first independent look at net-q paper data

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bulkcorr PWG meeting

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Independent code that reads 4 TH2Ds (net-X, tot-X, X, Xbar) *vs.* rmNcorr at all 7 $\sqrt{s_{NN}}$…

TH2Ds for X=p from xiaofeng luo (net-p paper),

X=p, q, K from daniel mcdonald (q and K at QM 2012)

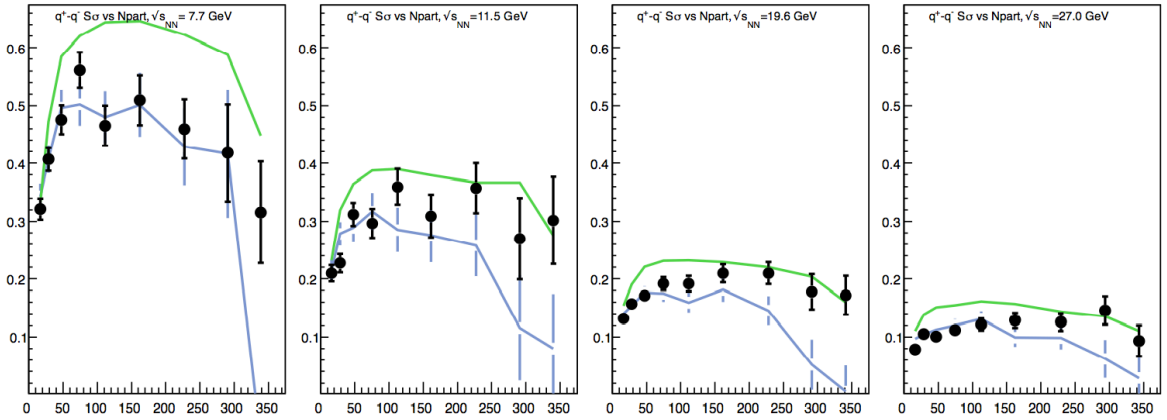
…and now…

NEW! X=q from nihar NEW!

This code then calculates:

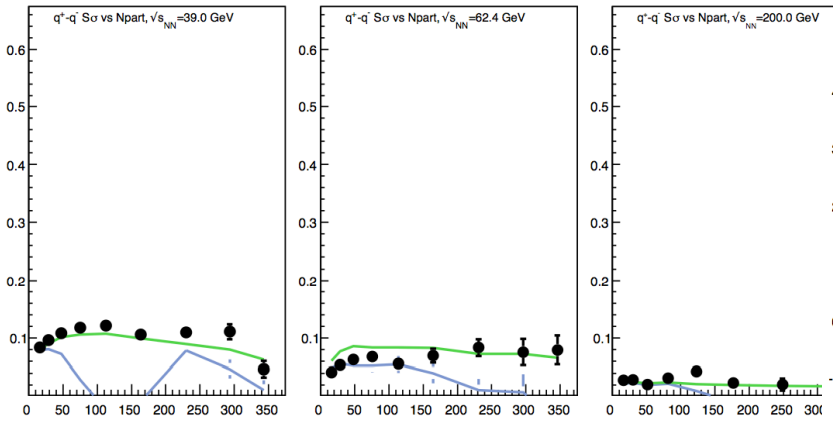
- cumulants & moments products from the experimental data…
- BD/P/NBD & ``sampled singles" baselines…
- efficiency corrections using XFL method… (Nihar uses Bzdak/Koch equations)

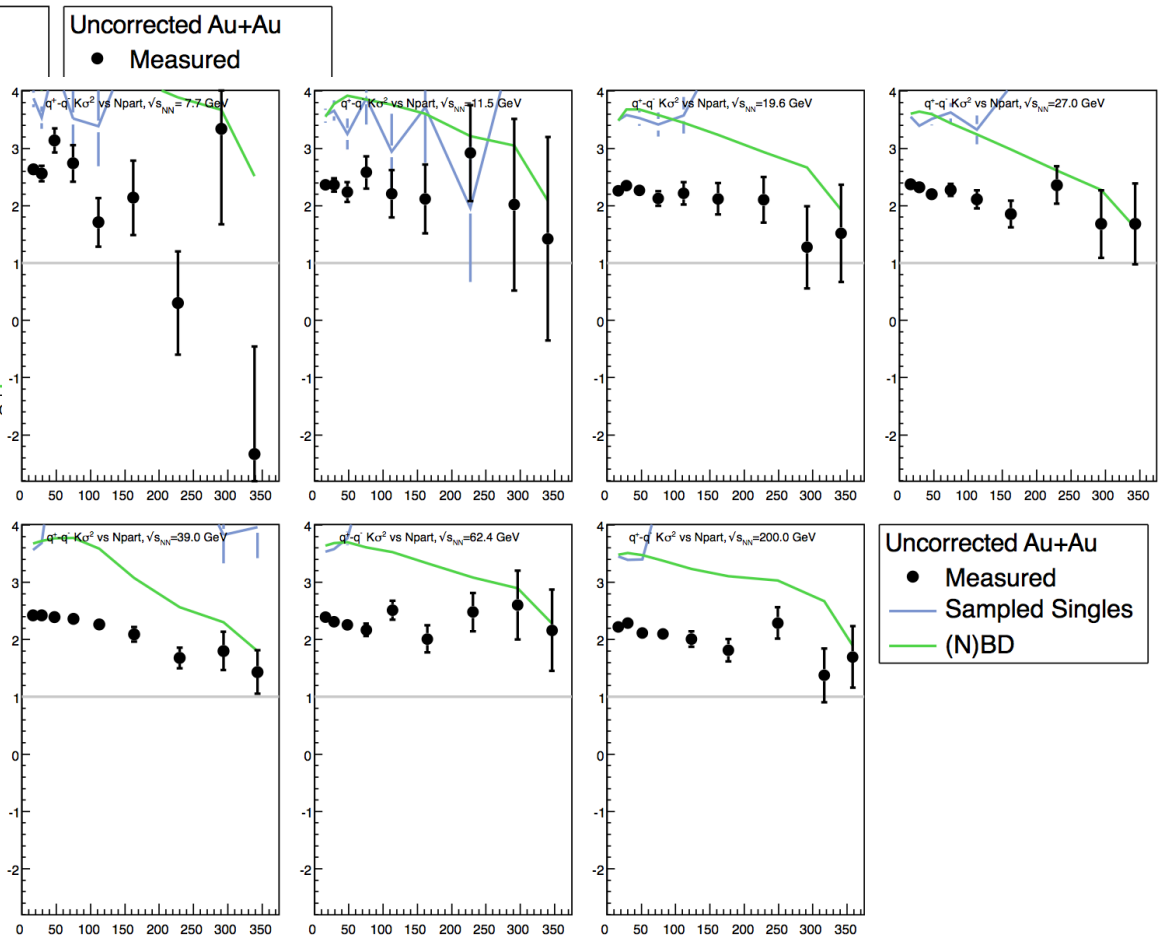
Calculated uncorrected Sσ and Kσ²



First step is to compare the uncorrected values…

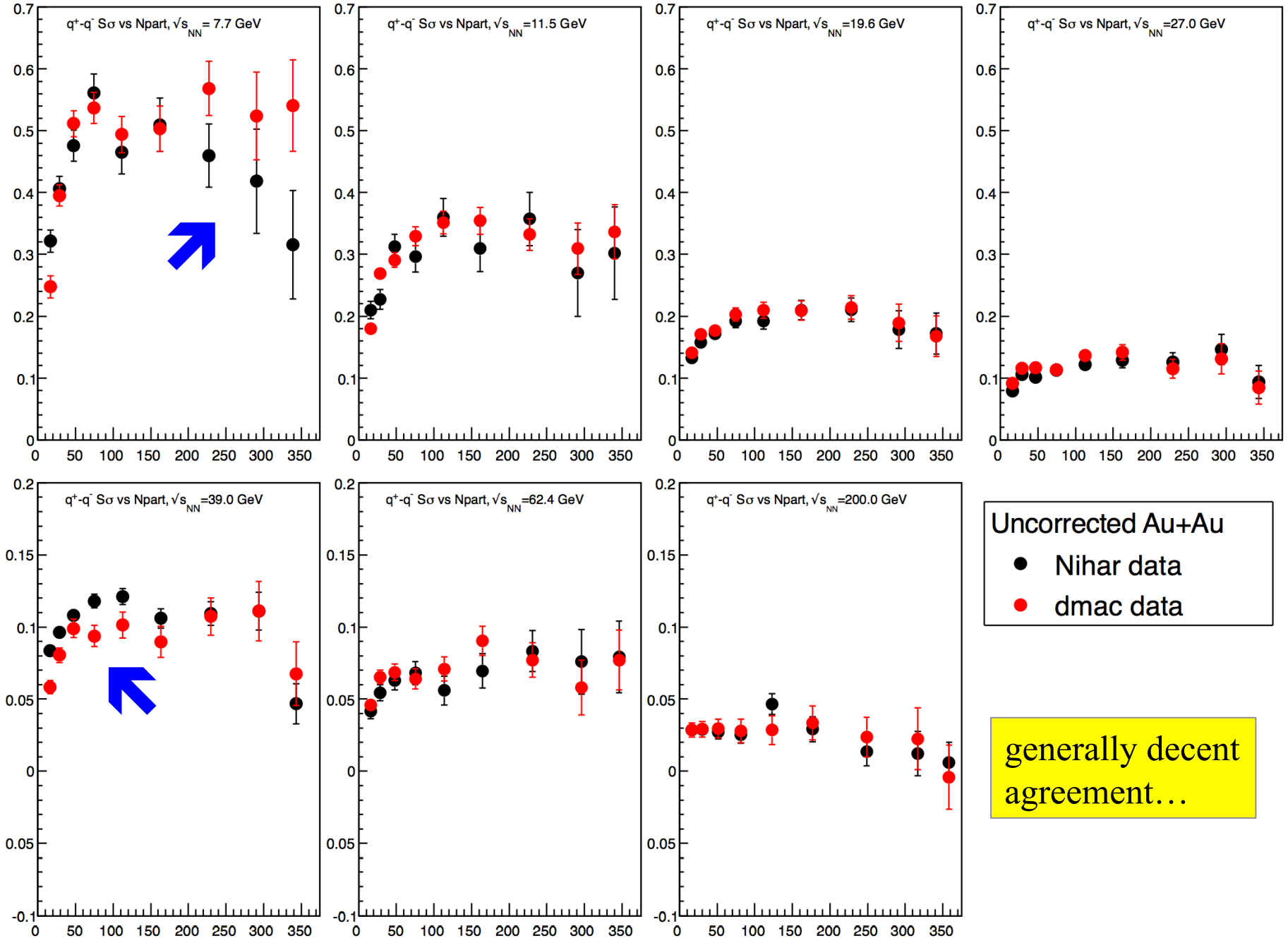
(ignore the lines for now)





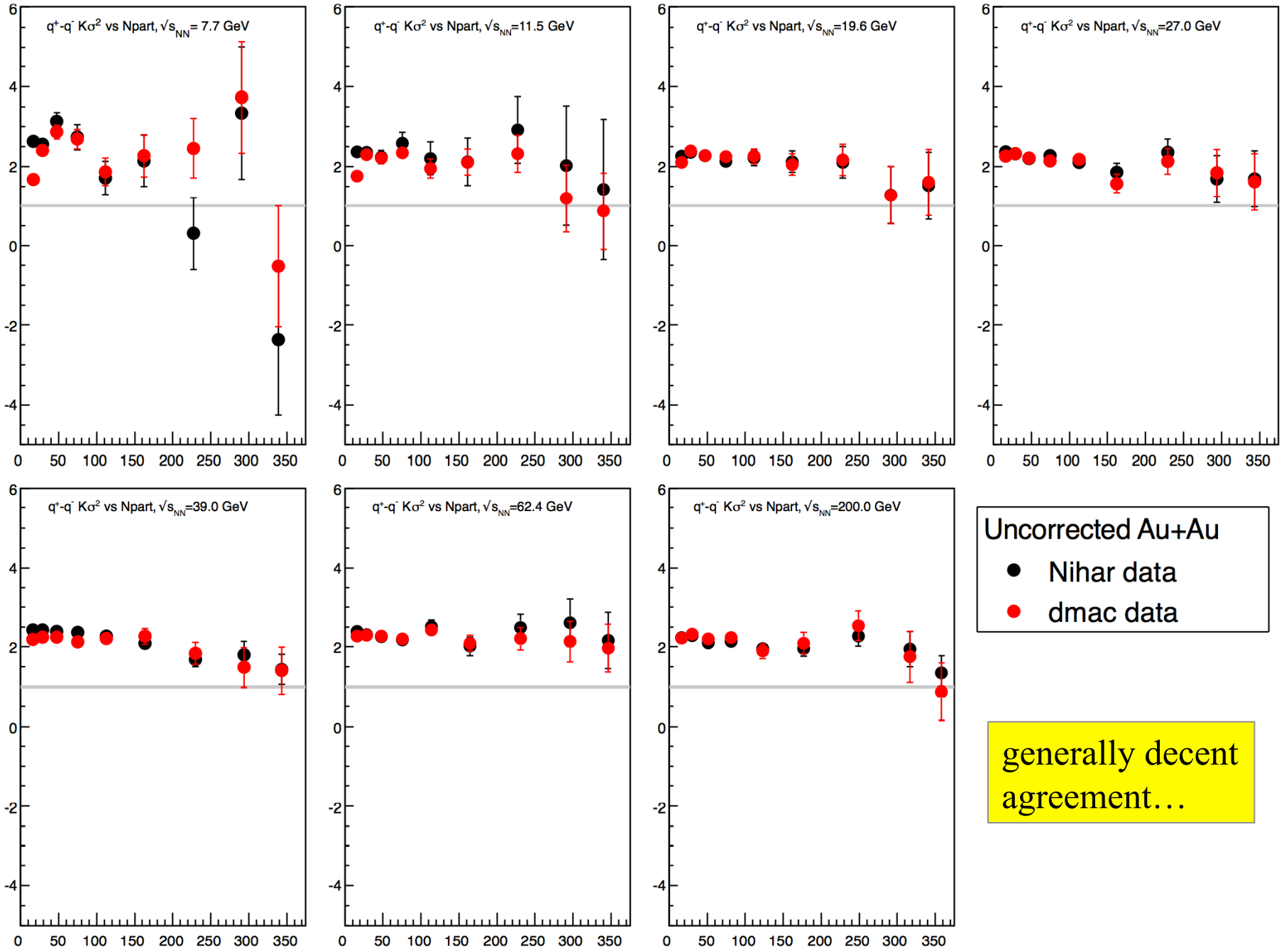
Nihar confirmed good agreement between his values and mine…

Comparison of uncorrected net-q Sσ *vs.* centrality by $\sqrt{s_{NN}}$…



generally decent agreement…

Comparison of uncorrected net-q $K\sigma^2$ *vs.* centrality by $\sqrt{s_{NN}}$…

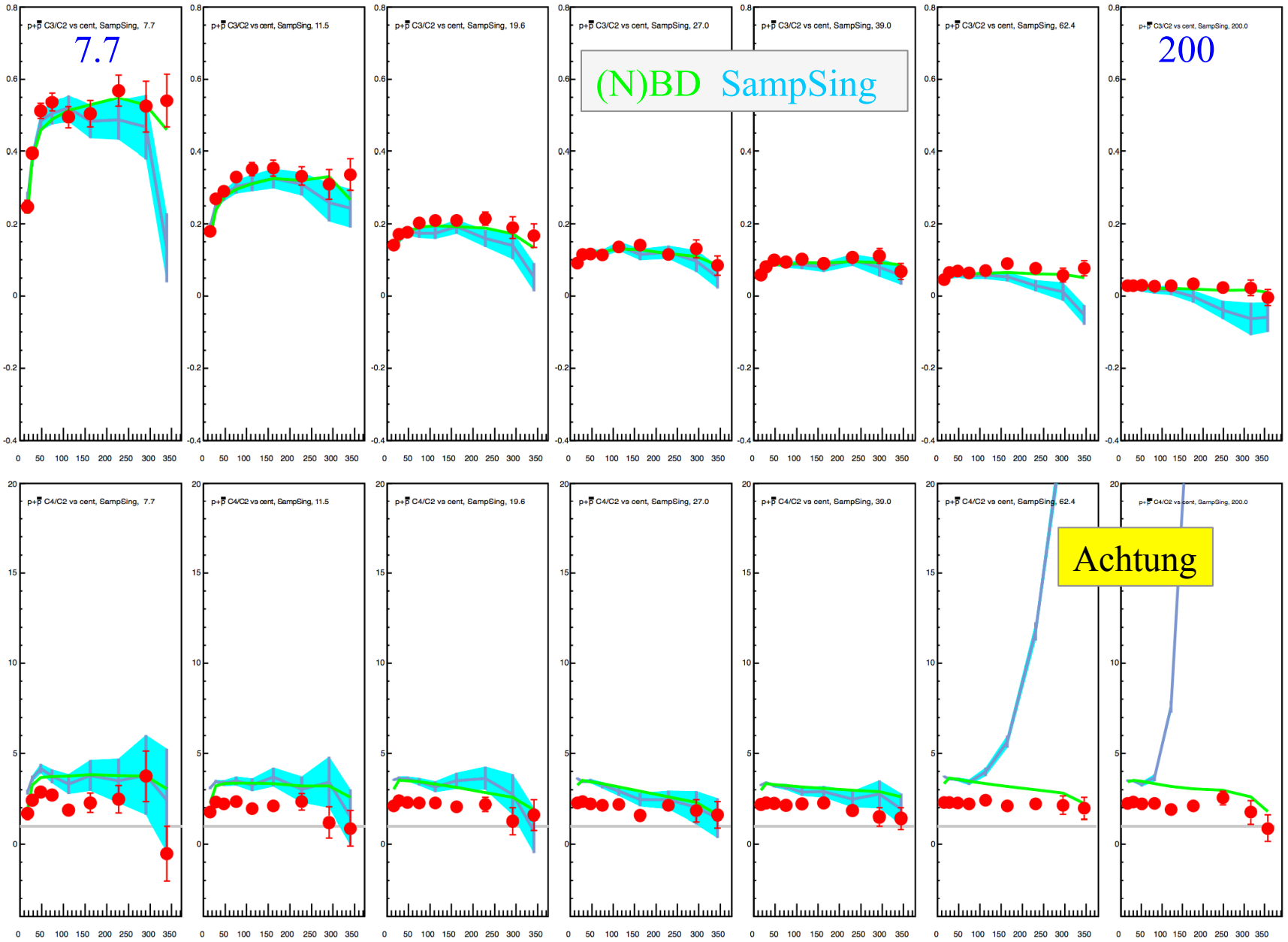


generally decent agreement…

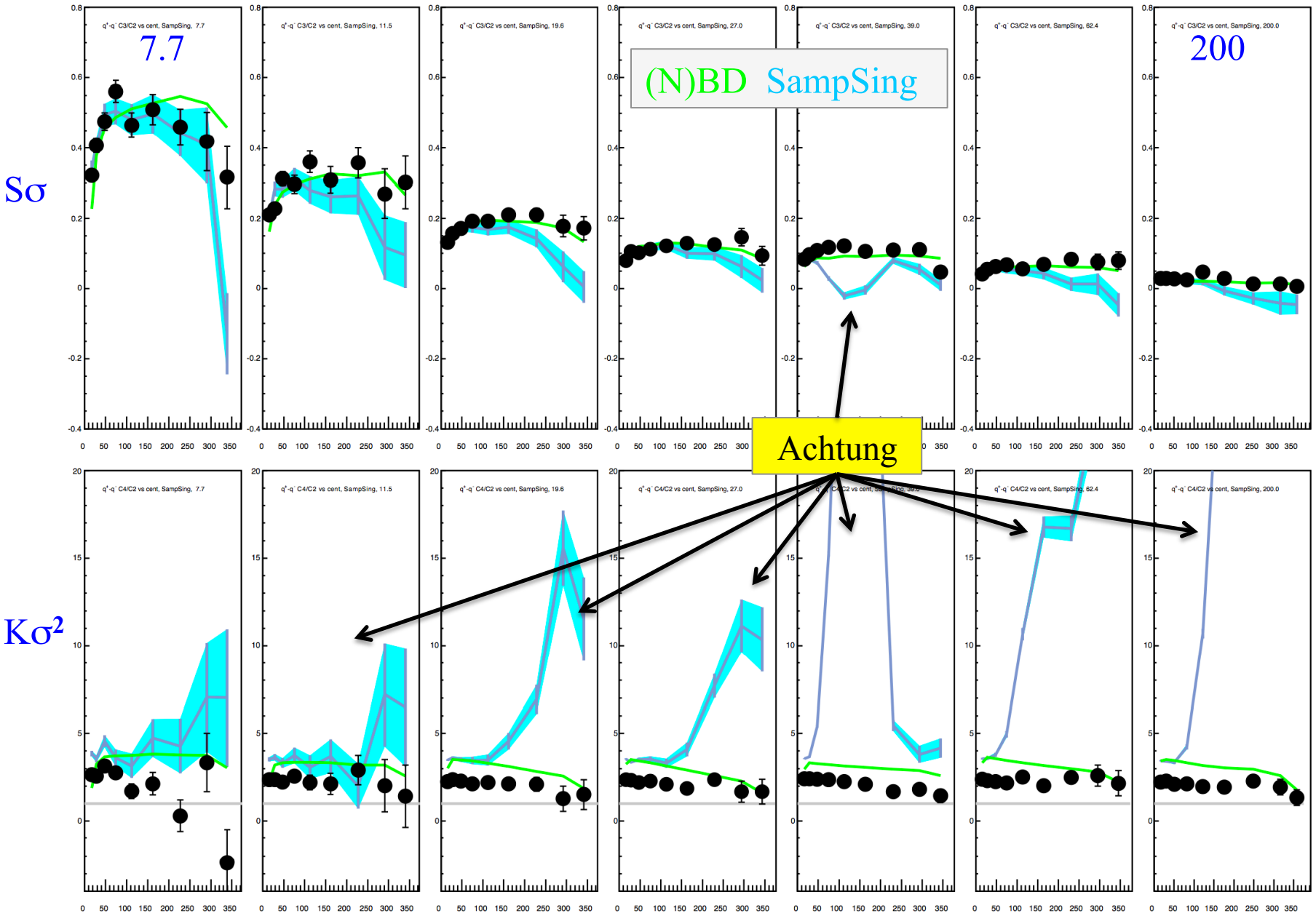
dmac data, Uncorrected net-q Sσ and Kσ² *vs.* N_{part} by $\sqrt{s_{NN}}$ with baselines

Sσ

Kσ²



nihar data, Uncorrected net-q Sσ *vs.* centrality by $\sqrt{s_{NN}}$ with baselines



Sampled singles $K\sigma^2$ shows strong intra-event correlations in 0% to ~50% central…
…in dmac data at 62.4 and 200 GeV
…in nihar data at 19.6, 27, 39, 62.4 and 200 GeV
Nihar data also shows a significant mid-central dip in $S\sigma$ at 39.4 GeV

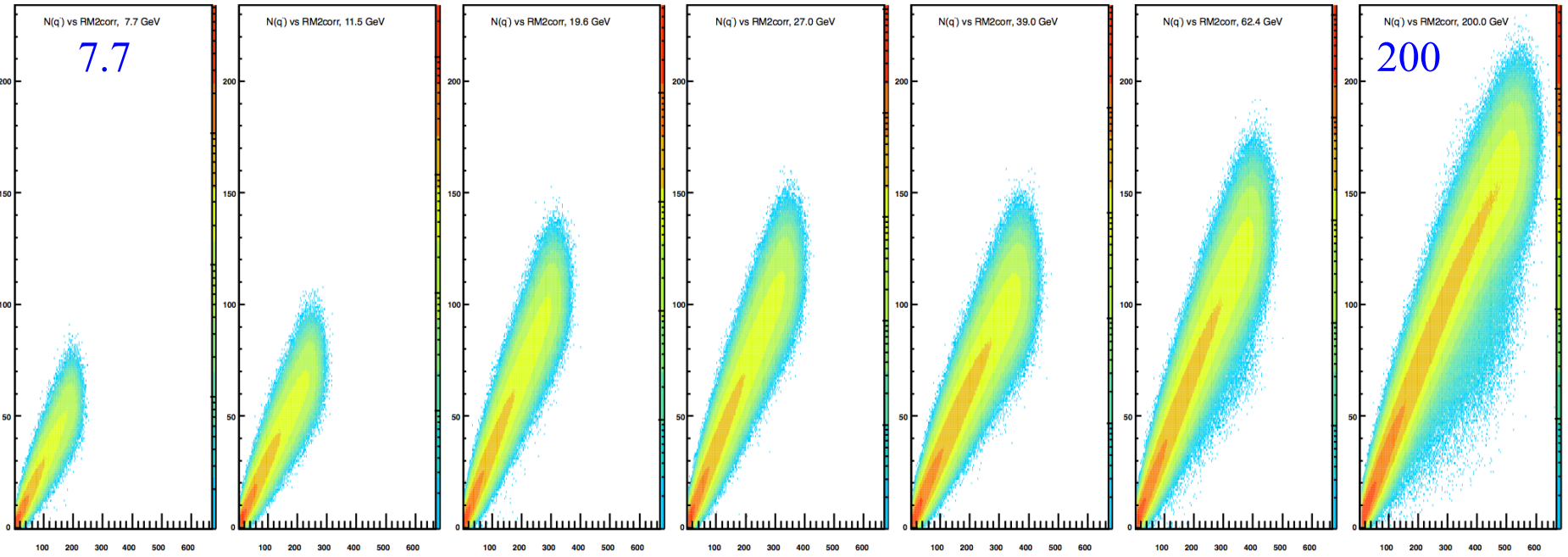
Aspects of the two analyses that are the same:
- centrality from refmult2corr, $0.5<|\eta|<1.0$
- refmult2corr bad run list
- analysis in $|\eta|<0.5$
- track cuts (as far as I know, could be rechecked)
- no PID performed

Additionally, dmac
…throws some runs away based on ~20 global observables
…does ~5-6 ``bad event in good run'' cuts based on global observable correlation TH2Ds
We should probably recompare what bad-event 2D cuts are being used in both cases…

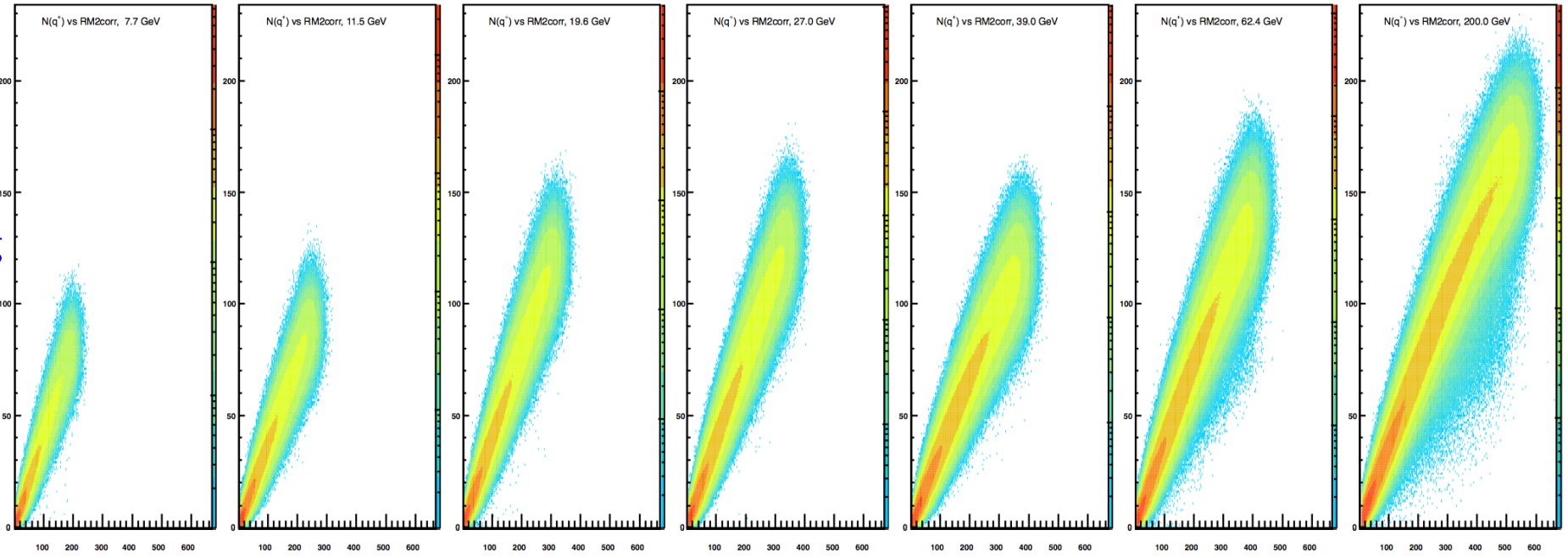
Let's look at the input that the sampled singles is using for the two datasets…

dmac data, Npos and Nneg *vs.* refmult2corr by $\sqrt{s_{NN}}$…

Npos

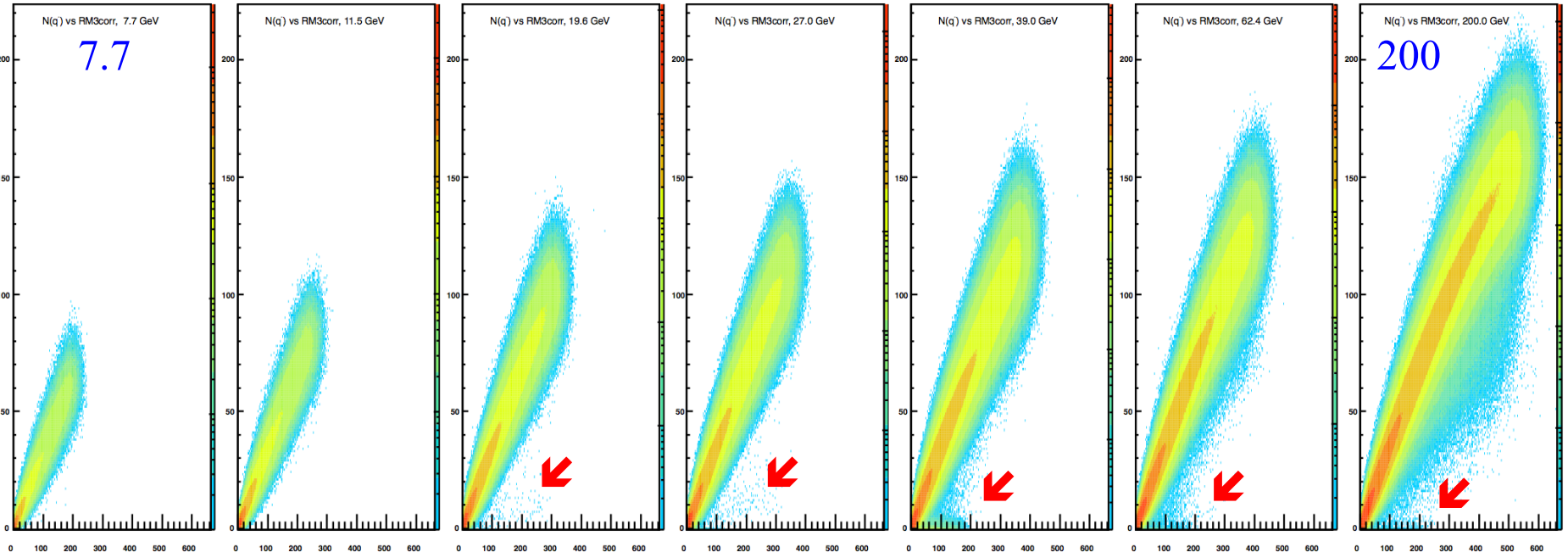


Nneg

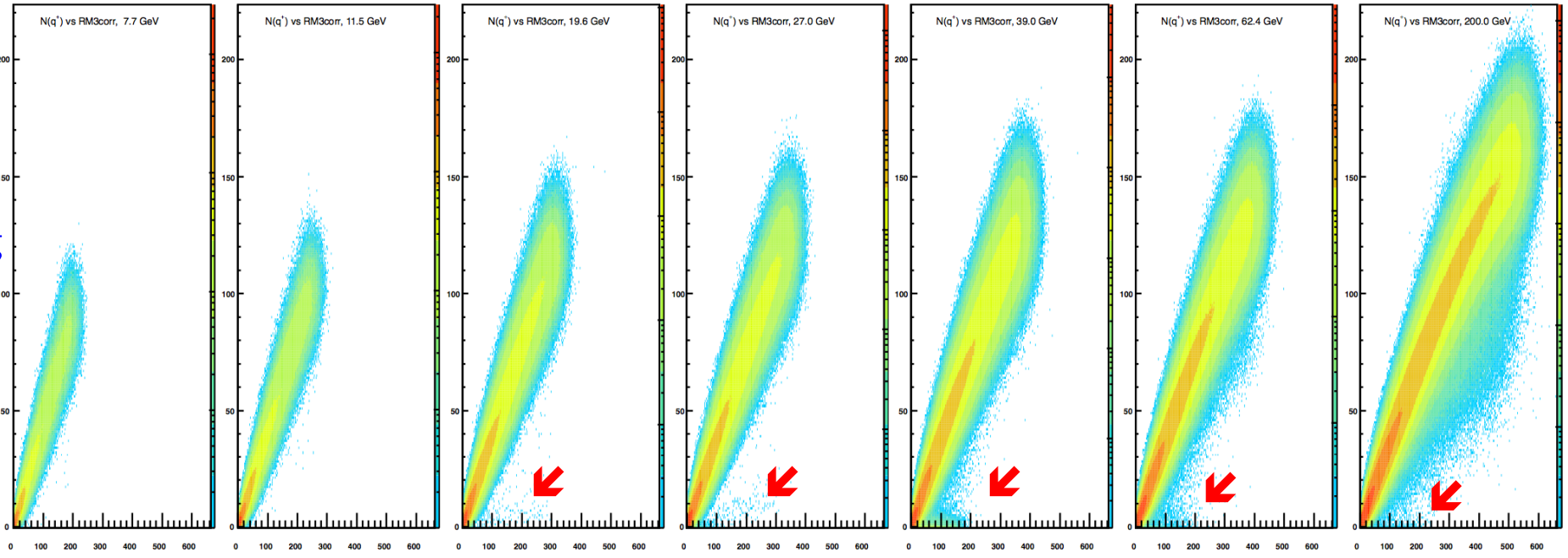


nihar data, Npos and Nneg *vs.* refmult2corr by $\sqrt{s_{NN}}$…

Npos

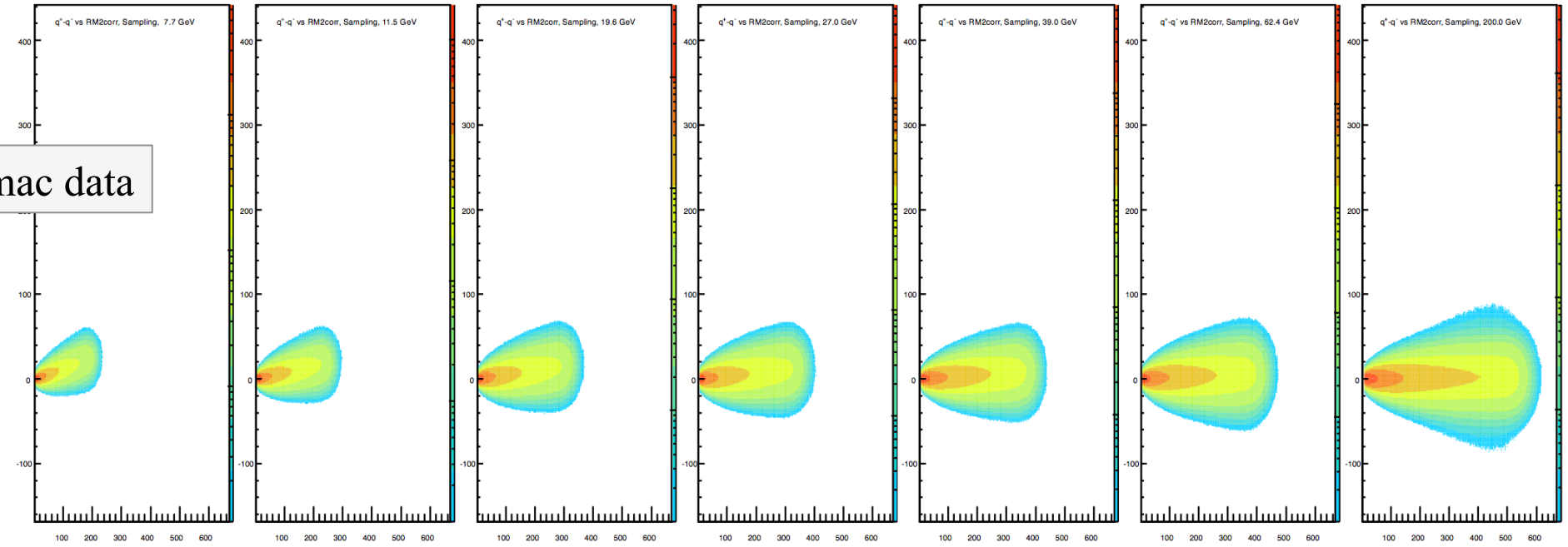


Nneg

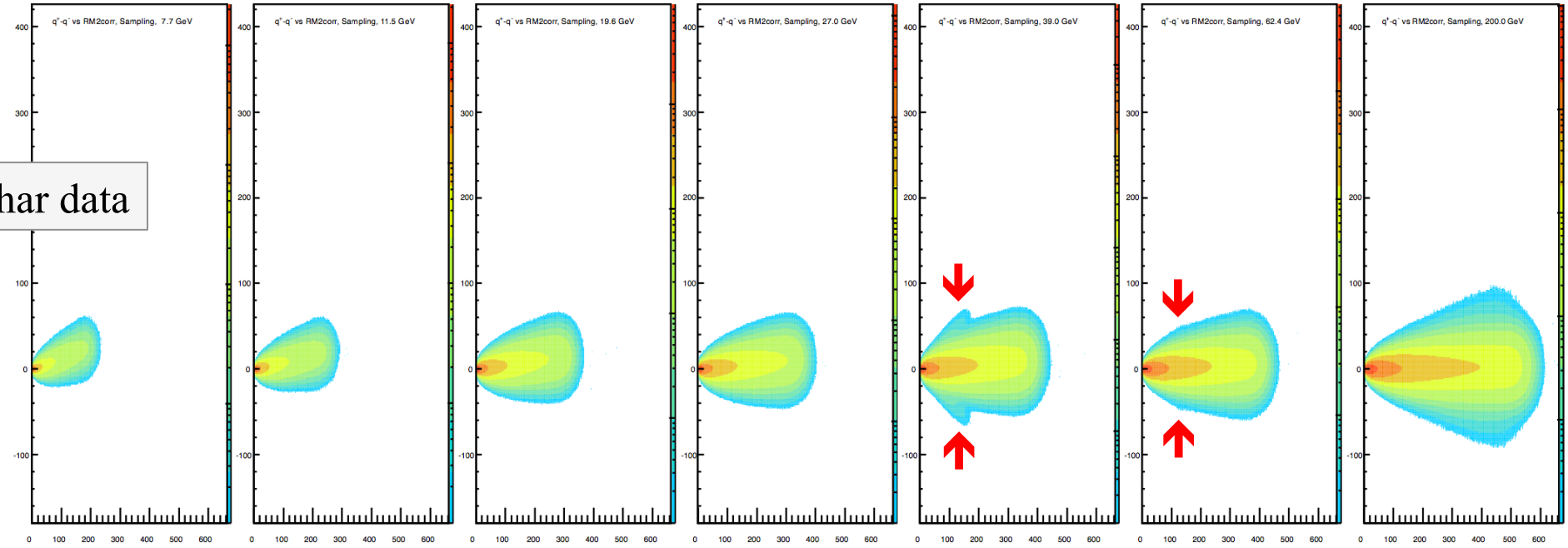


Comparison of Sampled Singles net-q *vs.* refmult2corr by $\sqrt{s_{NN}}$…

dmac data



nihar data



There seem to be much stronger low-mult tails in the nihar data compared to the dmac data…
The sampled singles is seeing these tails quite clearly…

Both dmac and nihar data show strong divergence of sampled singles from the data for
~0-50% central data at 62.4 and 200 GeV
Similar divergances also exist in the nihar data for 19.6, 27., and 39 GeV…

Strongly implies that these divergances are indicative of remnant background…
Note the moments products values Sσ and Kσ2 are not that different from the two analysis!

Suggestions:

Seems like a good time to review what bad-event 2D cuts are being used in the two analyses…

We should probably also consider a "TOF-filtered net-q" analysis…
don't use TOF for PID
but only include unidentified pos and neg tracks that have a TOF-match

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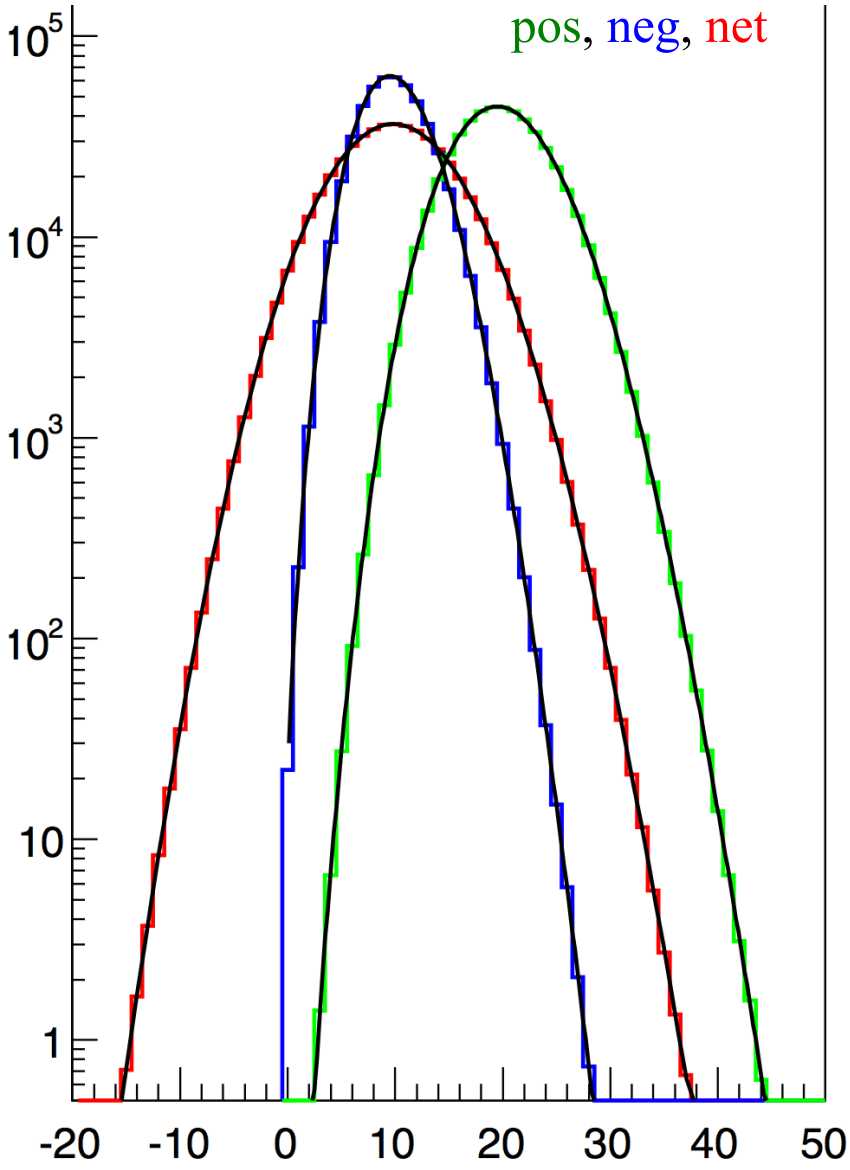
Turn now to a (data-free) efficiency study...
net-p paper uses efficiency corrections derived by Xiaofeng
net-q paper uses efficiency corrections from Bzdak/Koch paper

"effcheck" application

Input parameters are: C1pos, C2pos, C1neg, C2neg, and efficiency

For arbitrary values of the input parameters:

- generates N events, w/ values of (Npos,Nneg)
  - sampled from BD/P/NBD distributions
  - depending on the input parameters…
- forms Npos, Nneg, Nnet & Ntot distributions…
- calculates cumulants…
- does efficiency corrections using both methods
  - each coded as separate functions…
- plots mult distributions and directly
  - compares the two eff-corrected values…



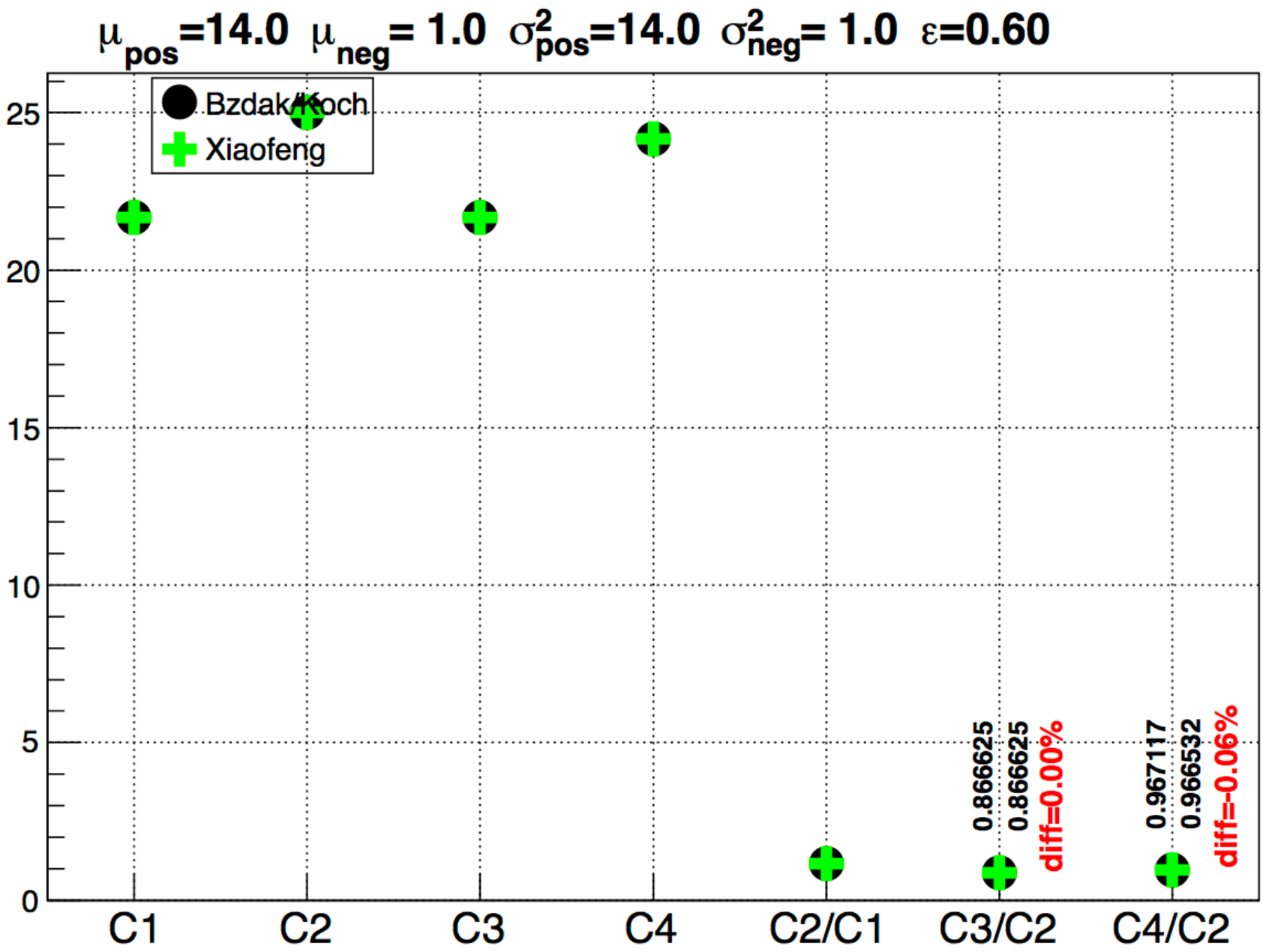
Standalone-application

requires GNU gsl & MathMore library

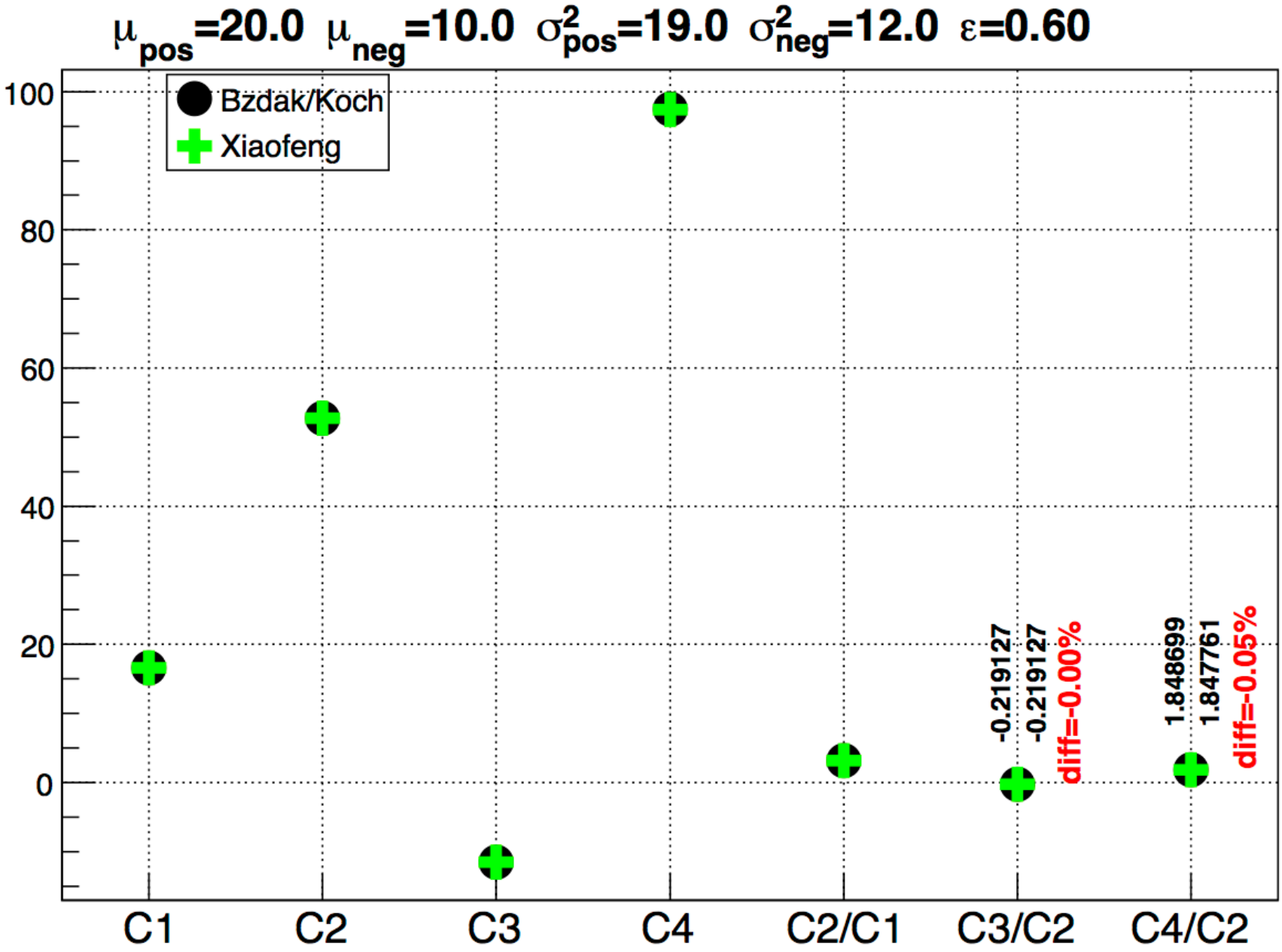
generates 10M events in ~21 sec…

…So, I ran the code for lots of different
(~net-p & ~net-q) parameter sets…

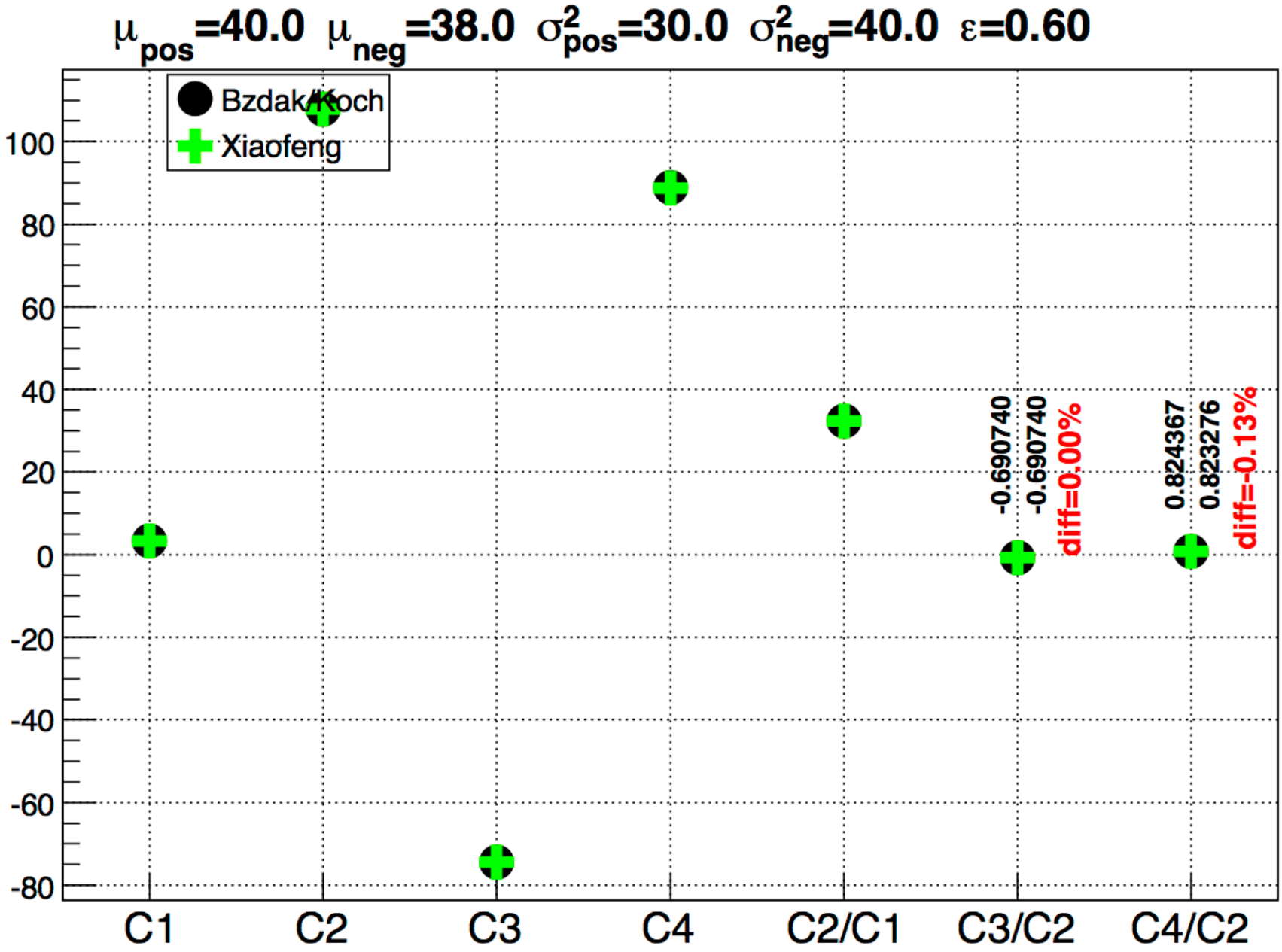
effcheck results…



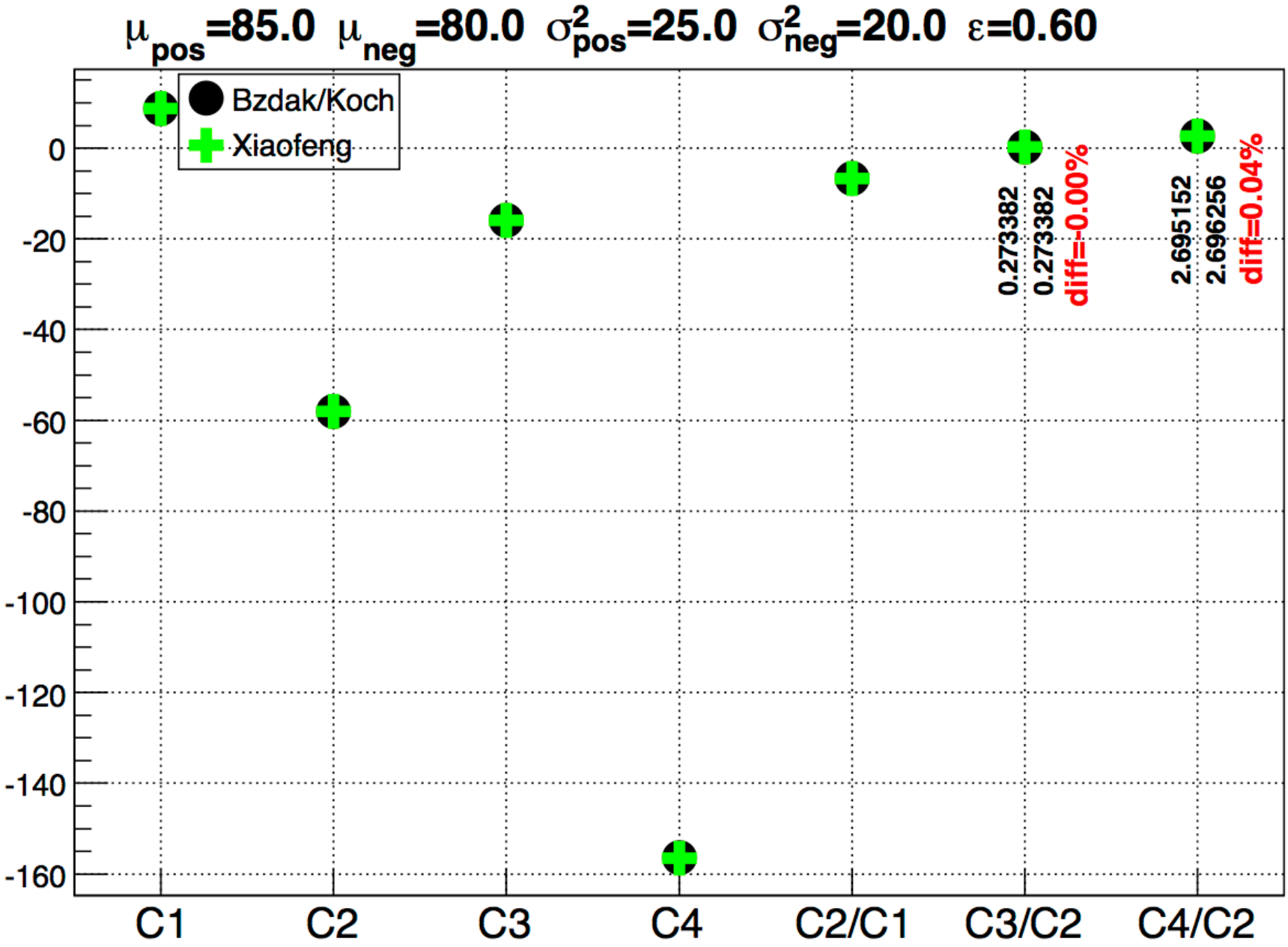
effcheck results…



effcheck results…



effcheck results…



Summary

Sampled singles divergences are more prevalent in the nihar data than in the dmac data.
Certainly appears to be stronger low-mult tails in the nihar data.

The moments products are not that different though.

- we should cross-check the bad-event 2D cuts used in the two analyses…
- TOF-filtered net-q analysis?

Standalone simulation performed that shows that the Bzdak/Koch equations and Xiaofeng's equations for the efficiency corrections are equivalent for arbitrary multiplicity distributions and efficiency values…

Note that the use of BD/P/NBD base distributions in this code forces Npos and Nneg to be uncorrelated random variables