Beam Energy Scan at STAR
Report from Warsaw Group

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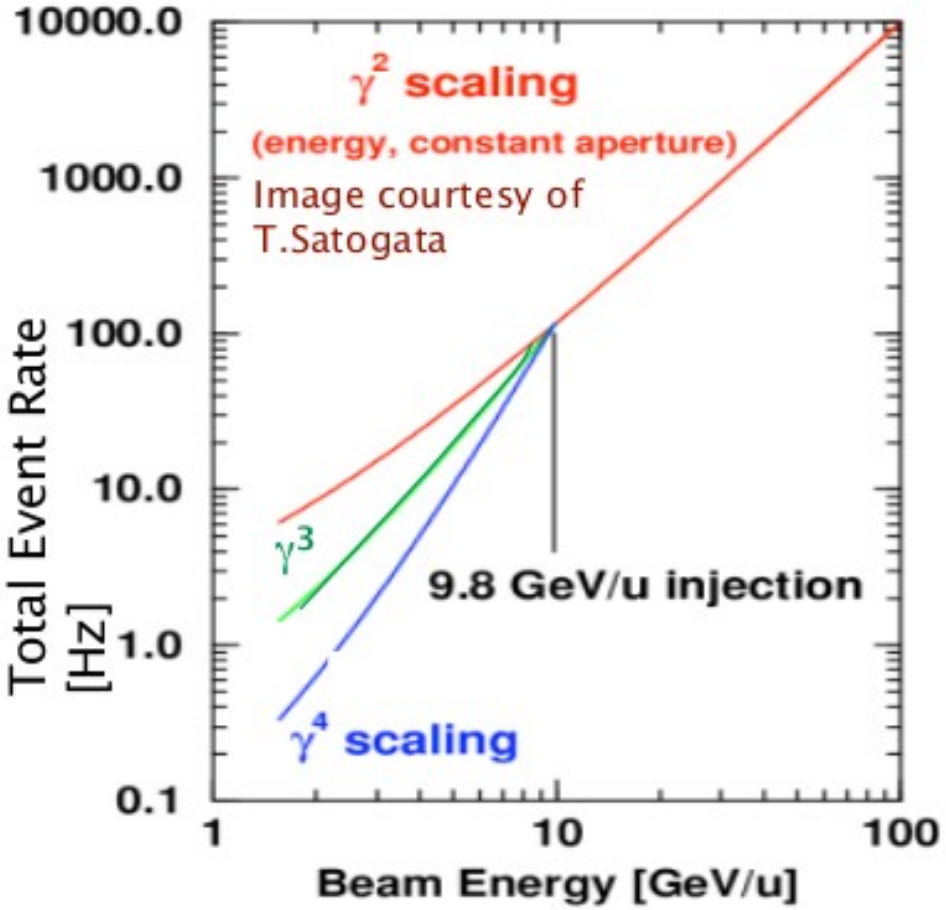
Work with models

Luminosity is the key issue



Determined collision rate for 2008 9.2 GeV Au+Au test to be ~1Hz.

Rate can be increased by:

- factor 2 by adding more bunches, only 56 used for tests (max 120).
- factor 3-6 by operating with higher charge in bunches.
- factor few by running in continuous injection mode
- electron cooling in RHIC (after 2012)

Expect to reach γ^3 rate even at lowest energies

UrQMD ver. 3.3 used

 # Events:

5 GeV: 0.5 M

7.5 GeV: 1.0 M

11.5 GeV: 1.0 M

17.3 GeV: 1.0 M

27 GeV: 0.7 M

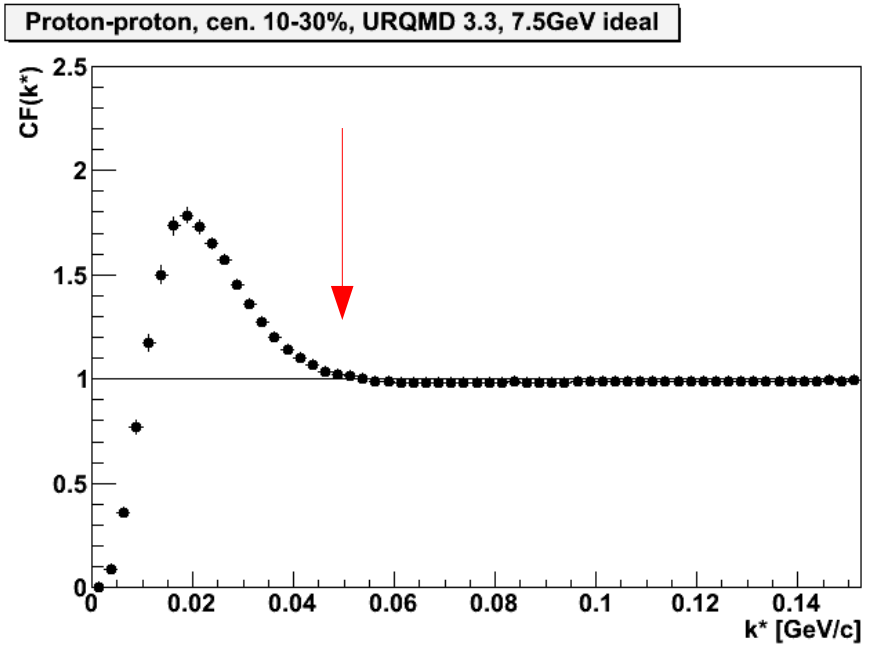
39 GeV: 0.5 M

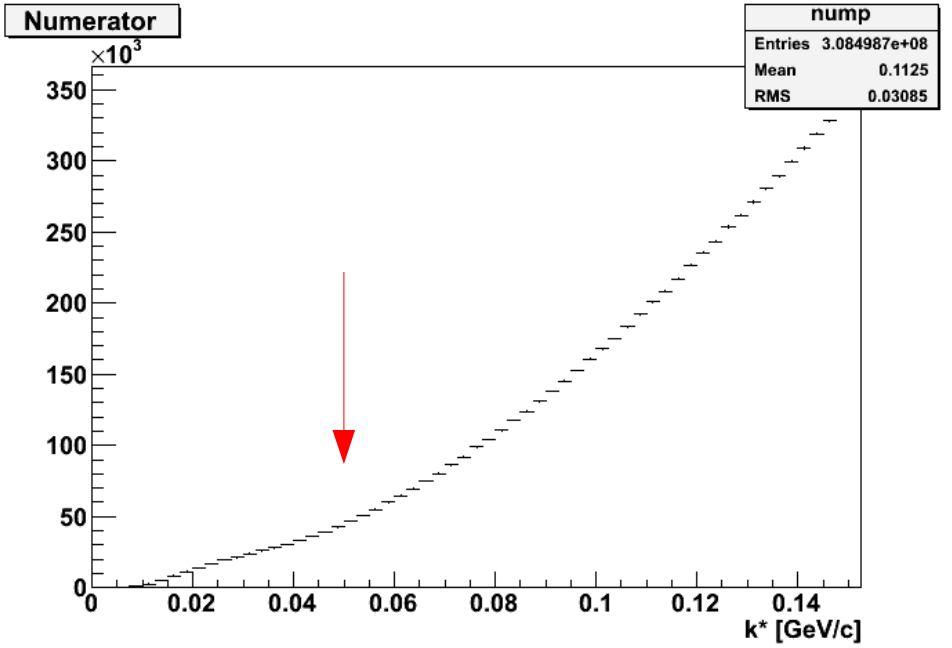
Assumed the same particle cuts as used during current analysis (optimized for 200 GeV, TPC only):

- pt in [0.4, 0.8] GeV/c
- $|Y| < 0.5$

An estimation for pt upto 2.0 GeV/c and $|Y| < 1.0$ is also done (but not presented here). They can be used when TOF information will be taken into account.

Statistical error estimation

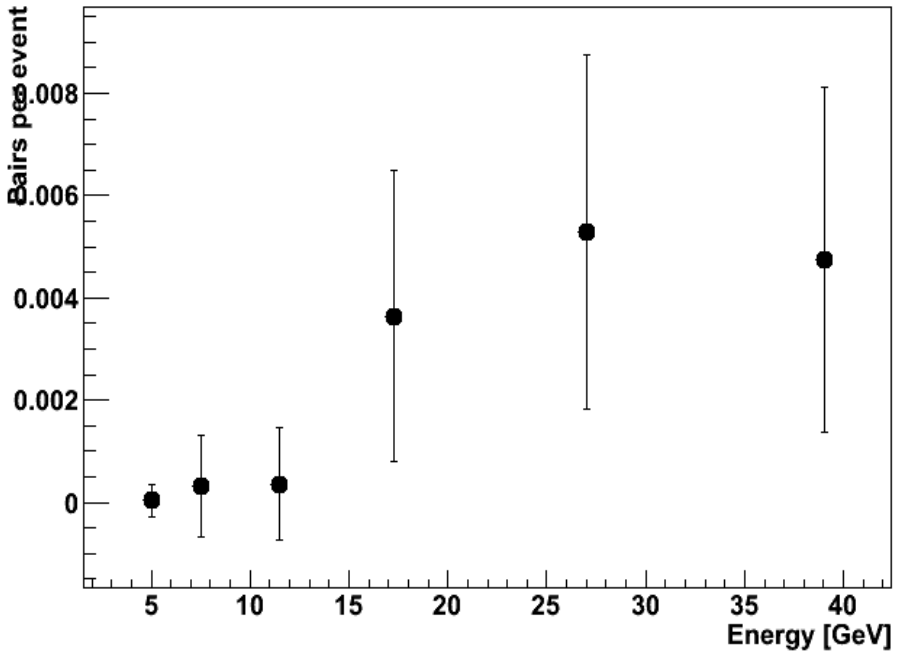




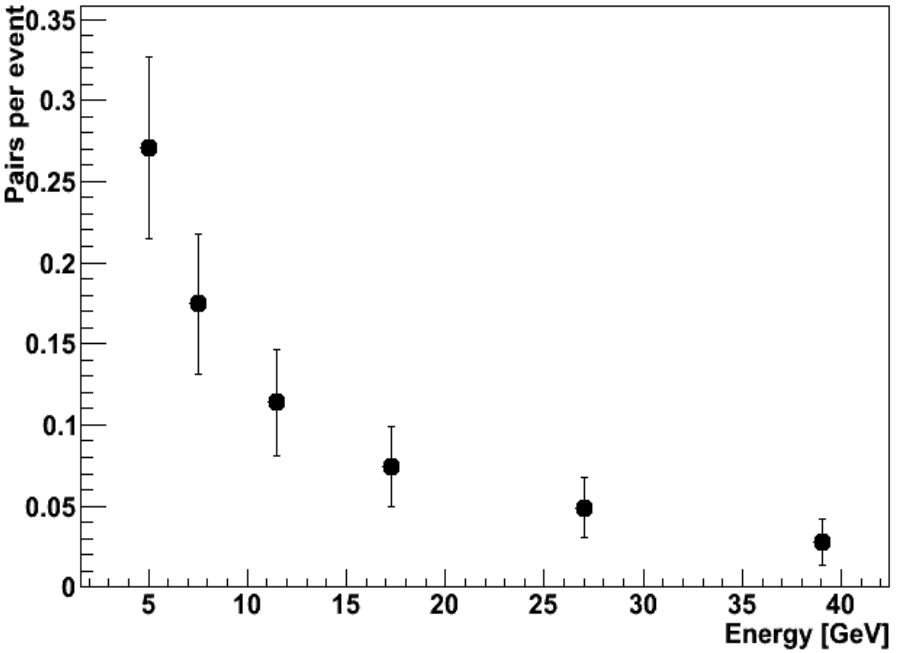
- Effect is localized at k* less than 50MeV
- We assume c.f. bin width of 5MeV
- To get average statistical error of 10% we need 100 pairs per bin in the effect area.
- So we should have 1000 pairs with k* less than 50MeV
- 4000 pairs for 5% error
- 25000 pairs for 2% error

Number of pairs per event (k*<50MeV)

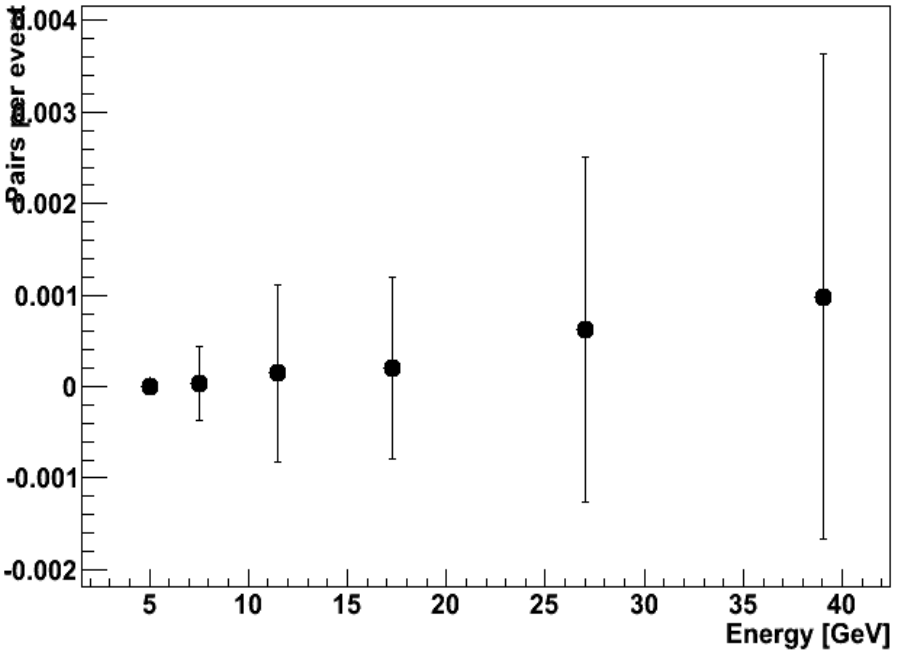
Proton-antiproton



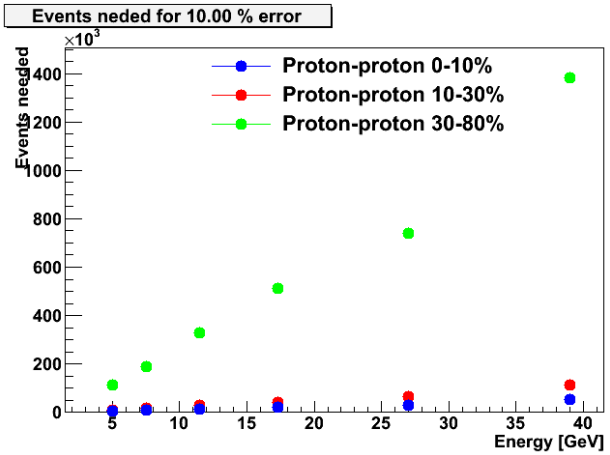
Proton-proton

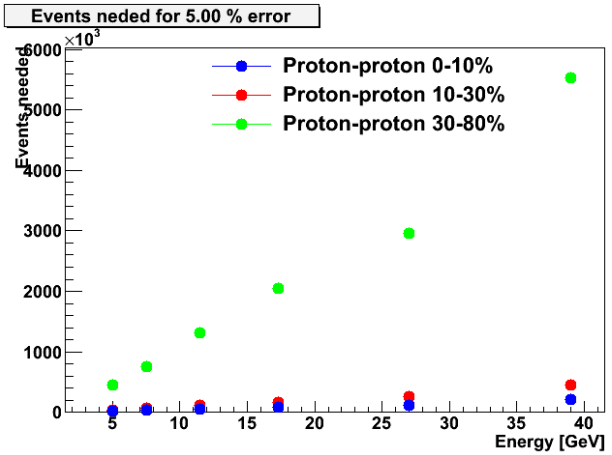


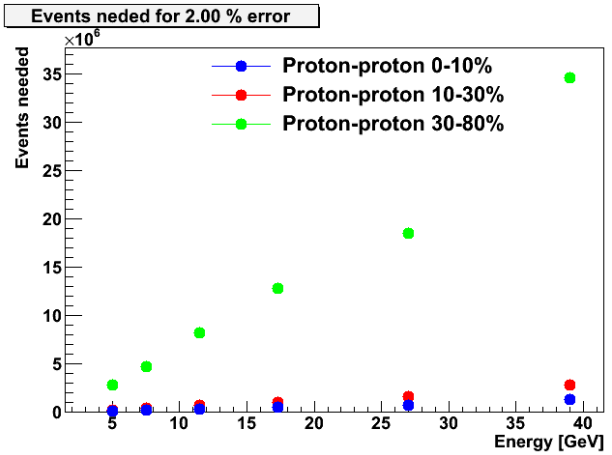
Antiproton-antiproton

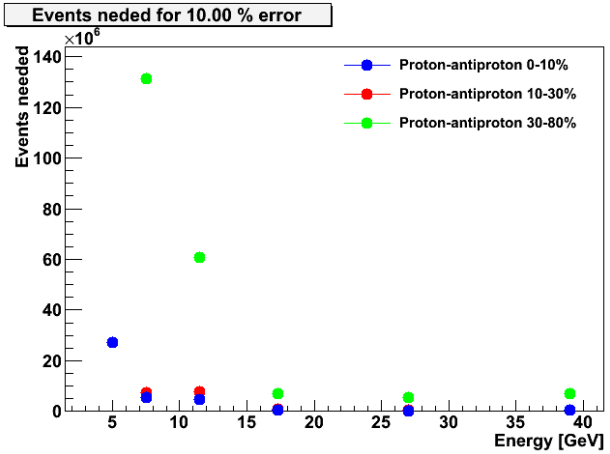


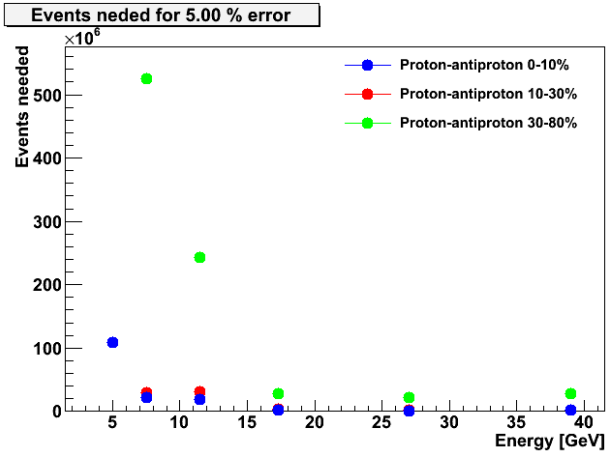
Number of events needed

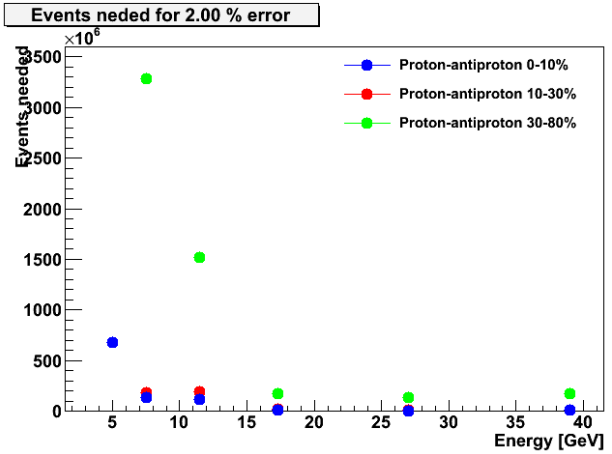


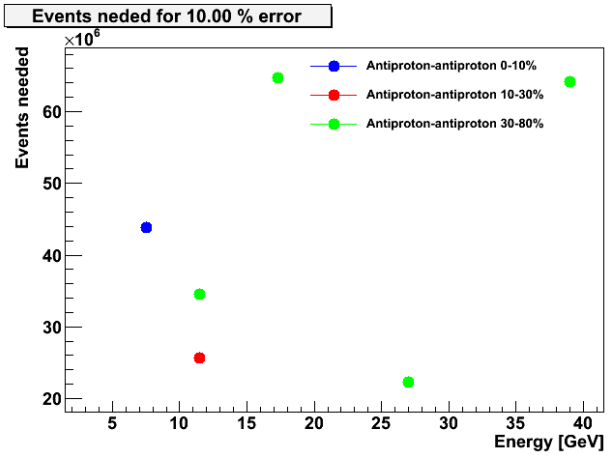


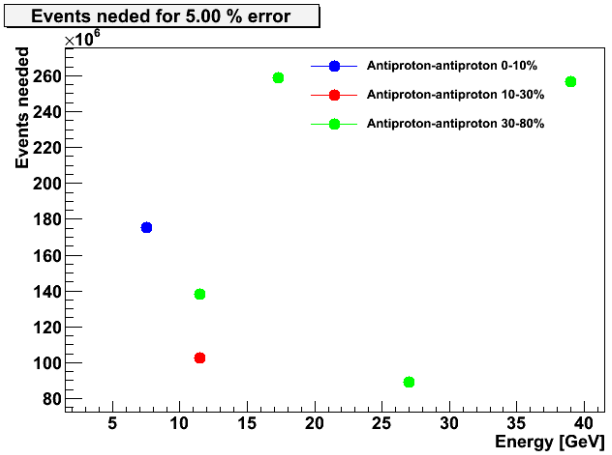


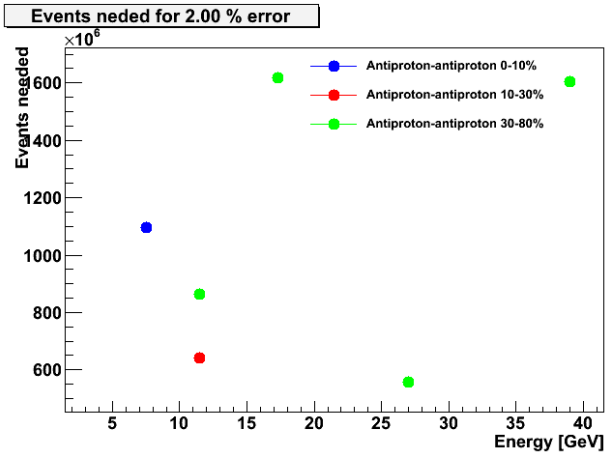




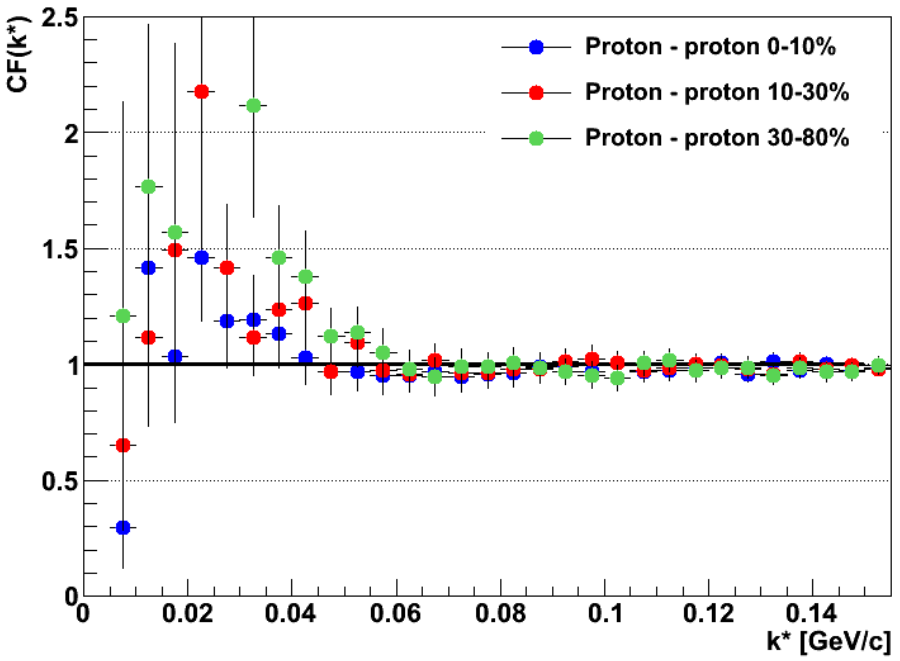




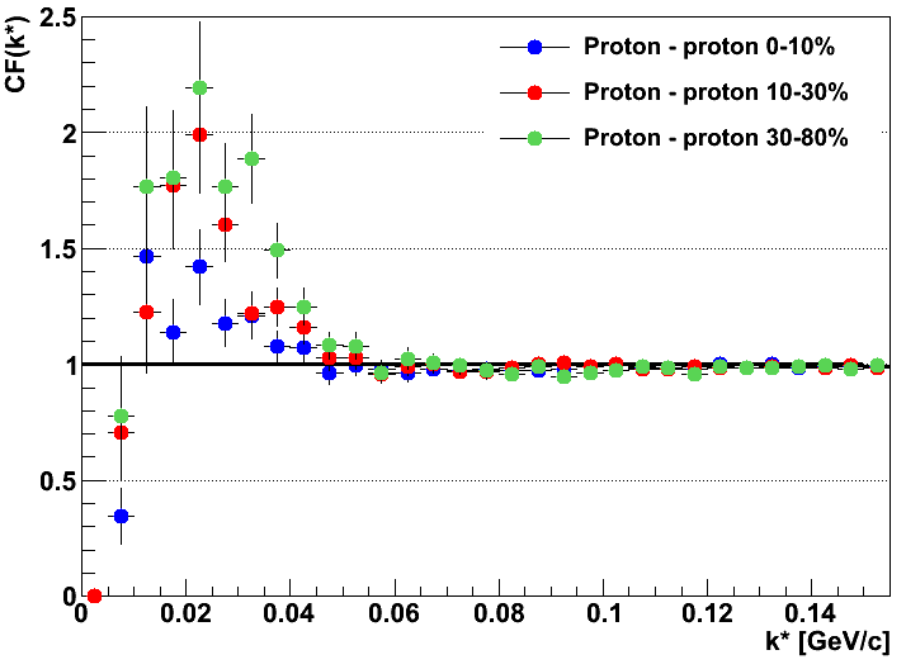




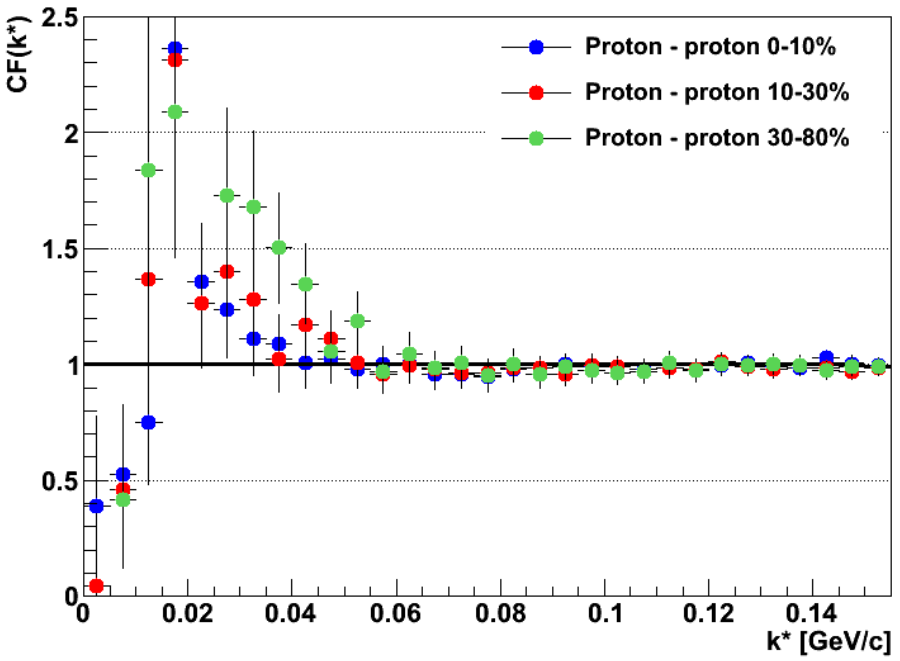
Proton - proton, MinBias, URQMD 3.3, 5GeV Target stat. error 10.0 %



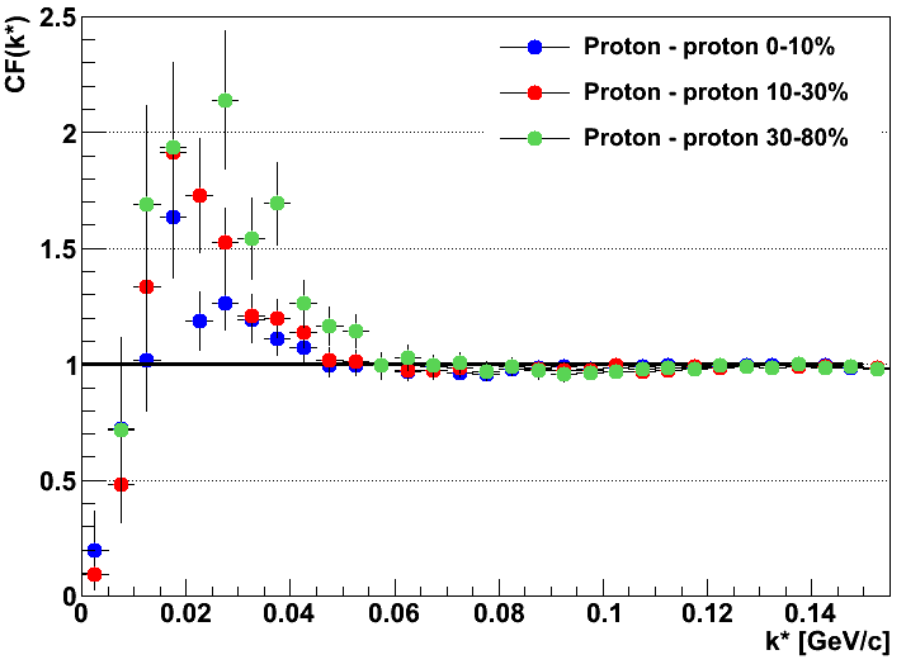
Proton - proton, MinBias, URQMD 3.3, 5GeV Target stat. error 5.0 %



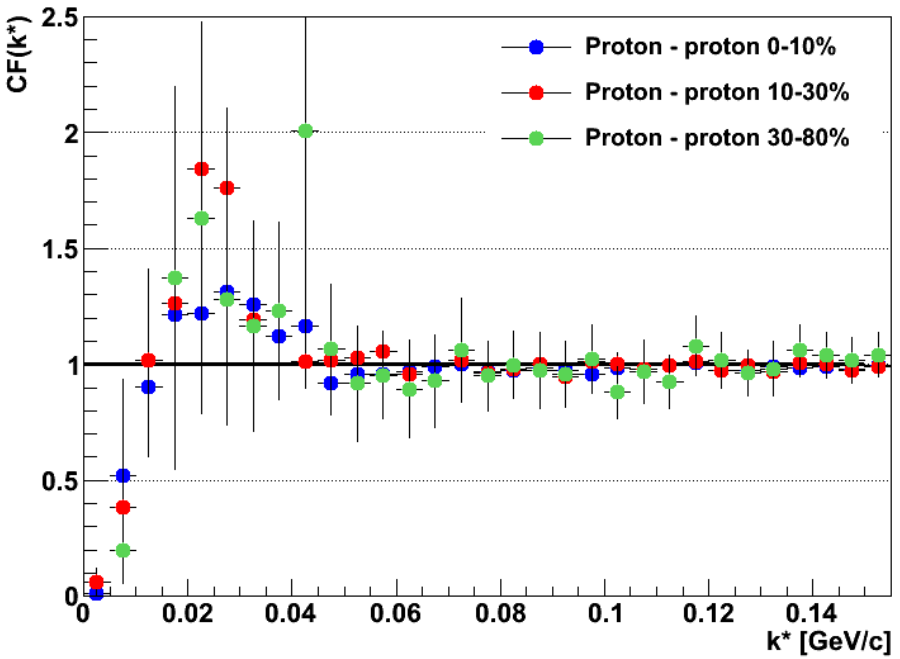
Proton - proton, MinBias, URQMD 3.3, 7.5GeV Target stat. error 10.0 %



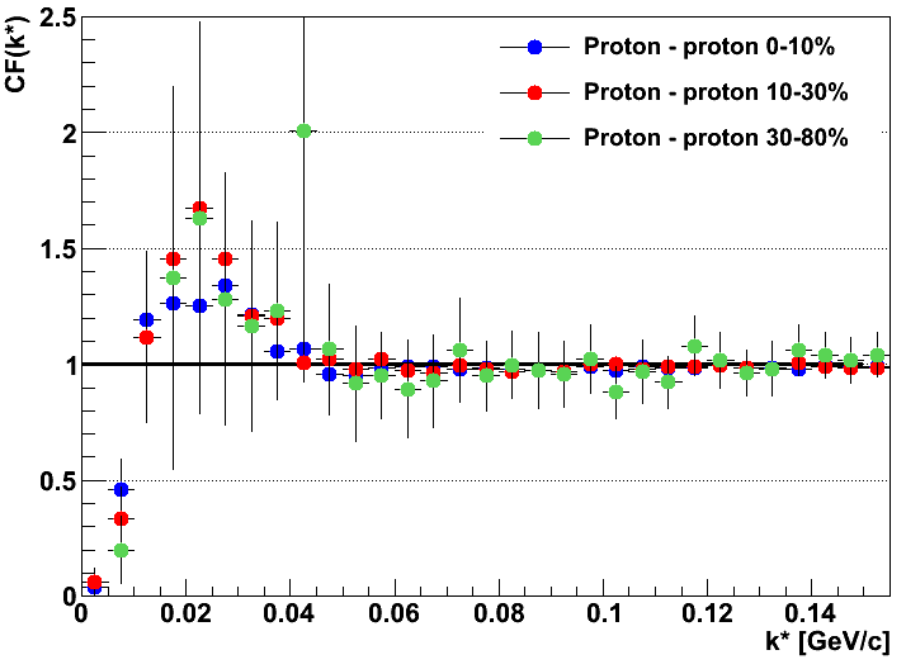
Proton - proton, MinBias, URQMD 3.3, 7.5GeV Target stat. error 5.0 %



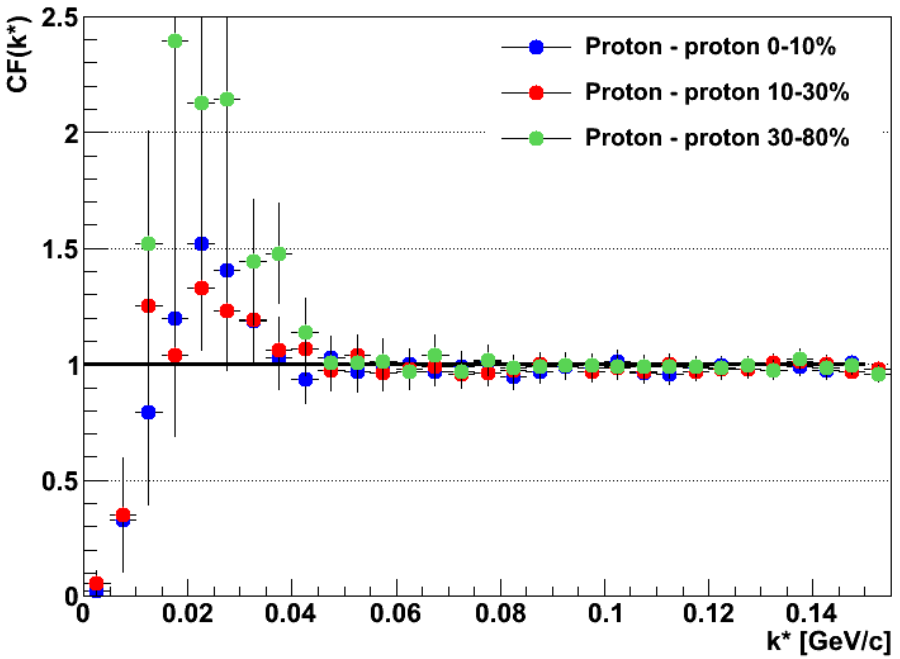
Proton - proton, MinBias, URQMD 3.3, 11.5GeV Target stat. error 10.0 %



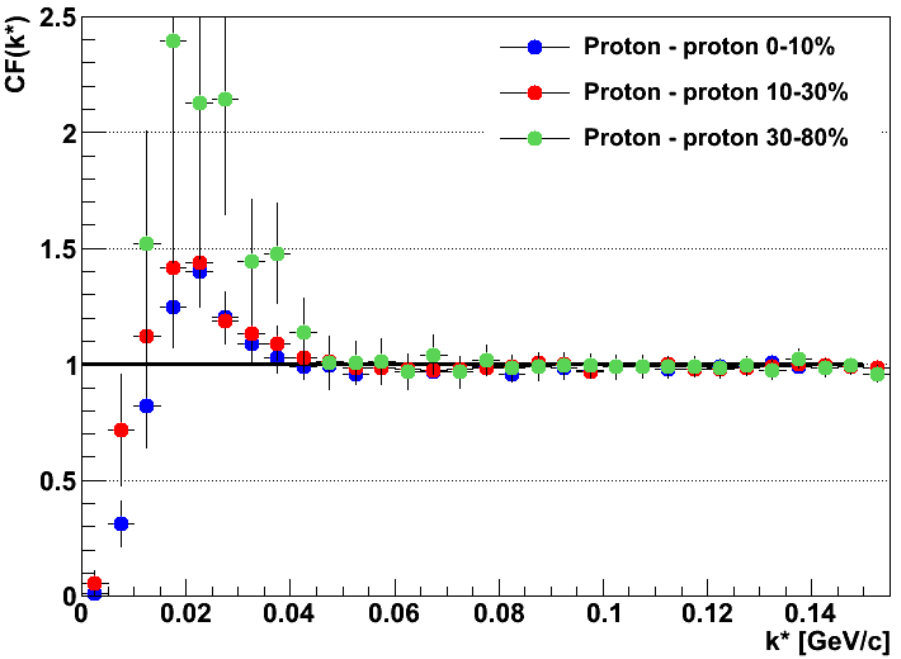
Proton - proton, MinBias, URQMD 3.3, 11.5GeV Target stat. error 5.0 %



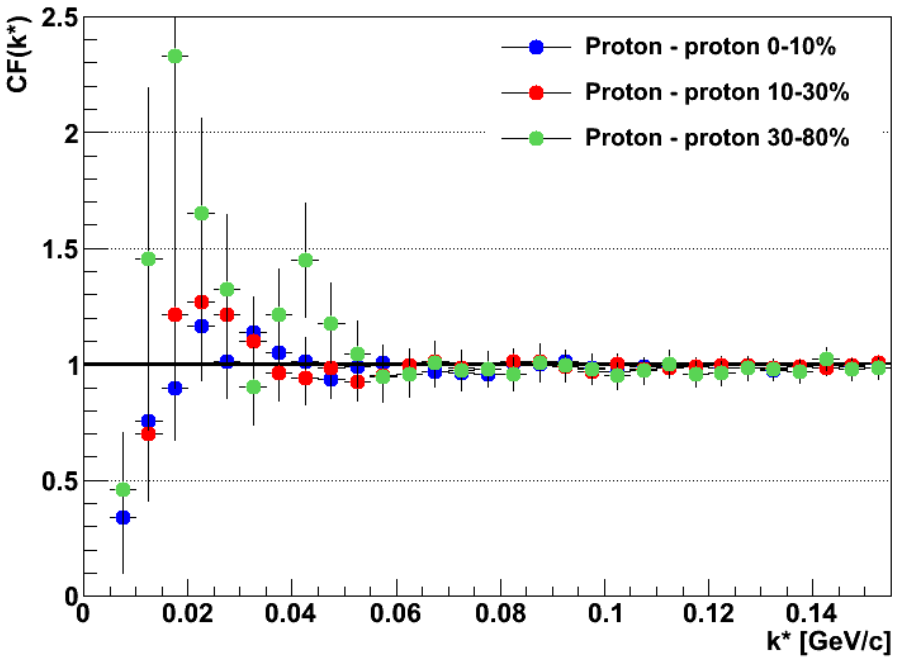
Proton - proton, MinBias, URQMD 3.3, 17.3GeV Target stat. error 10.0 %



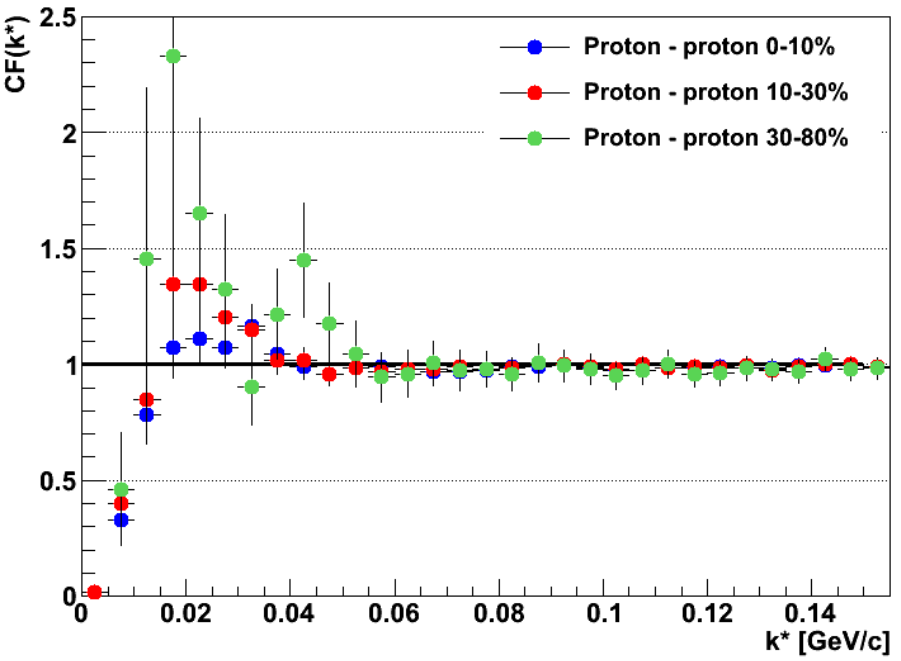
Proton - proton, MinBias, URQMD 3.3, 17.3GeV Target stat. error 5.0 %



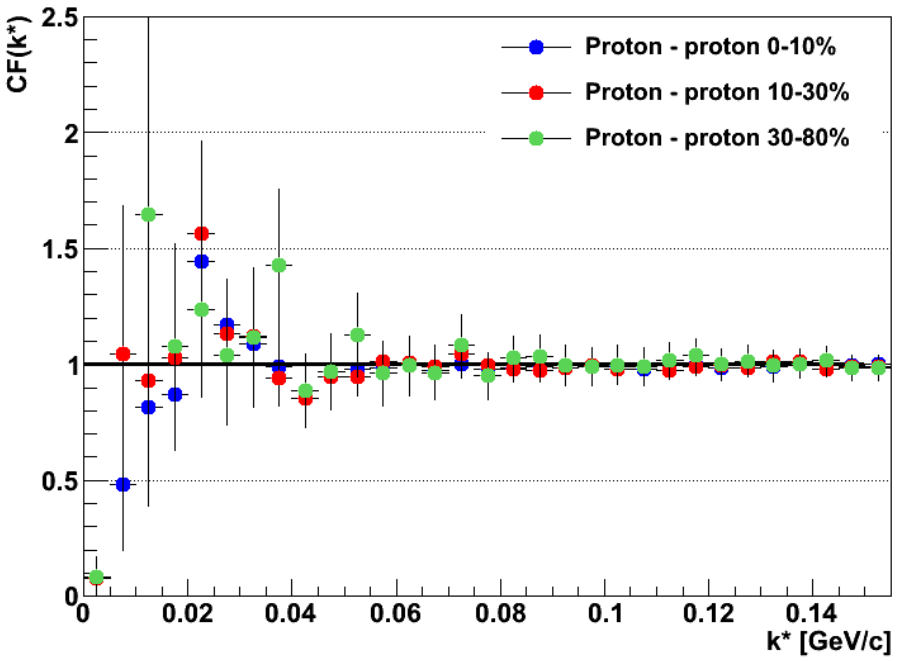
Proton - proton, MinBias, URQMD 3.3, 27GeV Target stat. error 10.0 %



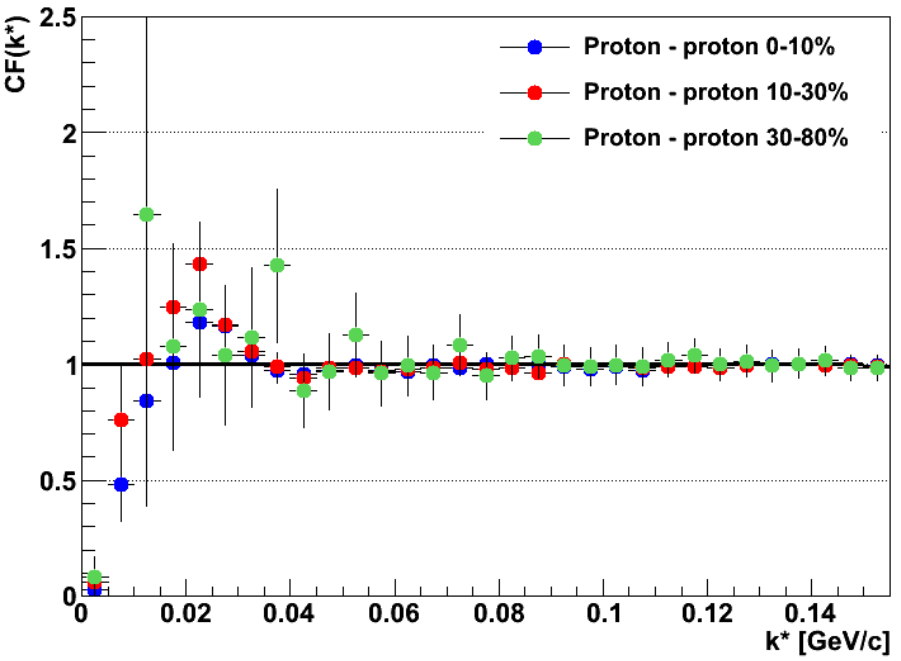
Proton - proton, MinBias, URQMD 3.3, 27GeV Target stat. error 5.0 %



Proton - proton, MinBias, URQMD 3.3, 39GeV Target stat. error 10.0 %



Proton - proton, MinBias, URQMD 3.3, 39GeV Target stat. error 5.0 %



http://drupal.star.bnl.gov/STAR/stamotes/public/sn0493

Collision Energies (GeV)	5	7.7	11.5	17.3	27	39
Observables	Millions of Events Needed					
v_2 (up to ~1.5 GeV/c)	**0.3**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**
v_1	0.5	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Azimuthally sensitive HBT	4	**4**	**3.5**	**3.5**	**3**	**3**
PID fluctuations (K/π)	1	**1**	**1**	**1**	**1**	**1**
net-proton kurtosis	5	**5**	**5**	**5**	**5**	**5**
differential corr & fluct vs. centrality	4	**5**	**5**	**5**	**5**	**5**
n_q scaling π/K/p/Λ $(m_T-m_0)/n<2$GeV	8.5	**6**	**5**	**5**	**4.5**	**4.5**
ϕ/Ω up to $p_T/n_q=2$ GeV/c		56	25	**18**	**13**	**12**
R_{CP} up to p_T ~4.5 GeV/c (at 17.3) 5.5 (at 27) & 6 GeV/c (at 39)				**15**	**33**	**24**
untriggered ridge correlations		27	13	**8**	**6**	**6**
parity violation		**5**	**5**	**5**	**5**	**5**

Experimental data

- 39GeV: >13M events
- 7.7GeV: >5M events
- 11.5GeV: >5M events
- FastOffline data (reco. ~24h after data taking)
- Pion and Proton femtoscopy
- Flow
- Particle ratios, ...

Results

No plots today, sorry.

Conclusion

As experiment we are ready for low energy running,
and as a group we have capability and manpower to play significant role
in femtoscopic analysis for BES@STAR
We are waiting for Run11