

Methodical and physical aspects of the residual correlations

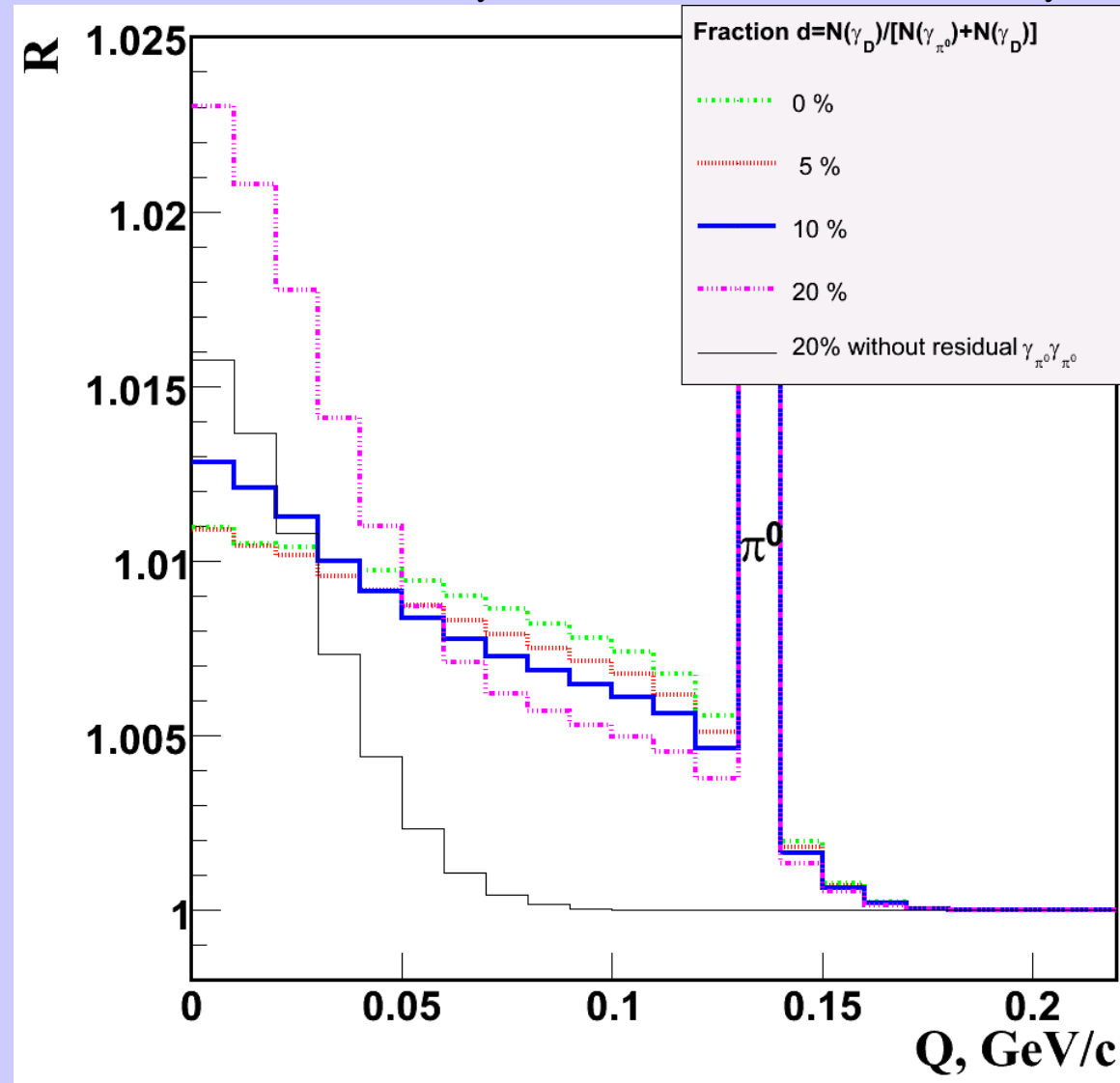
Konstantin Mikhailov, Aleksey Stavinskiy, Richard Lednicky

Outlook:

- Gamma-gamma correlation
- Proton-lambda correlation
- Phi-phi correlation

$\gamma\gamma$ correlations

nucl-th/0704.3290 A.Stavinskiy, K.Mikhailov, B.Erasmus, R.Lednicky



Simple generator for γ, π :

$$dN/dE \sim (p^2/E) \exp(-E/T_0), T_0 = 168 \text{ MeV}$$

Different fraction of direct photons:

$$d = 0, 5, 10, 20\%$$

$$R = 1 + \lambda \exp(-Q^2 r_0^2), \lambda = 1(\pi\pi), = 1/2(\gamma\gamma)$$

$$d^3N/d^3r^* \sim \exp(r^{*2}/4r_0^2), r_0 = 5 \text{ fm}$$

Residual correlations:

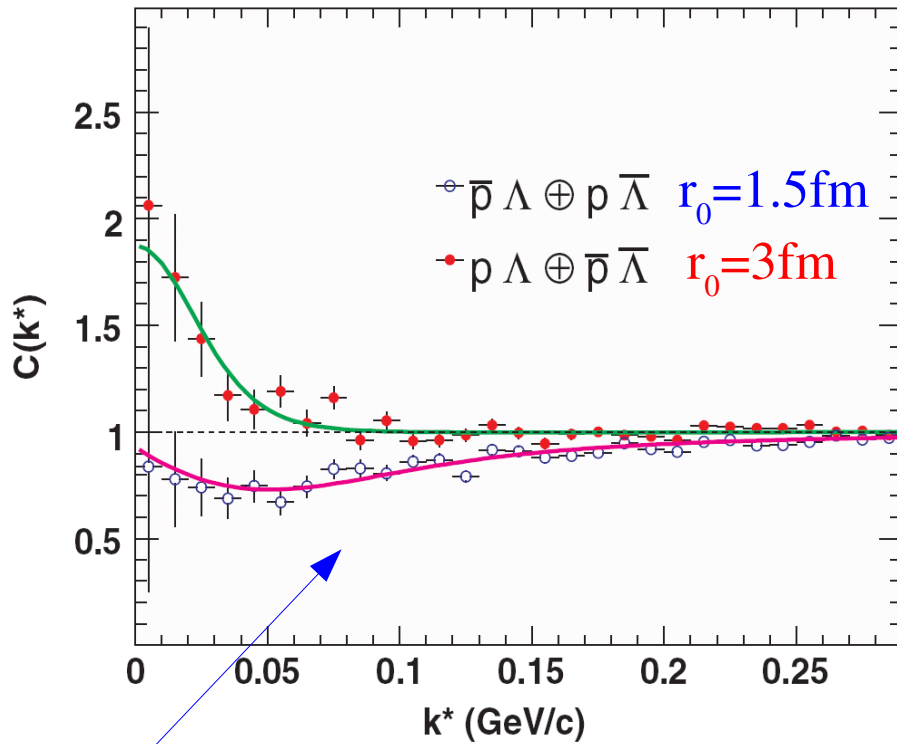
- first order of d ;
- wider than interference $\pi\pi(\gamma\gamma)$;
- can be used to measure direct photon fraction (very important in case of small d)

Residual correlations in $p\Lambda(\bar{p}\bar{\Lambda})$ correlations

STAR

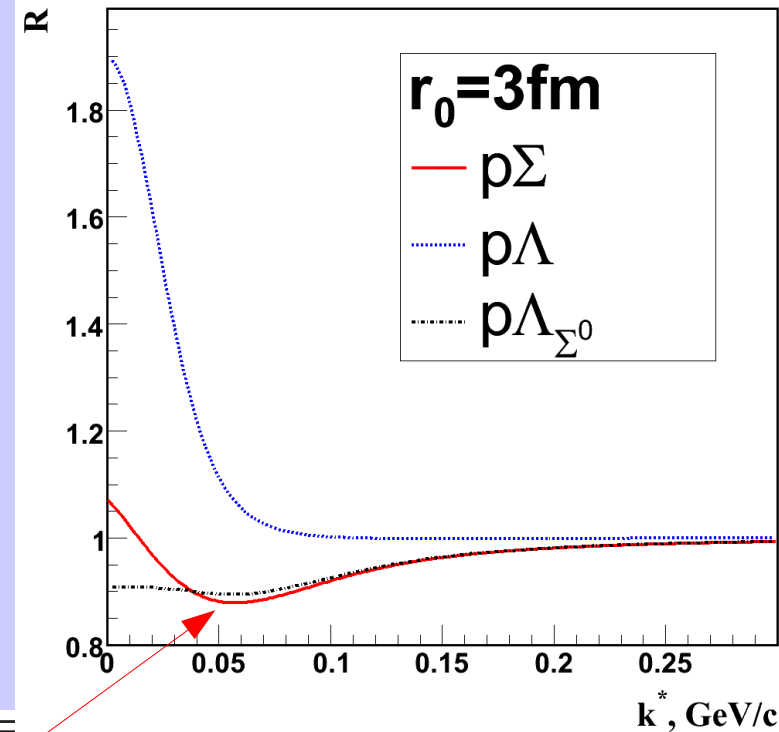
PHYSICAL REVIEW C 74, 064906 (2006)

Proton- Λ correlations in central Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV



nucl-th/0704.3290

A.Stavinskiy, K.Mikhailov, B.Erasmus,
R.Lednicky



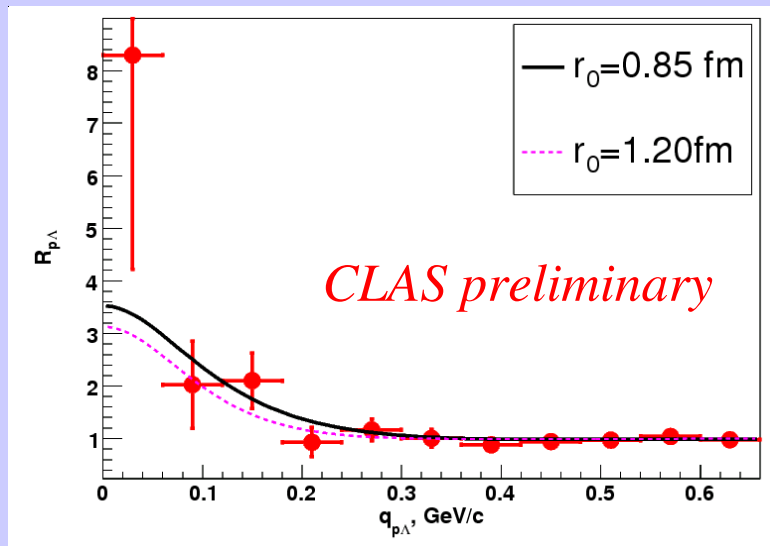
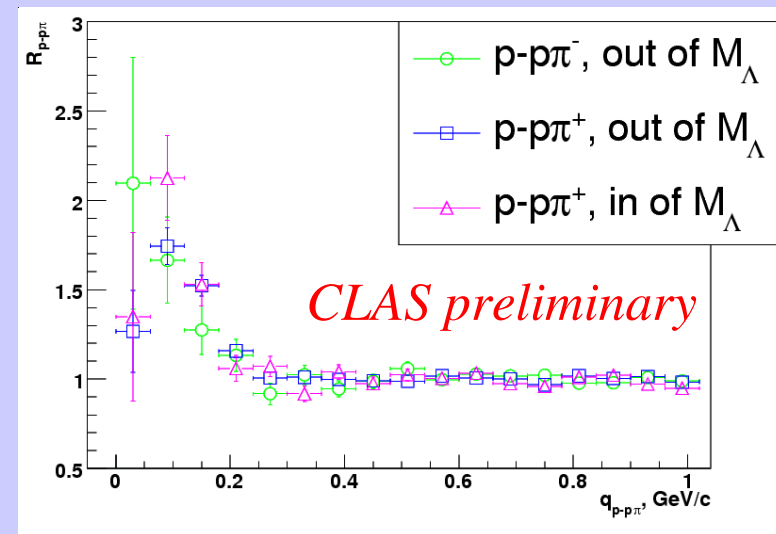
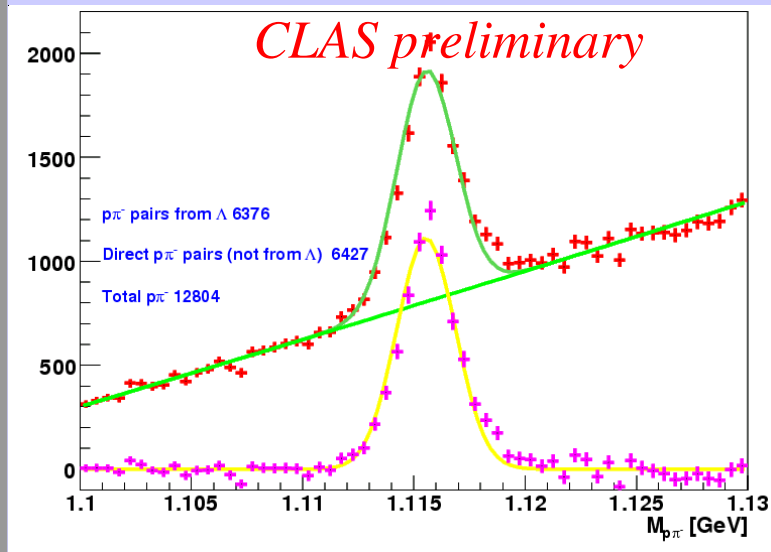
Large fraction of particles from decays

All pairs except $p_{\text{prim}} - \Lambda_{\text{prim}}$ are not correlated

Pairs	Fractions (%)
$p_{\text{prim}} - \Lambda_{\text{prim}}$	15
$p\Lambda - \Lambda_{\text{prim}}$	10
$p\Sigma^+ - \Lambda_{\text{prim}}$	3
$p_{\text{prim}} - \Lambda_{\Sigma^0}$	11
$p\Lambda - \Lambda_{\Sigma^0}$	7
$p\Sigma^+ - \Lambda_{\Sigma^0}$	2
$p_{\text{prim}} - \Lambda_{\Xi}$	9
$p\Lambda - \Lambda_{\Xi}$	5
$p\Sigma^+ - \Lambda_{\Xi}$	2
$p_{\text{prim}} - p_{\text{prim}}$	7

Femtoscopic correlated background in $p\Lambda$ correlations

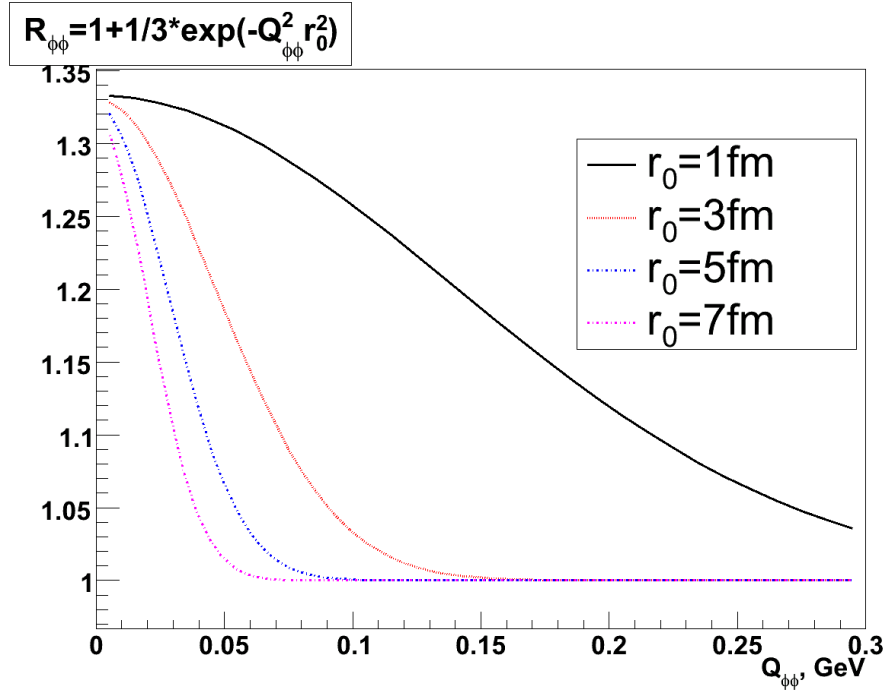
$e\text{He} \rightarrow e'p\Lambda X$ ($E_{\text{beam}} = 4.6\text{GeV}$) Jefferson Lab.



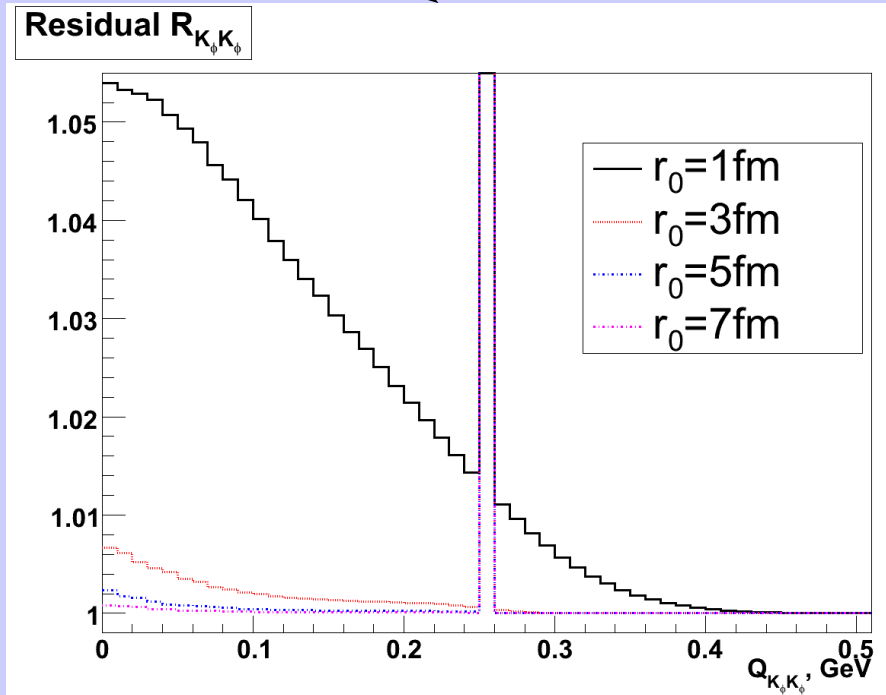
STAR: not identified $\Lambda \sim 14\%$

$p_{\text{prim}} - \Lambda_{\text{prim}} \sim 15\%$

Residual correlations for $\phi\phi$ correlations



Residual correlations could be sensitive to small fraction of droplets.



Conclusions

- The gamma-gamma residual correlation can be used to measure the fraction of the direct photons
- The neglect of the $p\Lambda_\Sigma$ residual correlation would lead to the underestimation of the parent $p\Lambda$ correlation effect and to the overestimate of the source size
- The femtoscopic correlated background should be taken into account for the $p\Lambda$ correlations
- $K_\phi K_\phi$ residual correlation could be useful to $\phi\phi$ -correlation study