net-proton moments baselines & efficiency corrections

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net-proton paper GPC discussion

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Xiaofeng has shared the basic histograms with me

(net-p, tot-p, p, pbar) vs RM3corr

From these, I can reproduce the plots in the paper

…Moments products from data *vs.* centrality and/or root-s

…With and without efficiency corrections

Can also calculate (N)BD and Sampled Singles expectations…

`http://wjllope.rice.edu/fluct/protected/moments_20130417.pps`

I have the same base TH2Ds from McDonald's net-p,net-K,net-q results

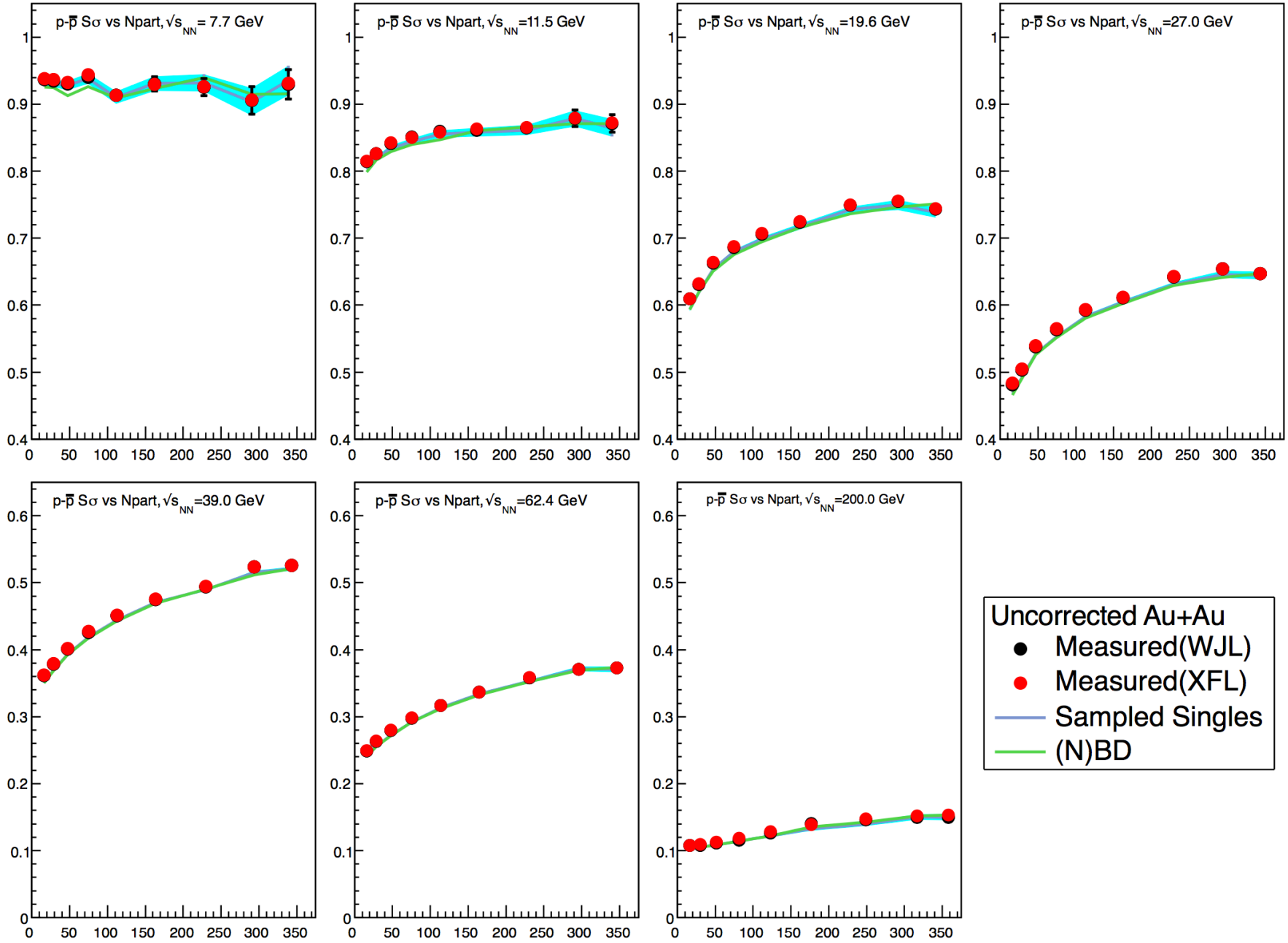
Here concentrate on results for this net-p paper.

First, calculate uncorrected results and compare

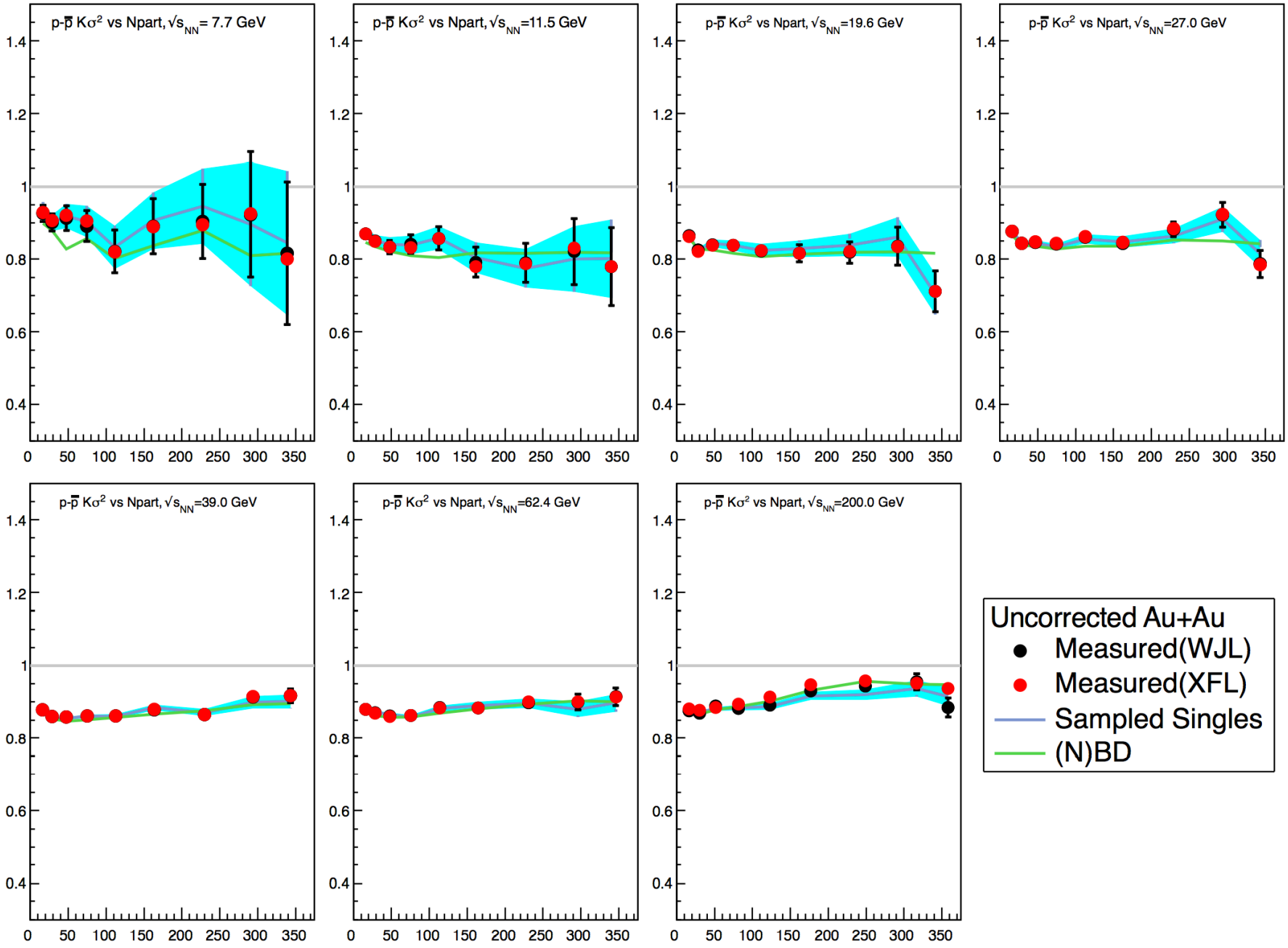
Then, perform the efficiency corrections and compare

Efficiency values are charge-independent and are taken from the analysis note.

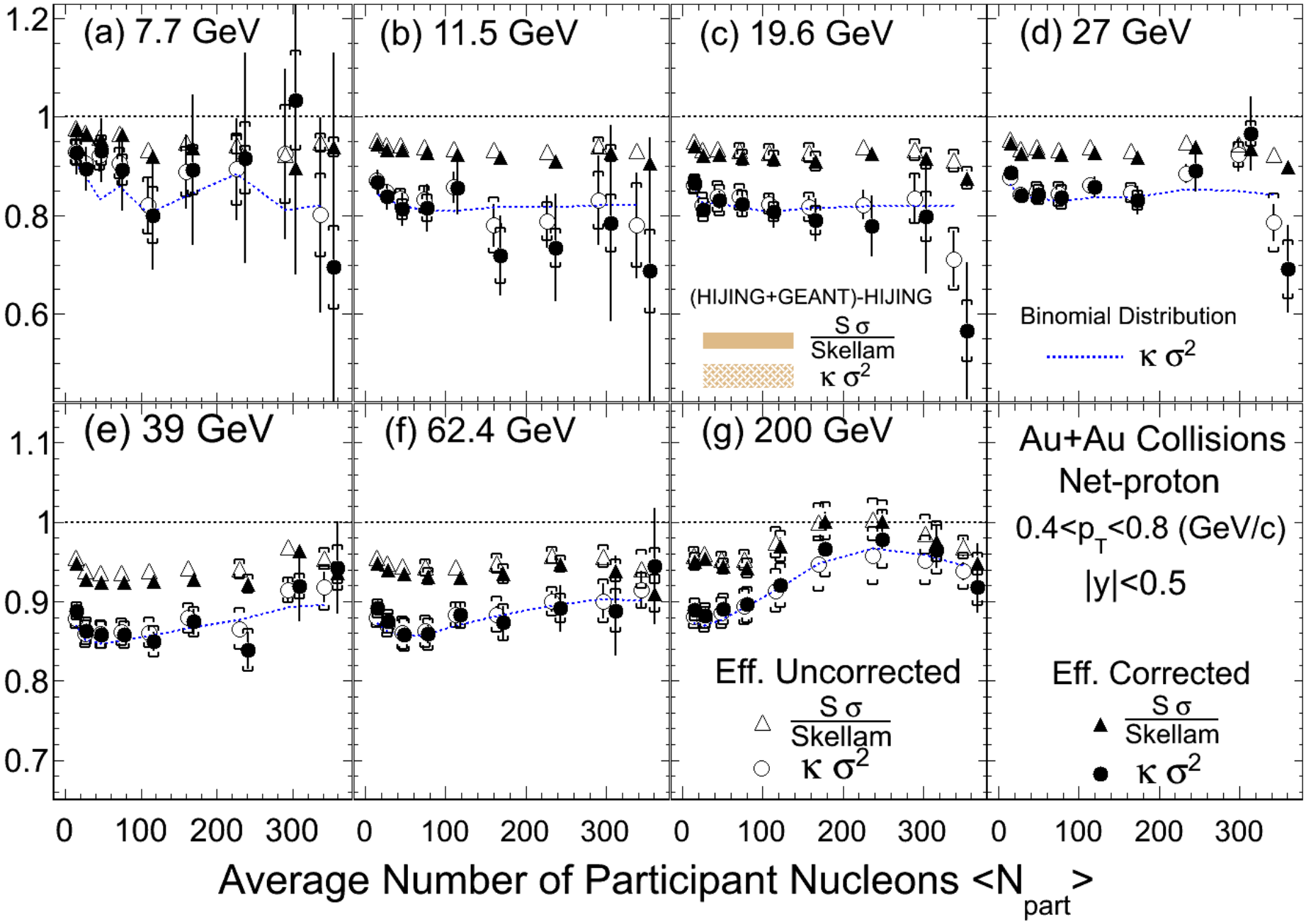
Uncorrected net-p Sσ *vs.* centrality by root-s



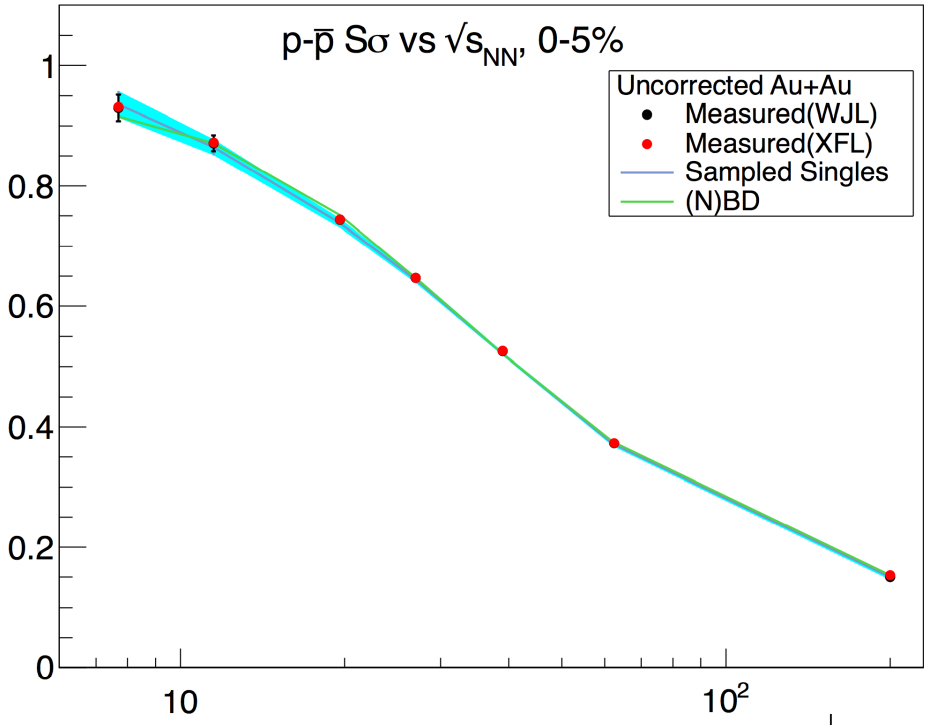
Uncorrected net-p $K\sigma^2$ *vs.* centrality by root-s



Compare my values to the **open points** (from Xiaofeng's code).

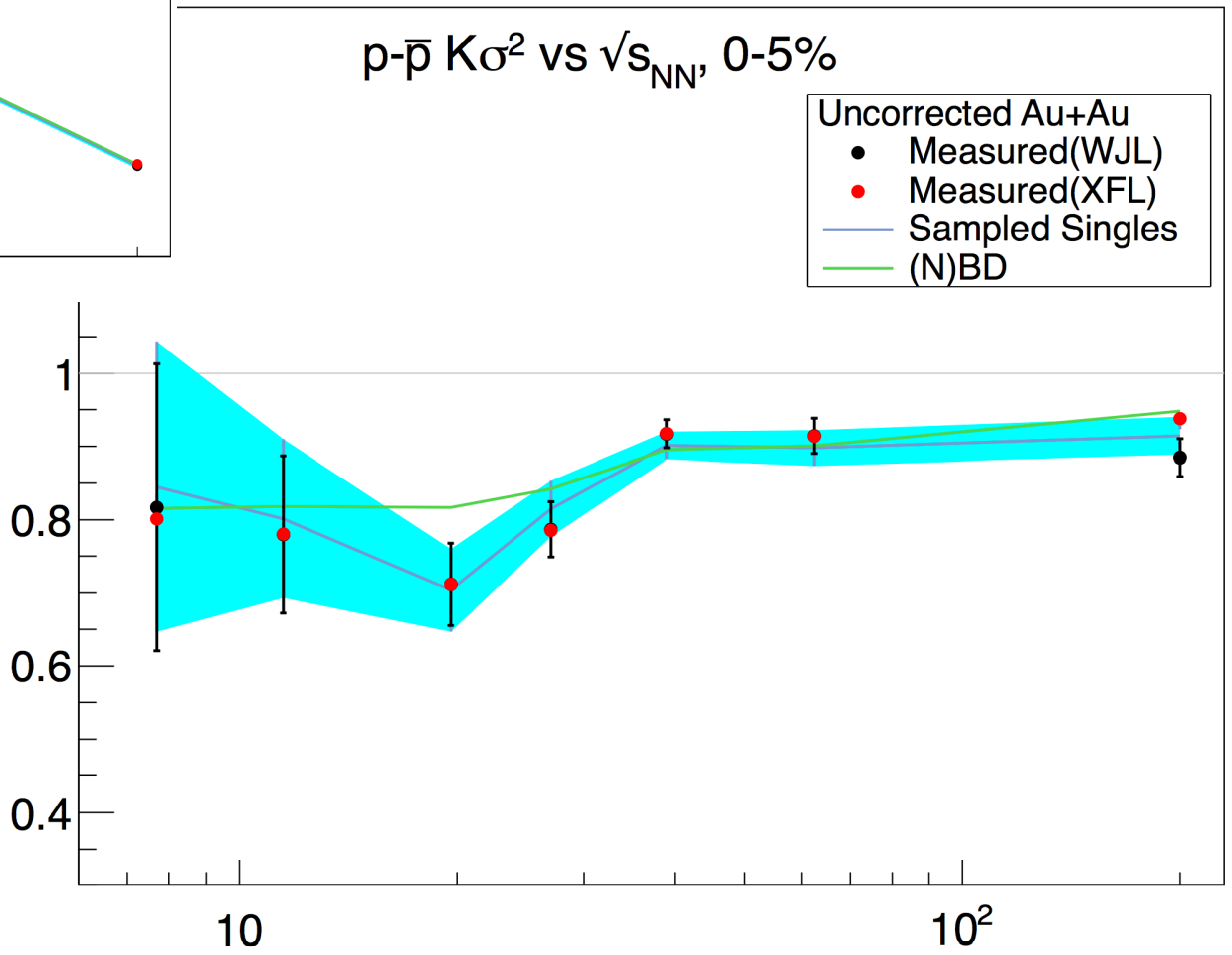


Uncorrected net-p Sσ & Kσ² *vs.* root-s for 0-5%

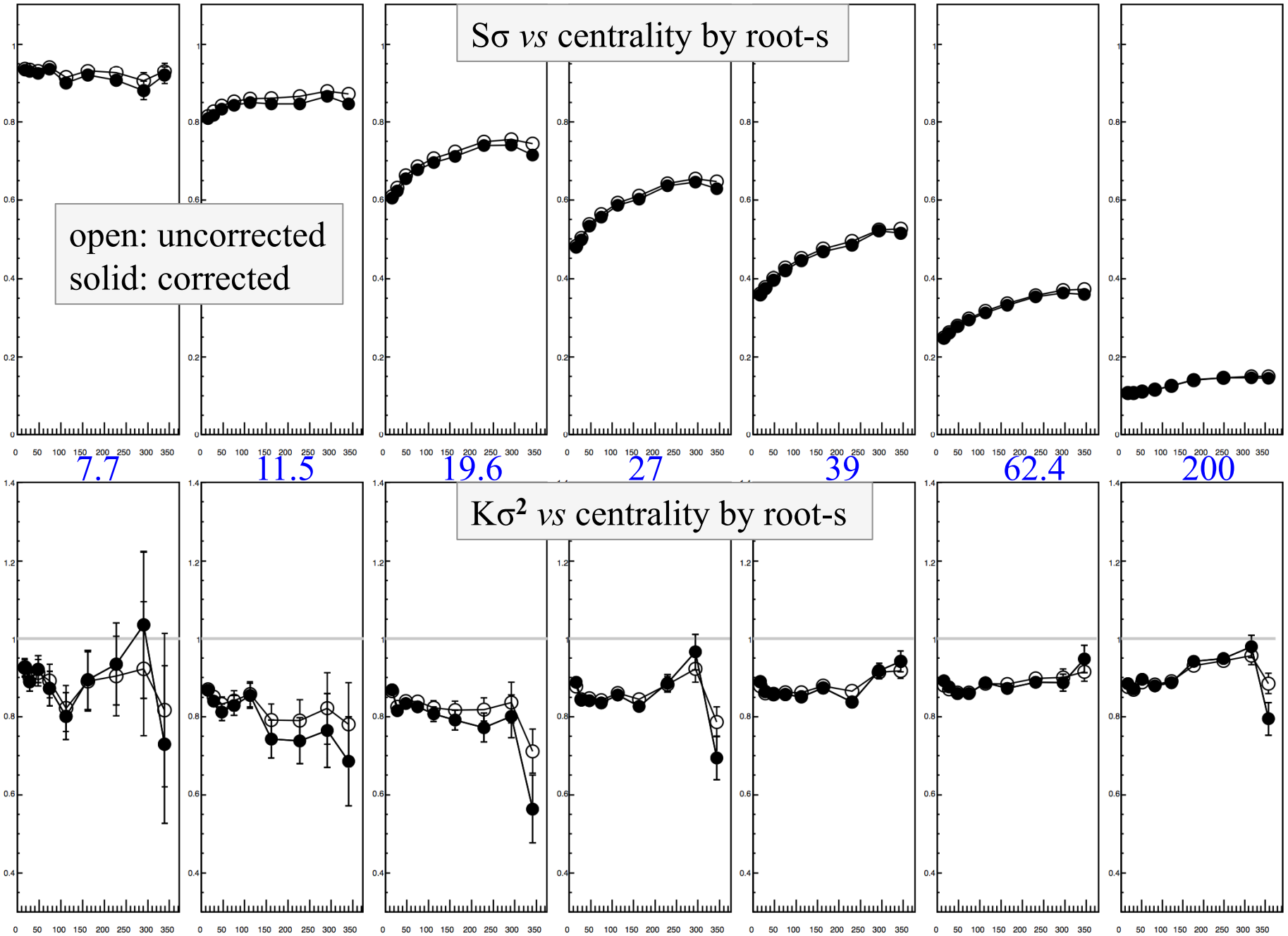


very good agreement to Xiaofeng's uncorrected results in general, except 200 (some v. slight differences at lowest root-s)

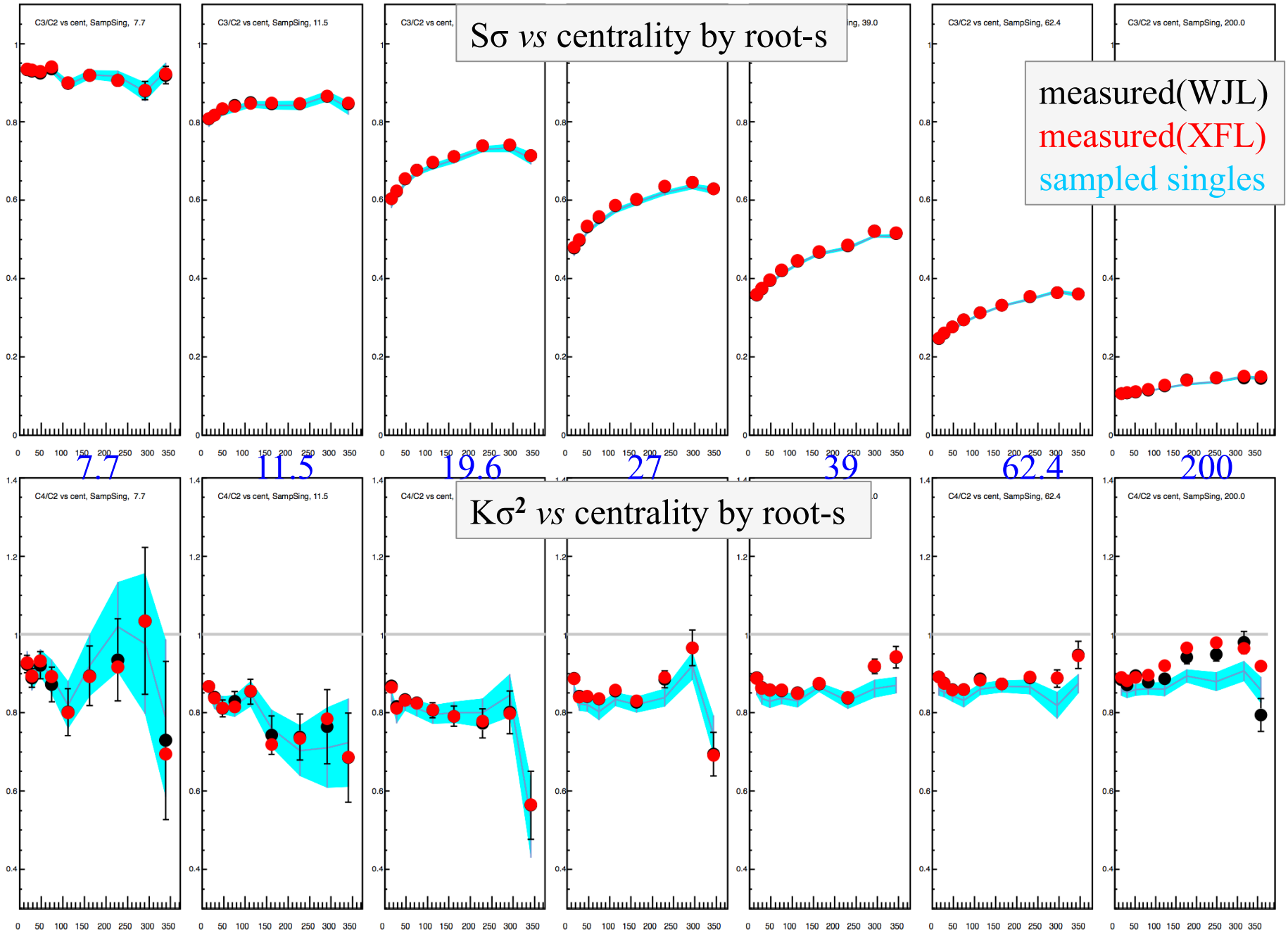
(N)BD and Sampled Singles reproduce the data values



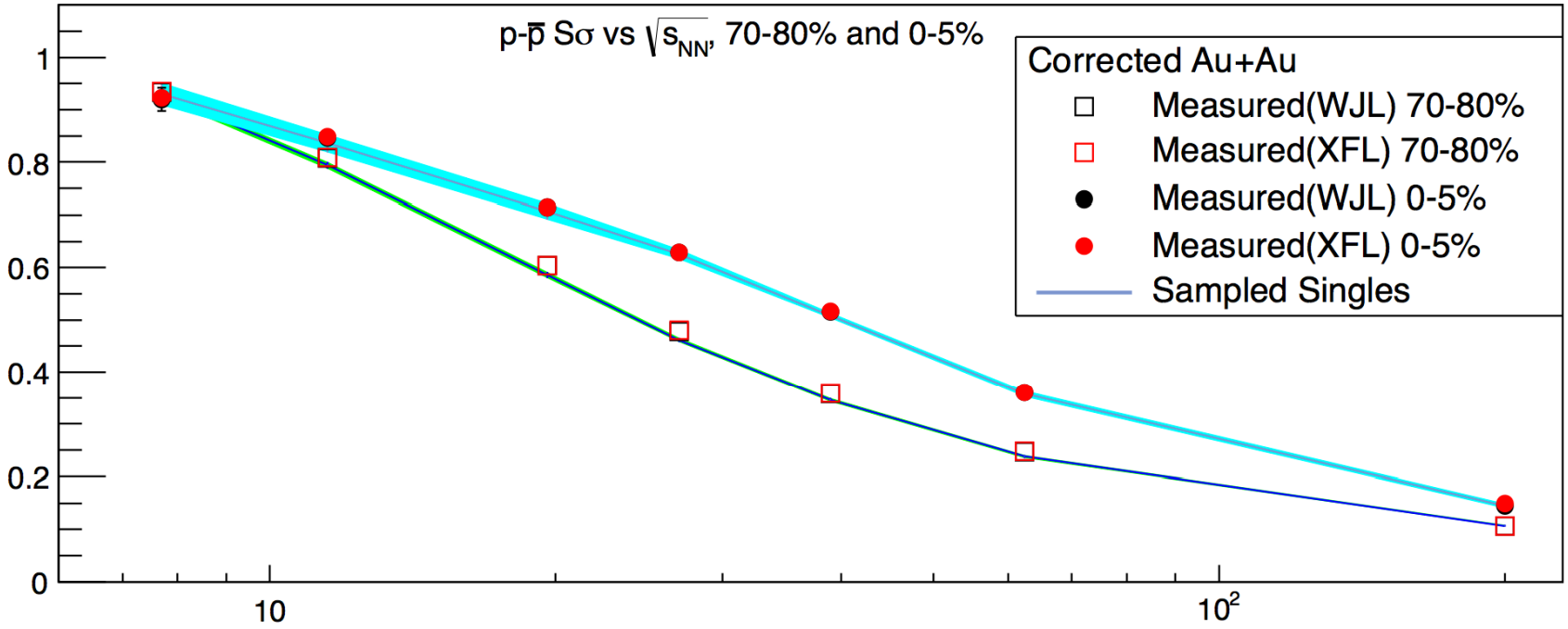
Now, perform the efficiency corrections…

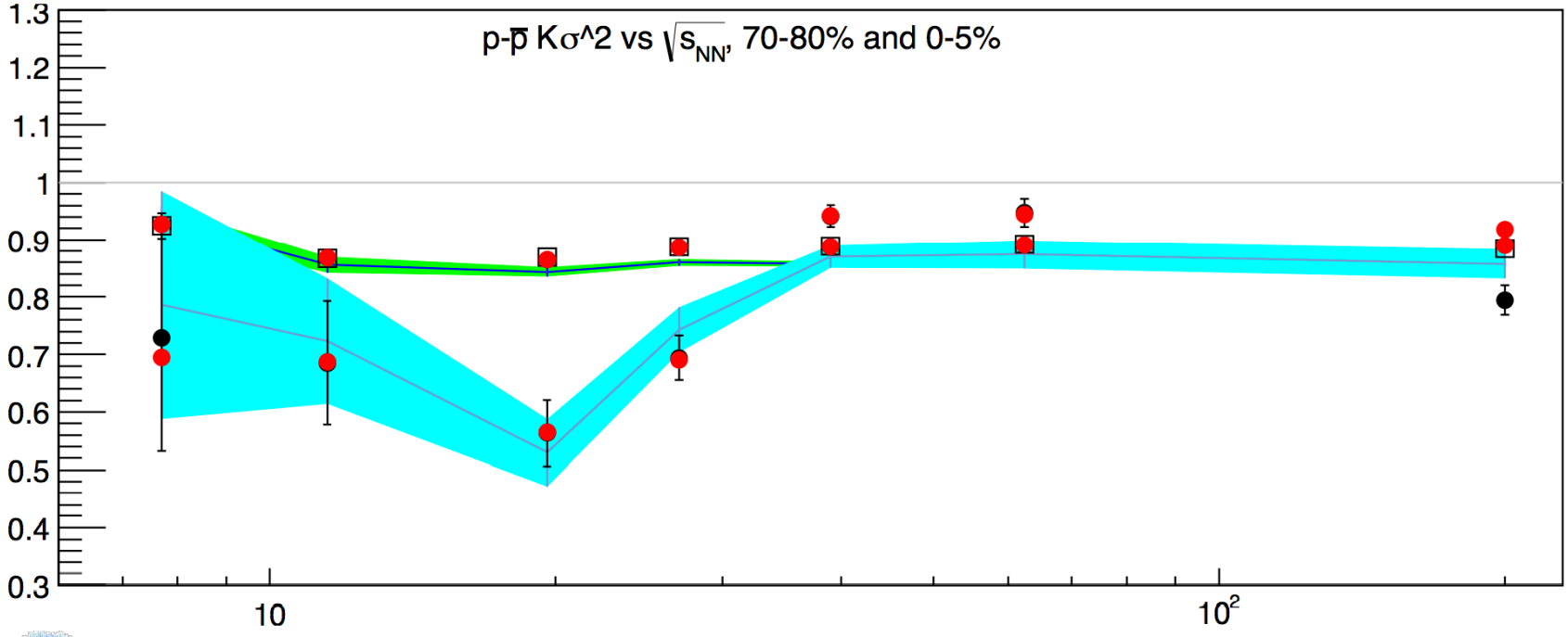


Efficiency-corrected Sσ & Kσ² with the Sampled Singles values

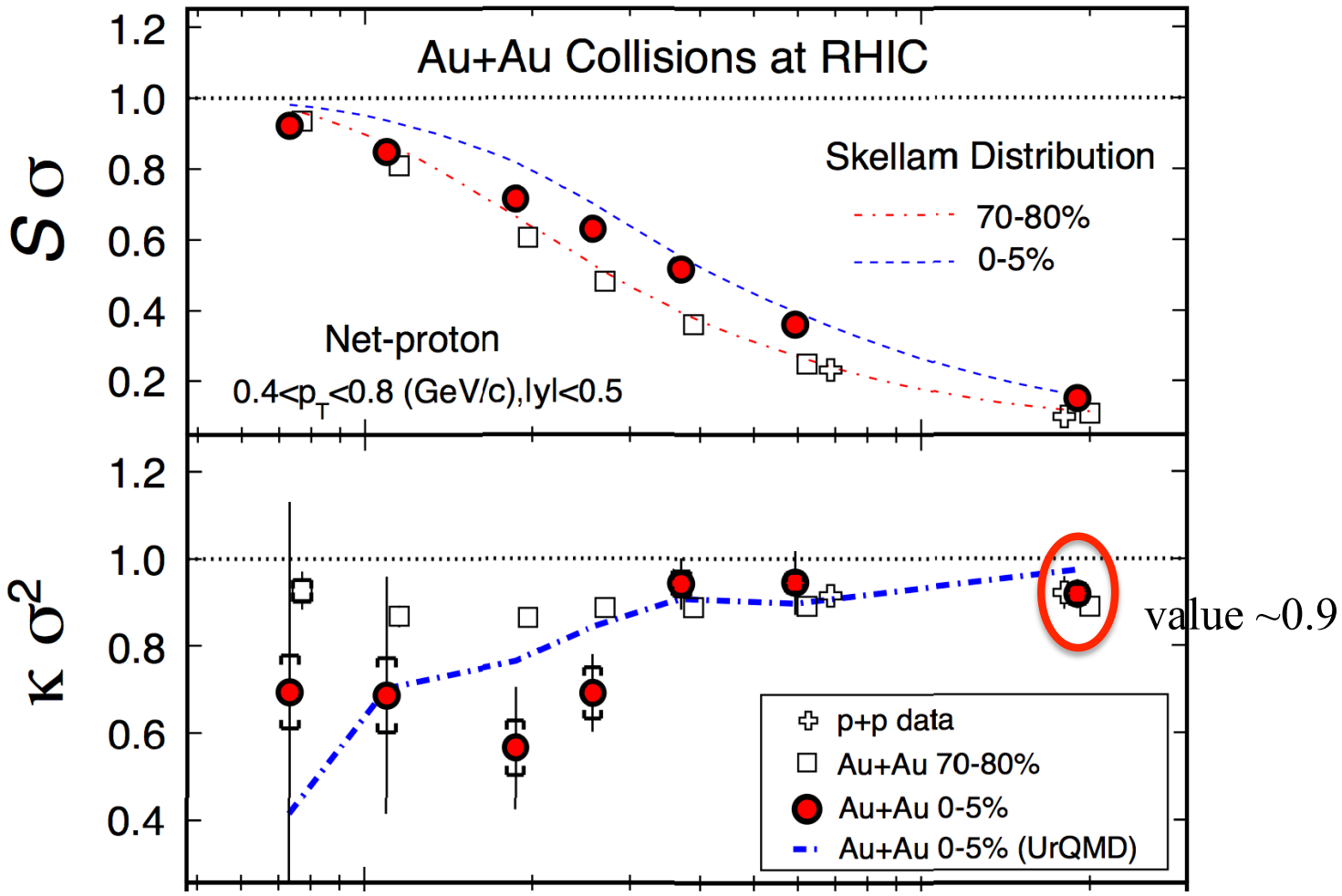


Efficiency-corrected Sσ & Kσ² with the Sampled Singles values





Compare to this plot from Xiaofeng's code



value ~0.9

My data values agree with paper's values, except at 200 GeV (& v. slightly @ 7.7 & 11.5)

Corrected sampled singles values reproduce the efficiency-corrected points in the paper.
Sampled singles bands on previous pages are ready to include in the paper if of interest.

Summary

Sampled singles approaches and (N)BD compared to XFL's data before efficiency corrections.
Sampled singles approaches and compared to XFL's data after efficiency corrections.

Completely independent code both for the data and the (N)BD and sampled singles.
Direct comparisons look quite good in general.

Sampled singles approach generally reproduces the moments in the paper both before and after the efficiency correction.

The sampled singles curves can quickly be made available to Xiaofeng if the GPC feels that this "expectation" provides useful new content to the paper.
Directly tests importance of intra-event correlations between Np and Npbar without any assumption on the shape of the singles distributions (unlike (N)BD)…

This basically completes the charge to me from the last GPC meeting. Your call.

Remaining slides are a few thoughts on the PID issue just FYI…

PID

Couple of my own opinions on the PID issue…

BNL group mentioned Rice work showing a dependence of the moments on the PID method, and suggested that the PID approaches be compared and the difference considered as a systematic.
…I don't think the situation is quite this simple…

Present response includes comparison to 'hybrid pid' approach and notes tof matching efficiencies are not yet understood.
…I am mildly uncomfortable with the former, and disagree with the latter…

I am not suggesting any changes to the paper here.

Just wanted to clarify some things and share my own opinions on others.

The PID issue noted in the BNL group's comments.

BNL group quoted Daniel's thesis re: a difference between the results from different PID methods… This comparison was made 1.5+ years ago when we were all using similar centrality definitions and cuts. I.e. direct comparisons were possible.

This ship has long since sailed. …now:

- Xiaofeng and Lizhu use refmult3corr, |y|<0.5, 0.4<pt<0.8, and dE/dx-only
- Daniel (all), Me (all), Nihar (net-q), and Amal (net-K) use refmult2corr, |eta|<0.5
- Daniel, Amal, Gary, and I require TOF.

Acceptance of xiaofeng & RICE analyses is very different. See <net-p> at 7.7 GeV

The most direct comparisons possible at the time were described here (late 2011)

http://www.star.bnl.gov/protected/bulkcorr/dmac/bulkcorr92611v3.pdf
http://www.star.bnl.gov/protected/bulkcorr/dmac/pwg20111130.pdf

and additional comparisons to the xiaofeng/lizhu's hybrid PID approach (used in refmult3!)

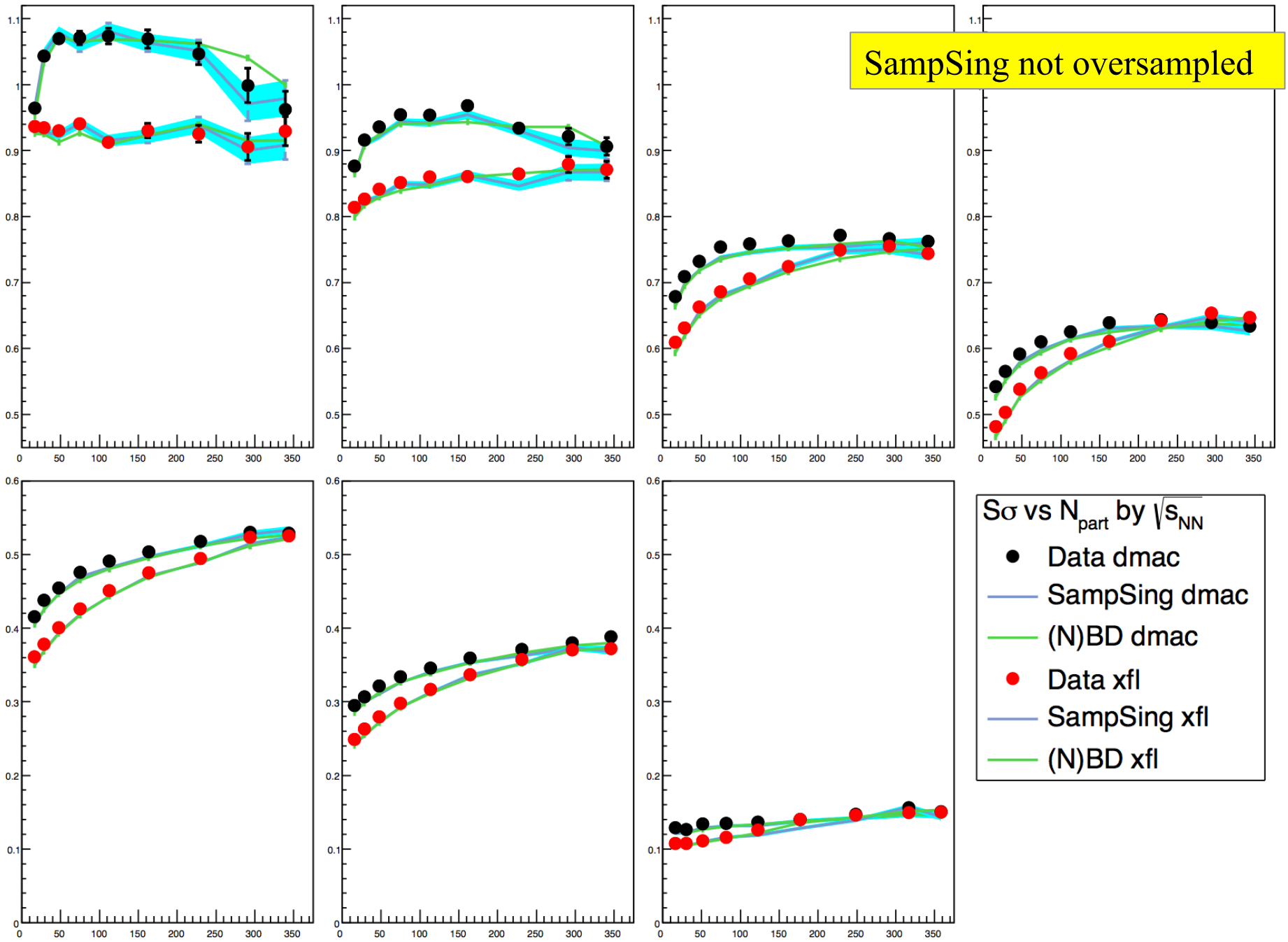
http://www.star.bnl.gov/protected/bulkcorr/dmac/bulkcorr20111102v2.pdf
http://drupal.star.bnl.gov/STAR/system/files/collaborationmeeting20111116.pdf

These comparisons showed differences between dE/dx-only *and* hybrid to "requiring TOF"

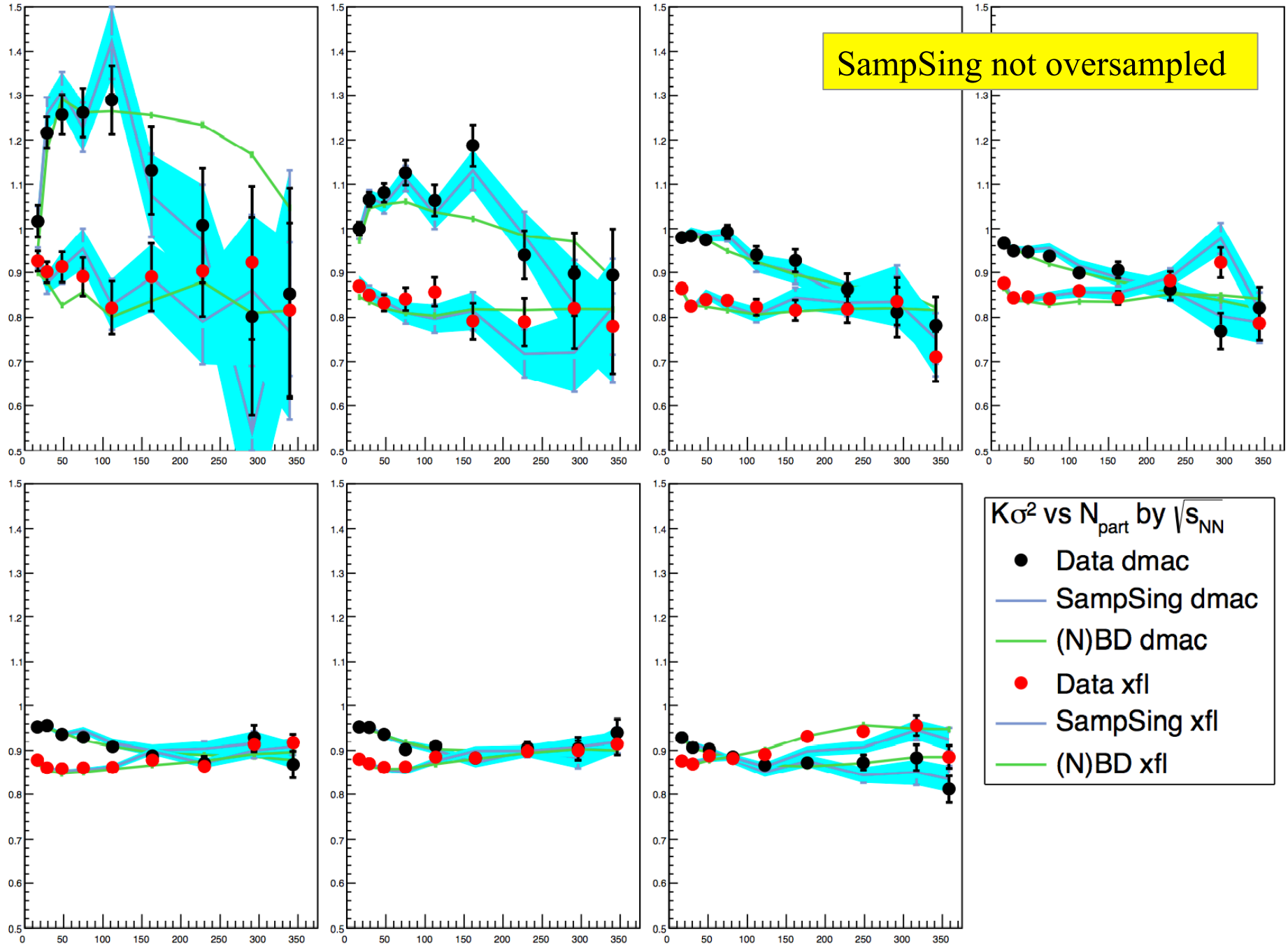
I'm not sure that comparing "hybrid PID" to "dE/dx-only" is a strong test because "hybrid PID" allows contamination in the tracks at pt~0.8 & high-η (ptot>0.9) that do not have TOF information (~30%)… But the other changes (wider |y| cut vs |η| cut, refmult2 to refmult3, etc) have made direct comparisons to "requiring TOF" difficult at this point.

Just for fun, I compare directly the latest results anyway now.

Uncorrected net-p Sσ *vs.* centrality by root-s, Comparison

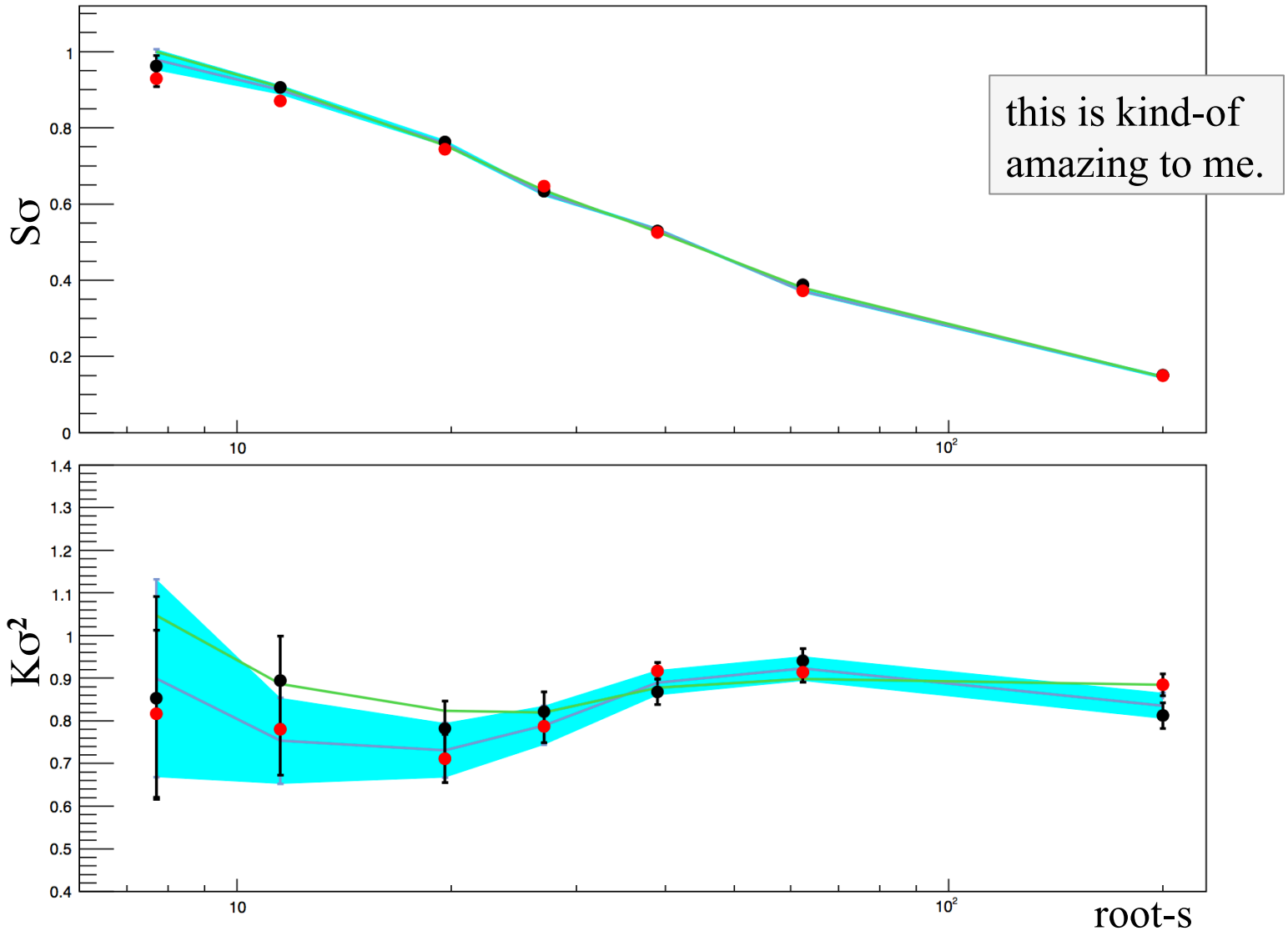


Uncorrected net-p $K\sigma^2$ *vs.* centrality by root-s, Comparison



Uncorrected net-p Sσ & Kσ² *vs.* root-s, 0-5%, Comparison

Despite widely different acceptances (~50% in <net-p> at 7.7) the present dE/dx-only analysis and the RICE "requiring TOF" give the same answer for 0-5% collisions.



PID and institutional comparison comments.

Direct comparisons between different analyses were possible in ~November 2011.
Many changes in individual analyses since. We've bifurcated into two camps really.

The different PID approaches being used in the different analyses are accompanied by many other differences (centrality and acceptance).
Which makes the latest results from different STAR institutions very difficult to compare…

The two net-p results agree very well for 0-5%, despite very different acceptances (amazing)
Large differences for more peripheral collisions… (acceptance? contamination? …)

It is not obvious to me that comparisons of present dE/dx-only PID to a hybrid PID are a rigorous indication that contamination is irrelevant.
hybrid PID != requiring TOF, because TOF efficiency is not perfect (~65-70%).
Contamination lives at lowest root-s. Where there is contamination, one is mixing $K\sigma^2$ values from different particles that are each roughly ~1 already anyway.

I think the real question is obvious:
How do the RICE "require-TOF" results compare to the present results if **both** are efficiency corrected (including the "extra" TOF inefficiency obviously).

I have all the pbar and p embedding files (all 7 root-s values), and very well known TofMatch efficiencies from my light nucleus studies. I.e. this is a comparison that I can do.
Example: `http://wjllope.rice.edu/files/tofmatch_paprap_cuts1.ps.pdf`
But there'd still be different eta/y and pt ranges…. so both camps should do this (long paper)