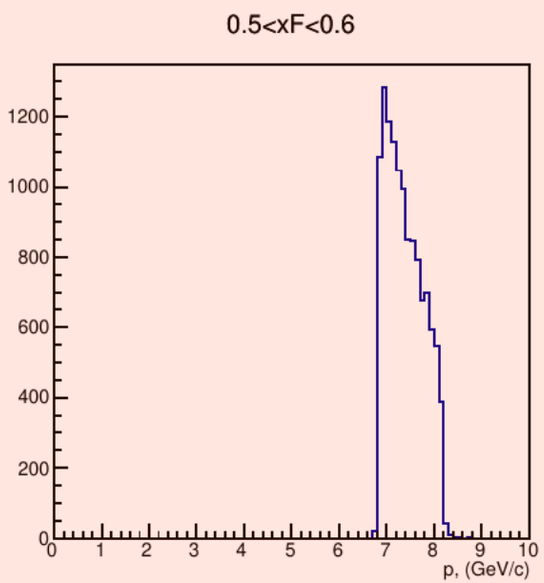
PID in SPD (Straw + TOF)

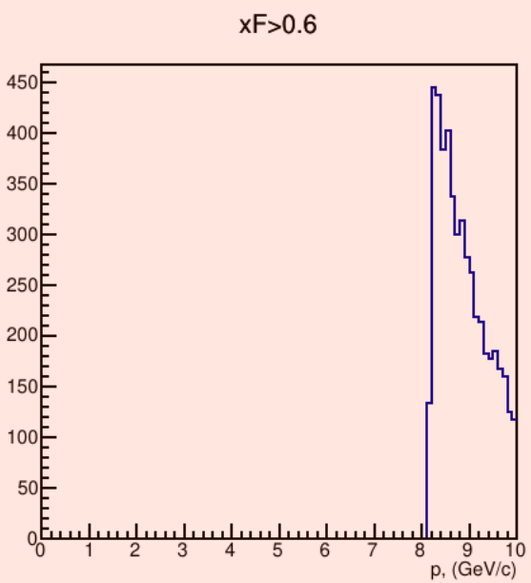












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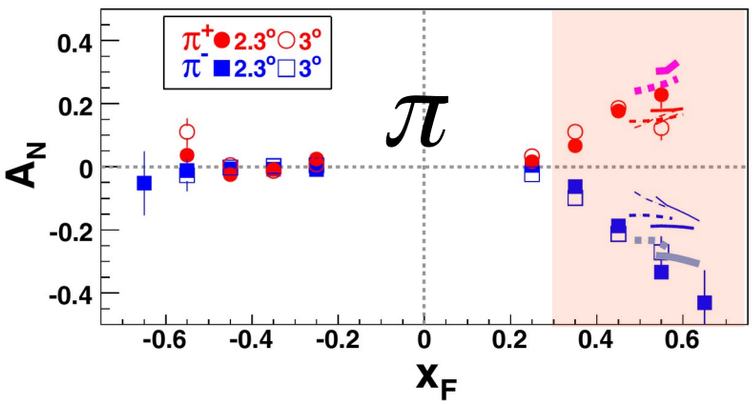
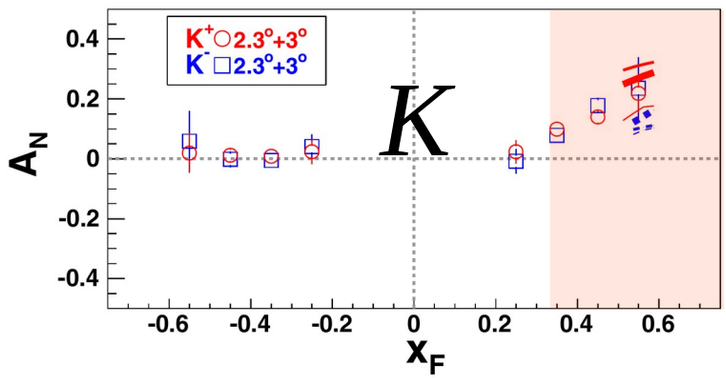
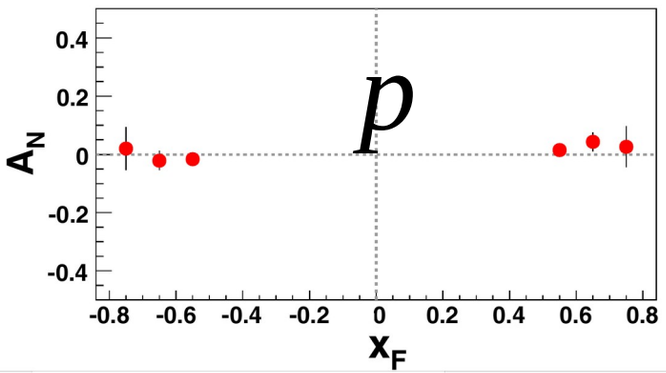
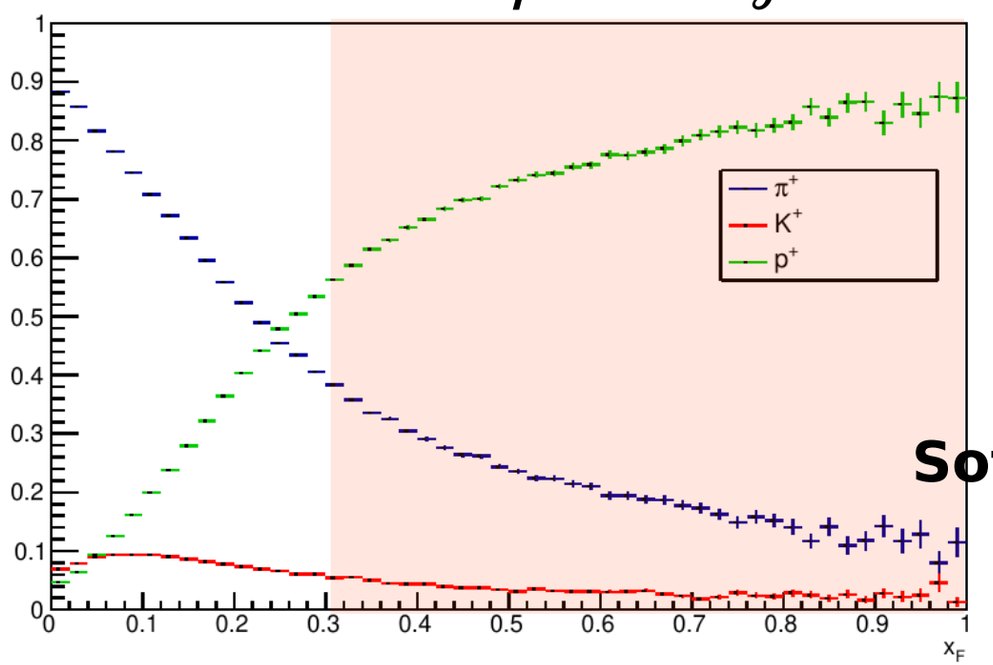


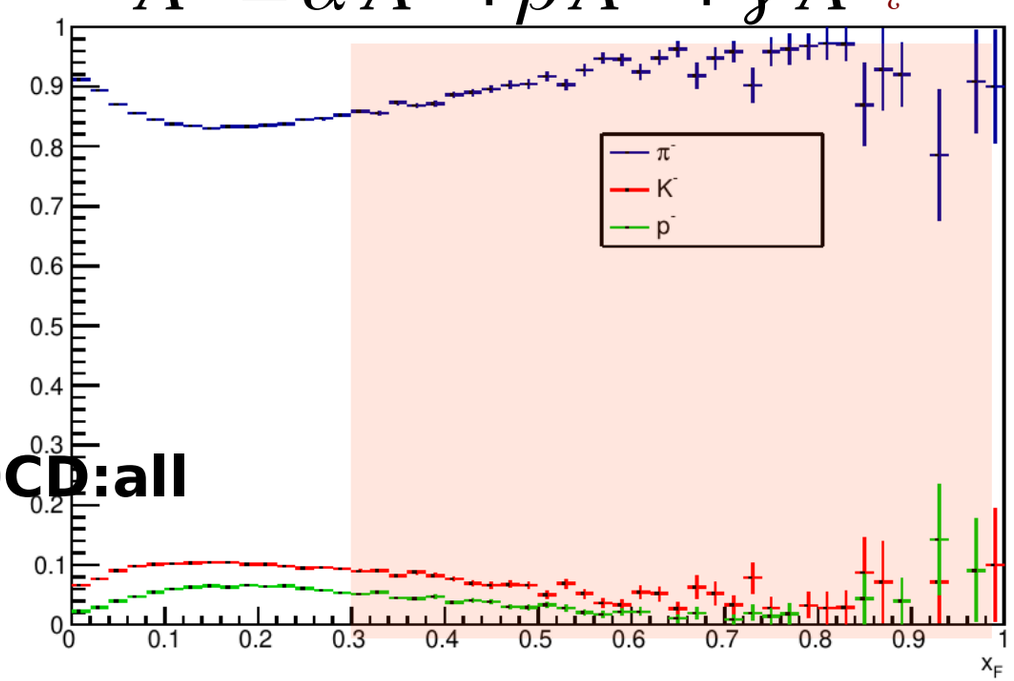




$$A^{h+} = \alpha A^{\pi+} + \beta A^{K+} + \gamma A^{p}$$



$$A^{h-} = \alpha A^{\pi-} + \beta A^{K-} + \gamma A^{\bar{p}}$$



SoftQCD:all

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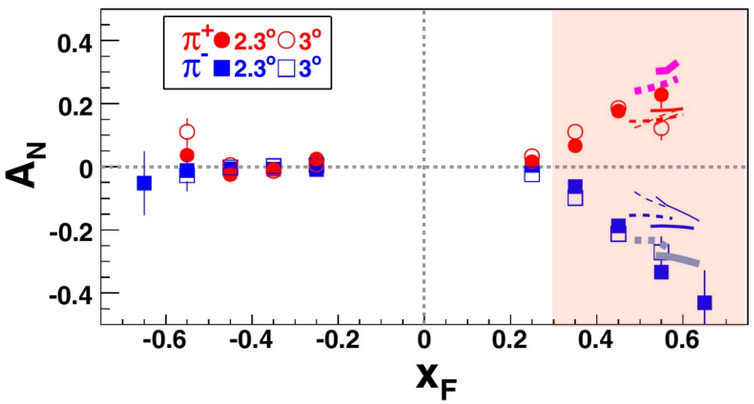
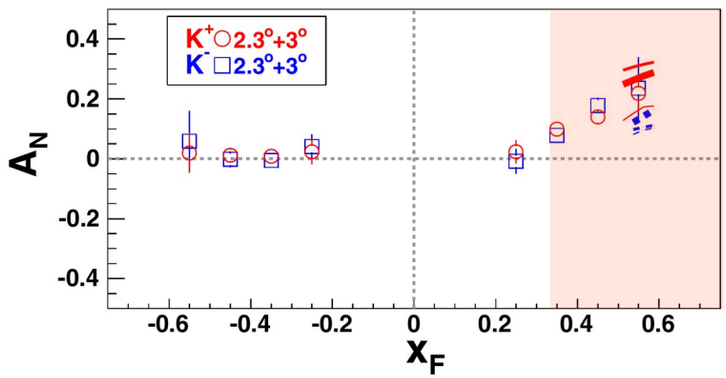
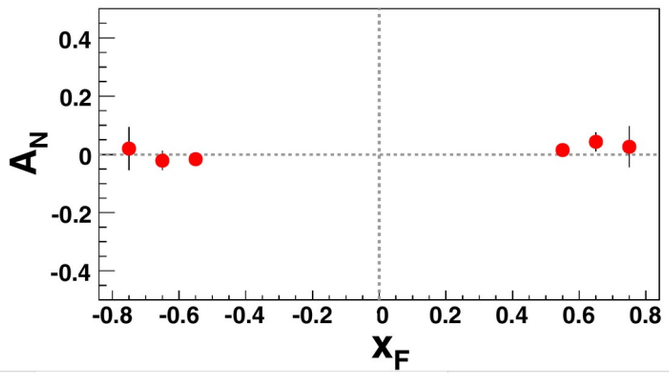
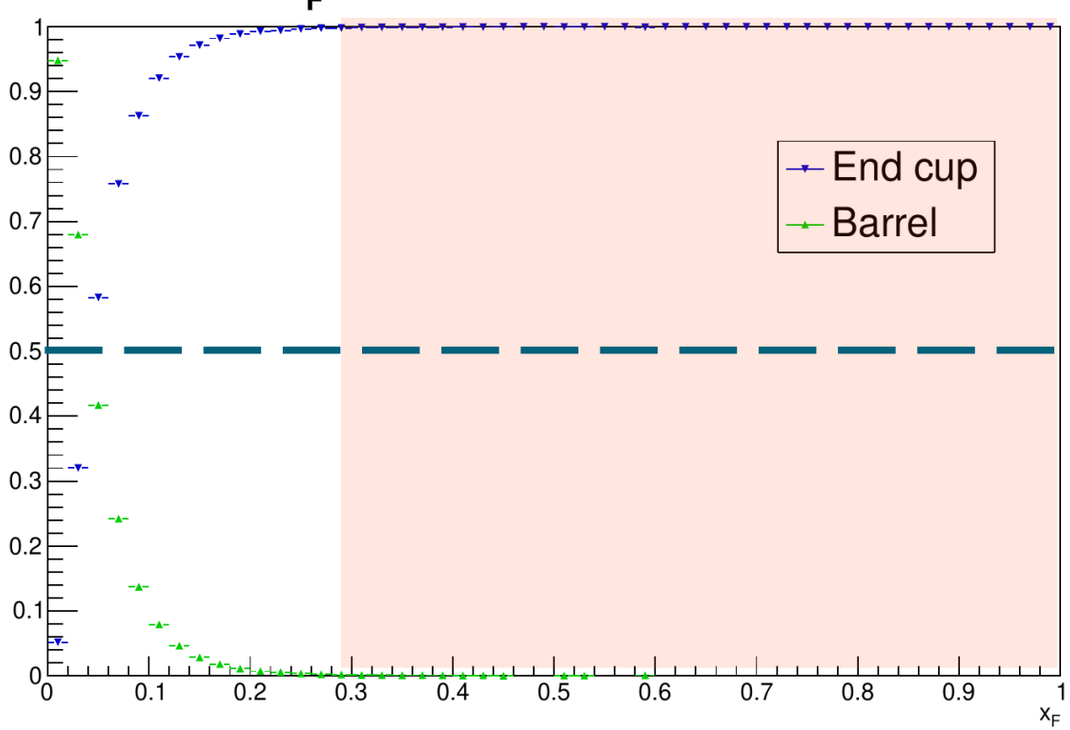
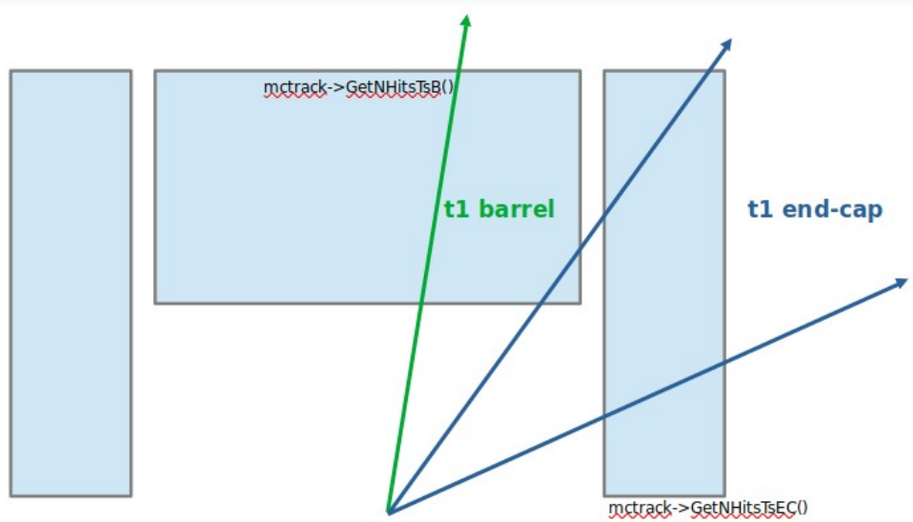


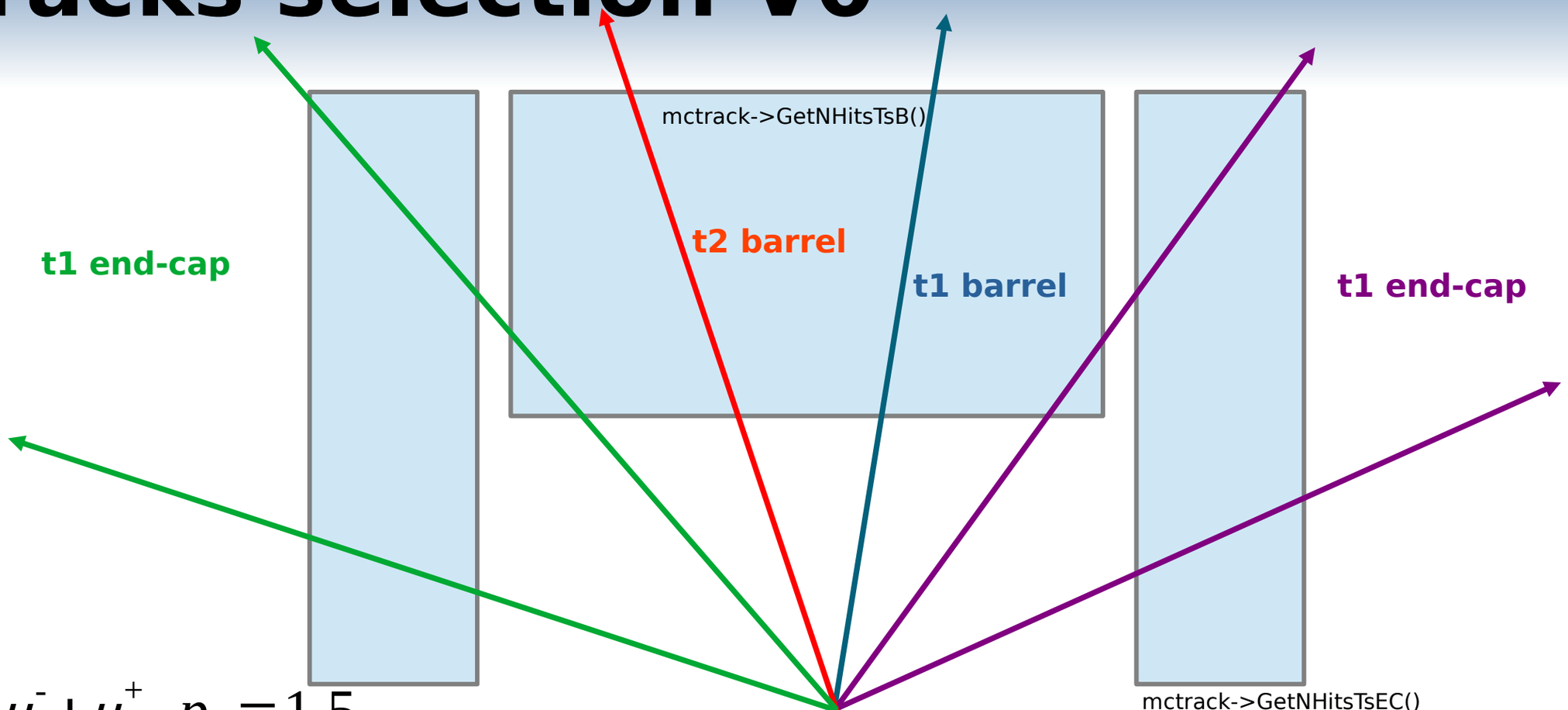








Tracks selection V0



$J/\psi \rightarrow \mu^- + \mu^+ , p_T = 1.5$

$D^0 \rightarrow K^- + \pi^+ , p_T = 0.86$

$\Lambda \rightarrow p + \pi^- , p_T = 0.1$

$K^0 \rightarrow \pi^+ + \pi^- , p_T = 0.20$

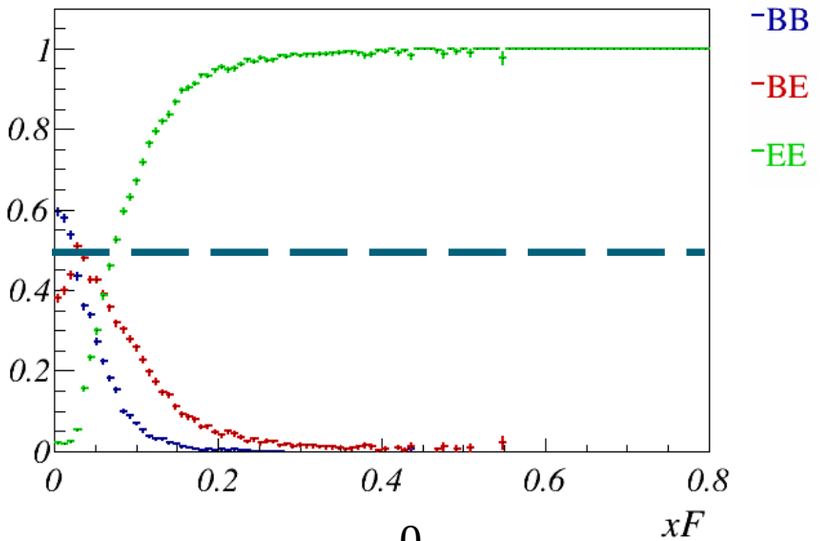
$\pi^0 \rightarrow \gamma + \gamma , p_T = 0.067$

BB - t1 barrel and t2 barrel
BE - (t1 barrel and t2 end-cap) or (t1 end-cap and t2 barrel)
EE - t1 end-cap and t2 end-cap

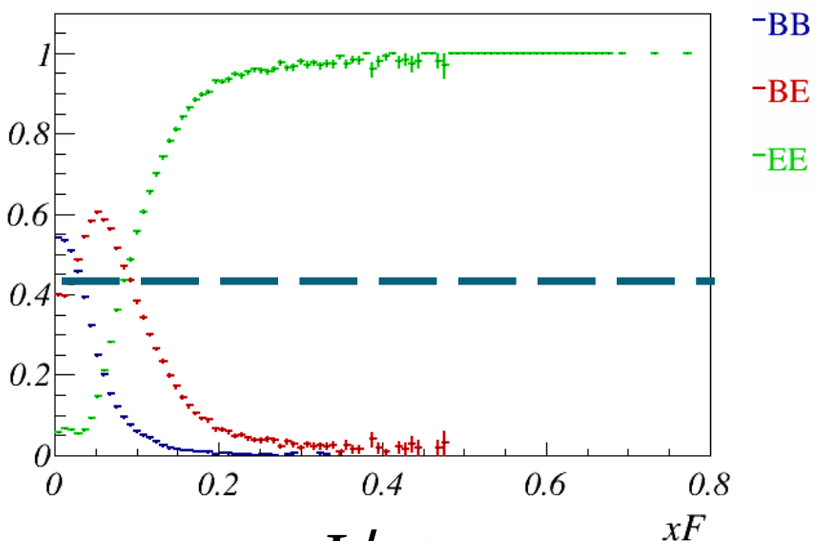
xF

Made by Artem and Natalia

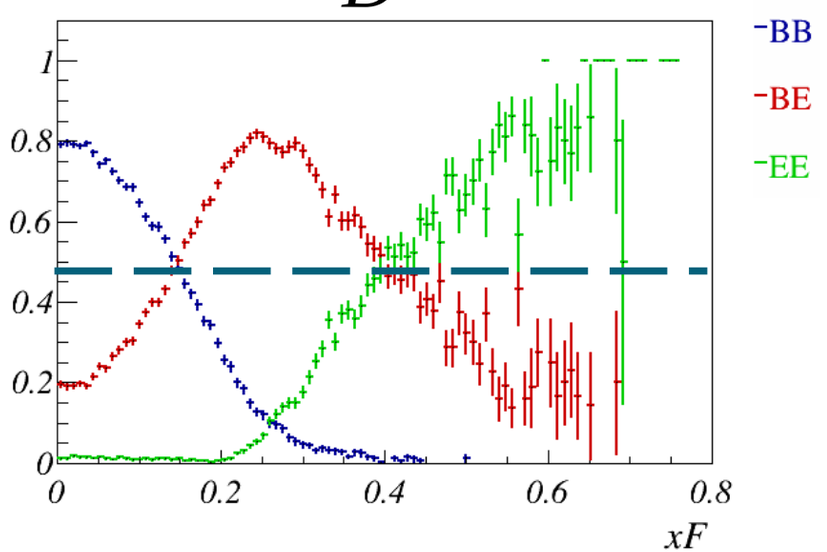
Λ



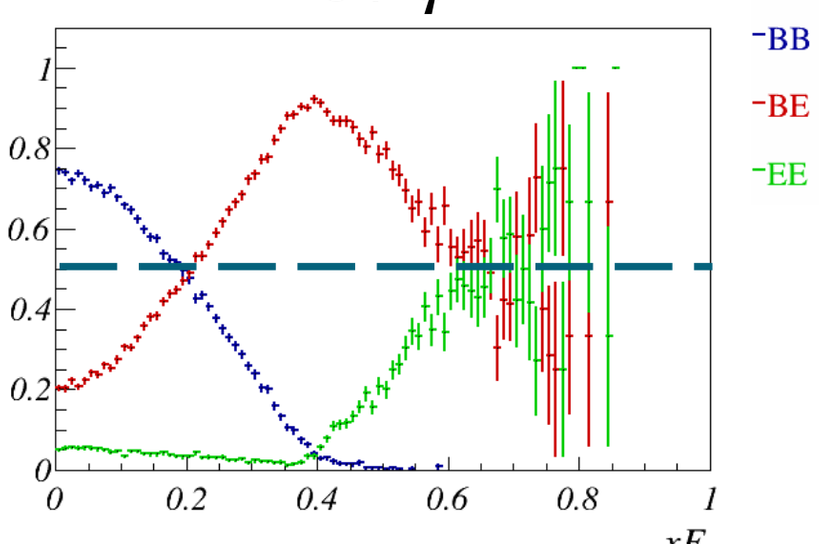
K^0



D^0



J/ψ

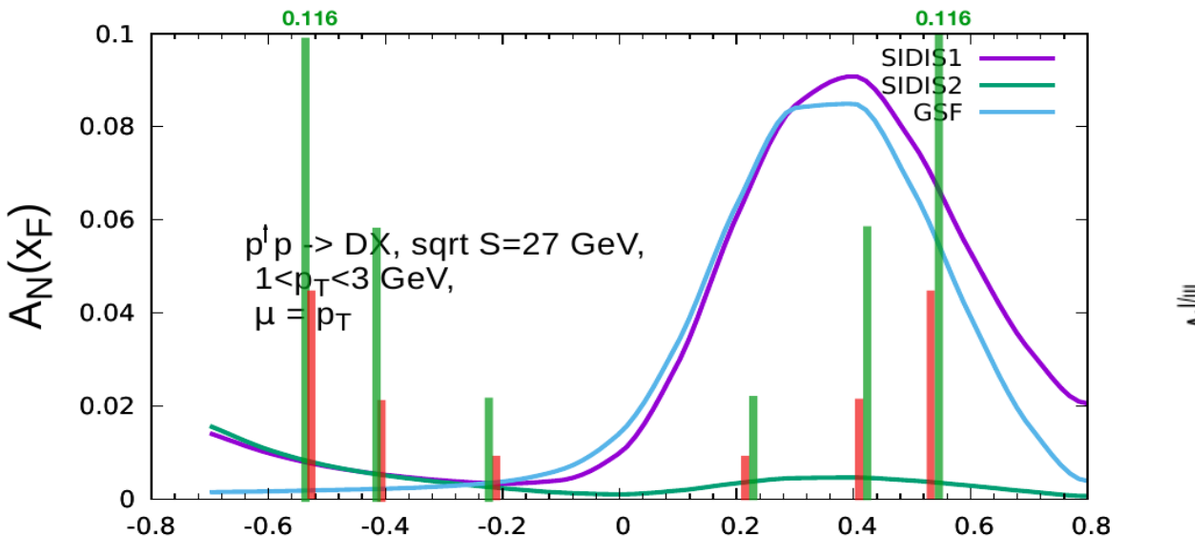


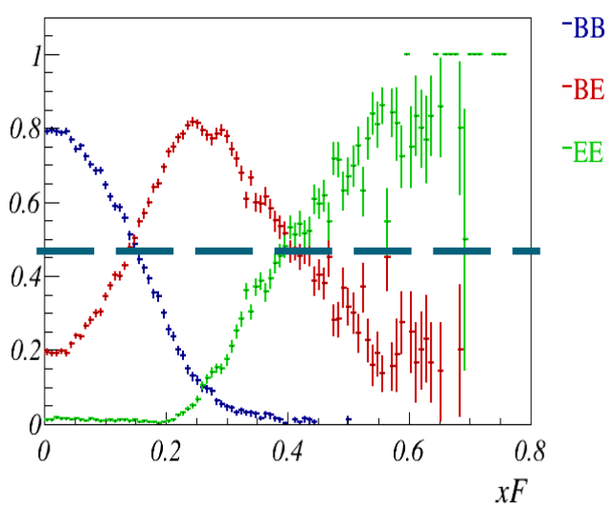
Prediction SSA for D⁰ and J/psi

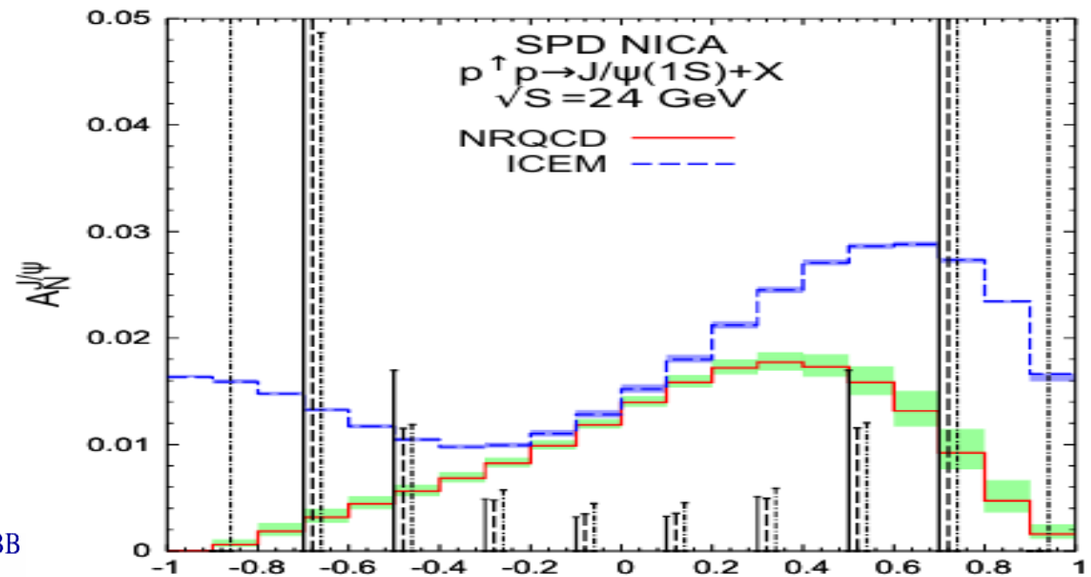
D^0

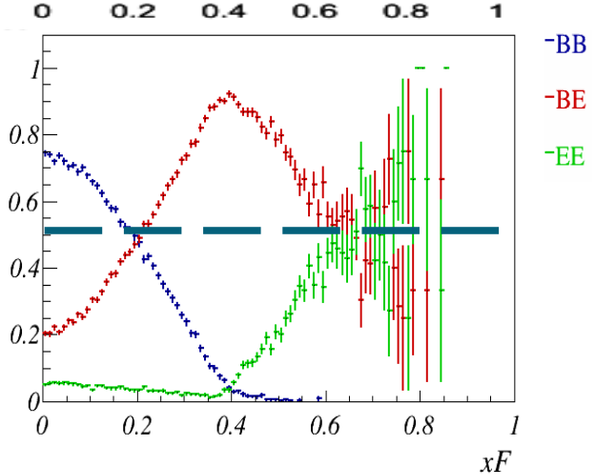
SPD CDR

J/ψ



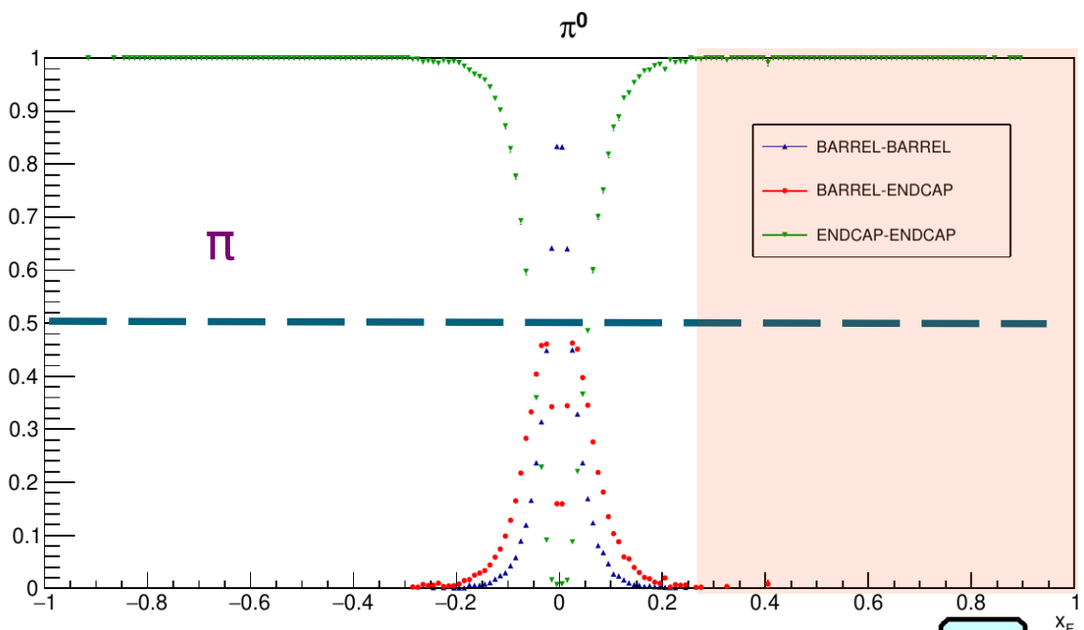


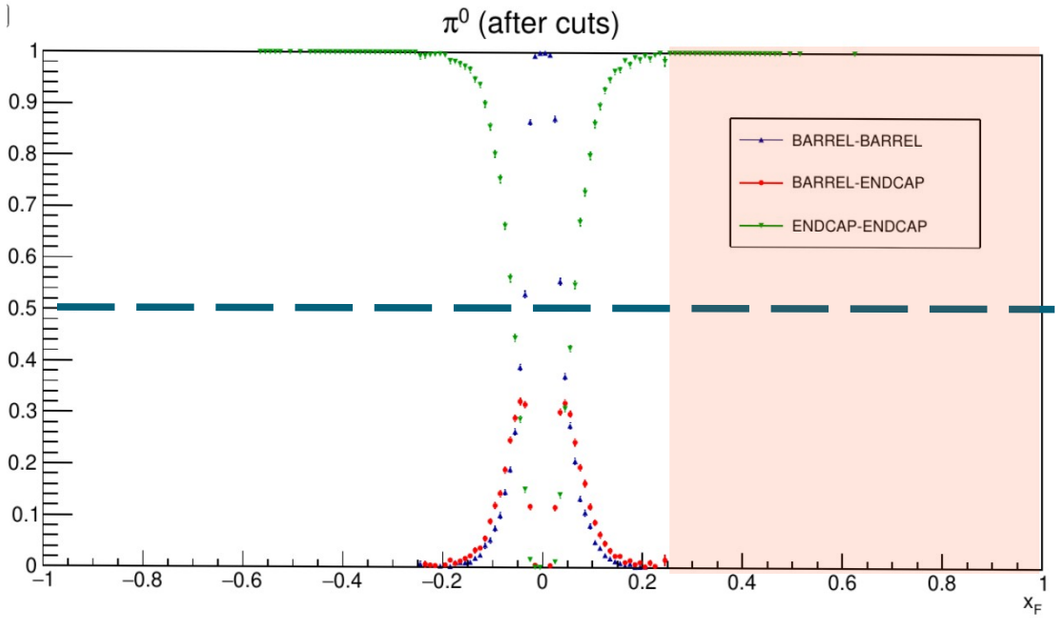


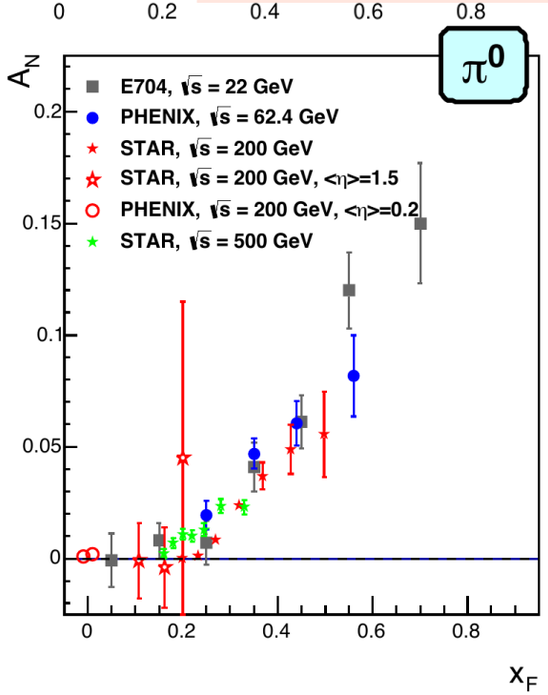


xF for π^0

Made by Ruslan







- Exclude «charged» multi-particle clusters
- $E_\gamma > 200\,\mathrm{MeV}$
- $|M_{inv} - \mu| < 3\sigma$
  $(\mu = 131\,\mathrm{MeV},\ \sigma = 10\,\mathrm{MeV})$

Summary

Particle	Everything detected in End-Cap xF (ratio>50%)
π, K, p	>0.05
π^0	>0.06
K^0	>0.1
Λ	>0.08
D^0	>0.4
J/ψ	>0.6