BEMC centrality

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bulkcorr PWG meeting

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Standard centrality definitions are based on refmult cuts (Ntracks $|\eta|<0.5$)

"higher moments" analyses make a centrality selection then proceed to calculate the moments of the distributions of the E-by-E multiplicity of specific particles or multiplicity differences.

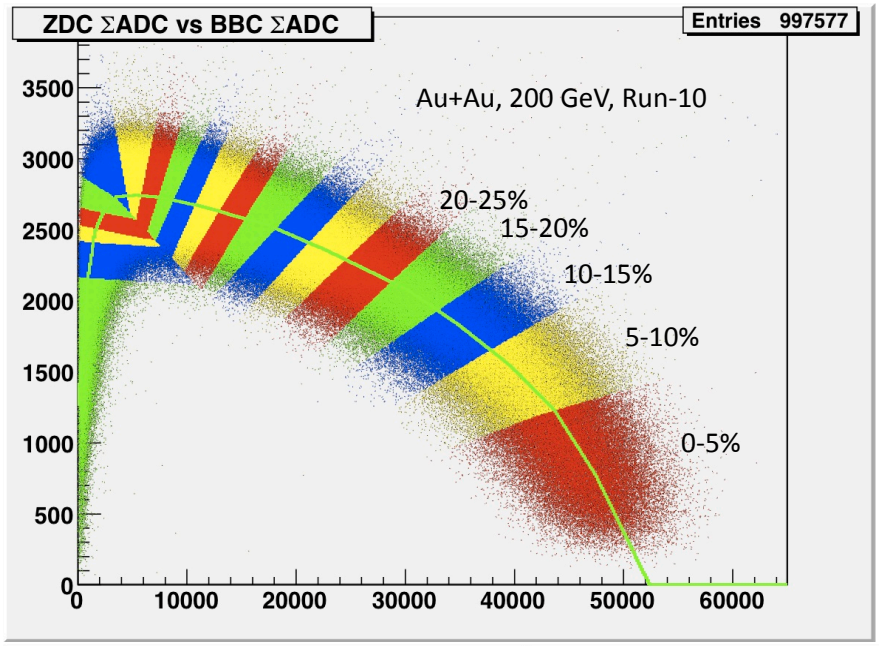
Note: these moments are not "central moments" so K,S moments are sensitive to the mean values of the multiplicities.

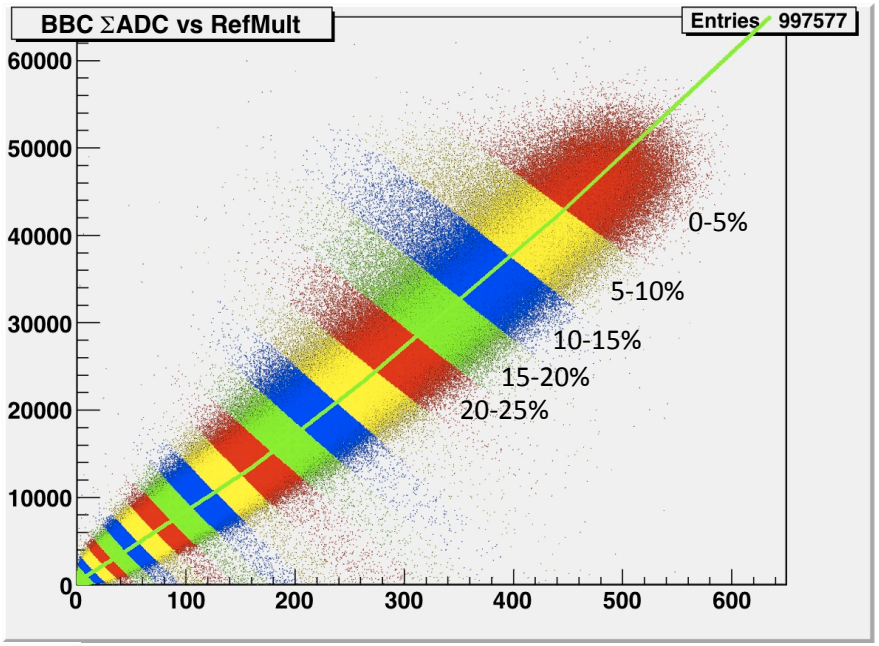
Autocorrelation between the centrality selection and the K,S moments values?

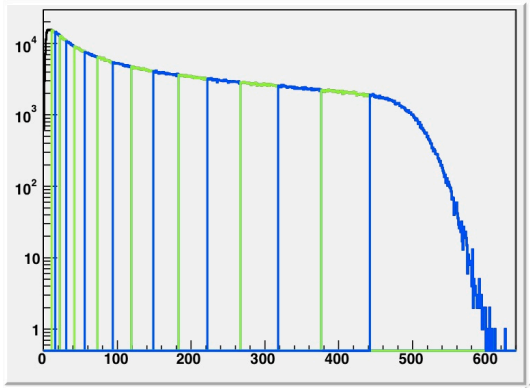
e.g. Nihar & Lizhu define "refmult2" ($0.5<|\eta|<1.0$) for centrality and then calculate the moments in the range $|\eta|<0.5$.

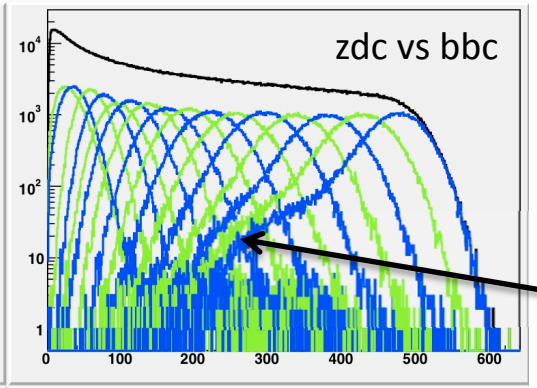
Refmult/BBC/ZDC correlations explored in previous bulkcorr presentation

http://wjllope.rice.edu/fluct/protected/cent_slides_20110817.pdf

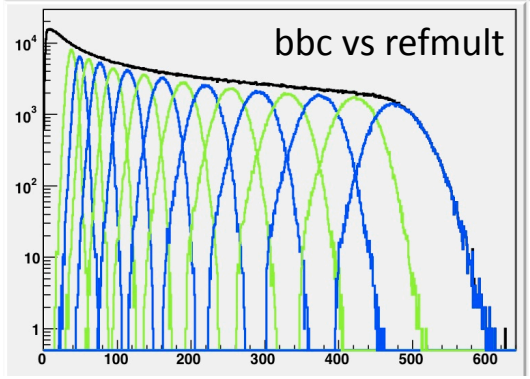








low-refmult tails = problem!



Problems with ZDC vs BBC and BBC vs refmult cuts:

1. No ZDC at low root-s, BBC full of background
2. Tails in the variable distributions for most central events
3. If refmult involved, still susceptible to autocorrelations

So we need something else

- eta gap, *e.g.* refmult2 or FTPC... (not lots of data for FTPC – too slow)

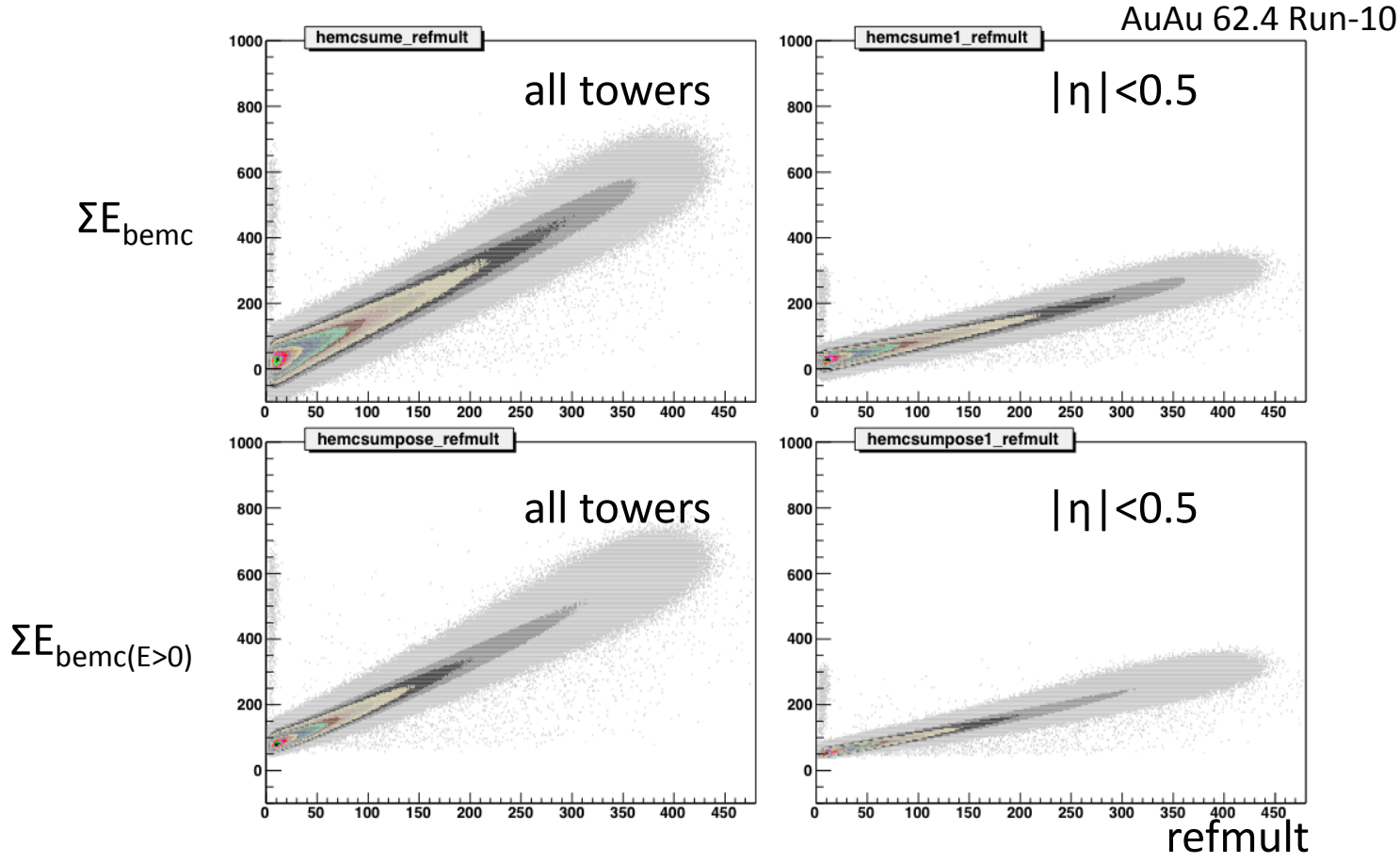
OR

- same acceptance as TPC but different detector & particles...

BEMC: not very sensitive to h±, but large signals for gamma's from π^0... ($N\gamma \approx N_h$)

Wide coverage...

Tower info exists for all root-s values...



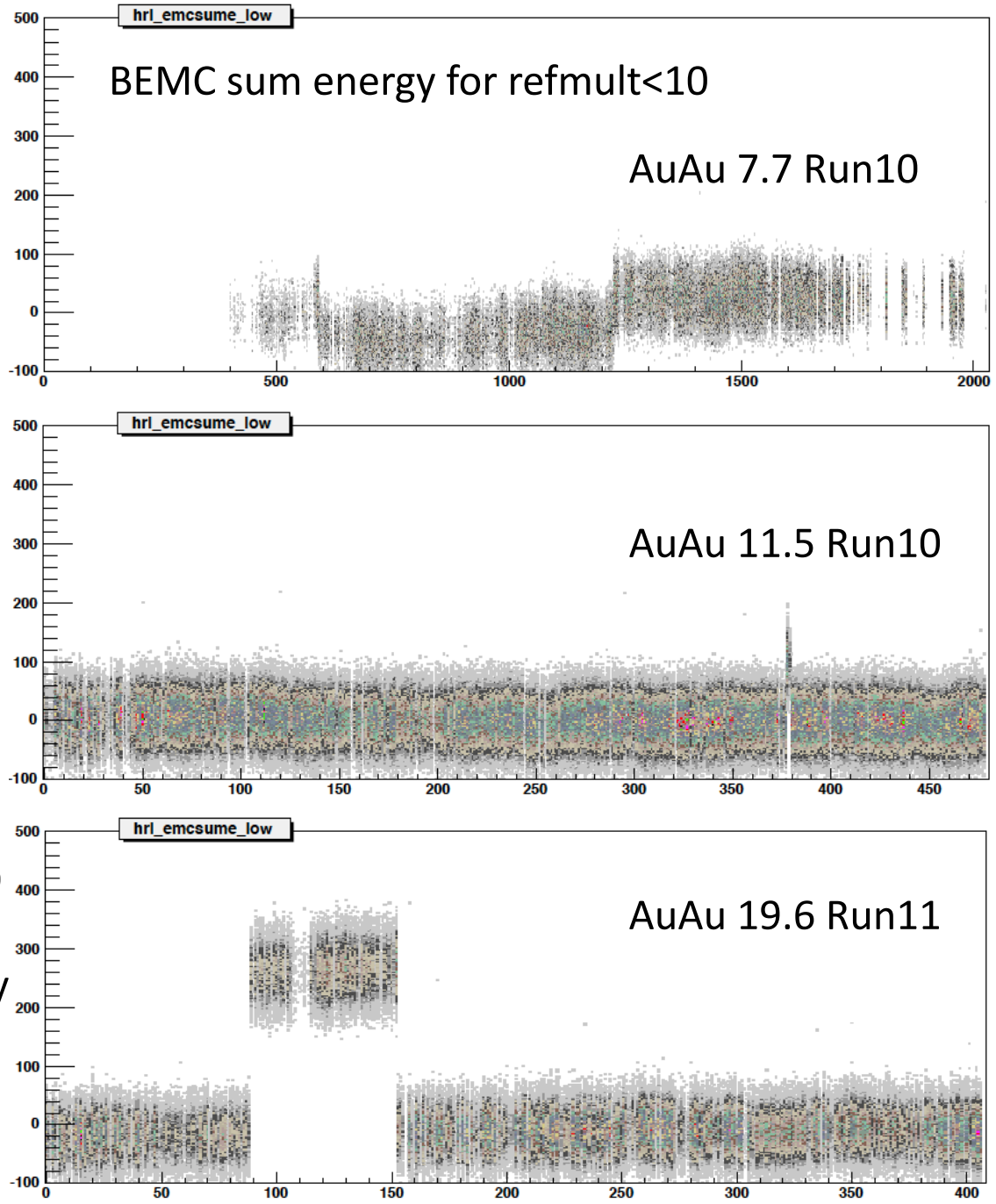
Problem though:
BEMC tower calibration in
BES data is not very good....

done by fill in p+p and AuAu200,
otherwise ~once/week.... (J. Stevens)

Tens of GeV shifts in 7.7 & 11.5
~300 GeV shift in 19.6
(no huge jumps in 39 and 62.4)

Not only this, but the sumE
pedestal is really wide (tens of GeV)

I can see tower pedestals moving by
~10-20 MeV/ch in different runs
across the entire BEMC



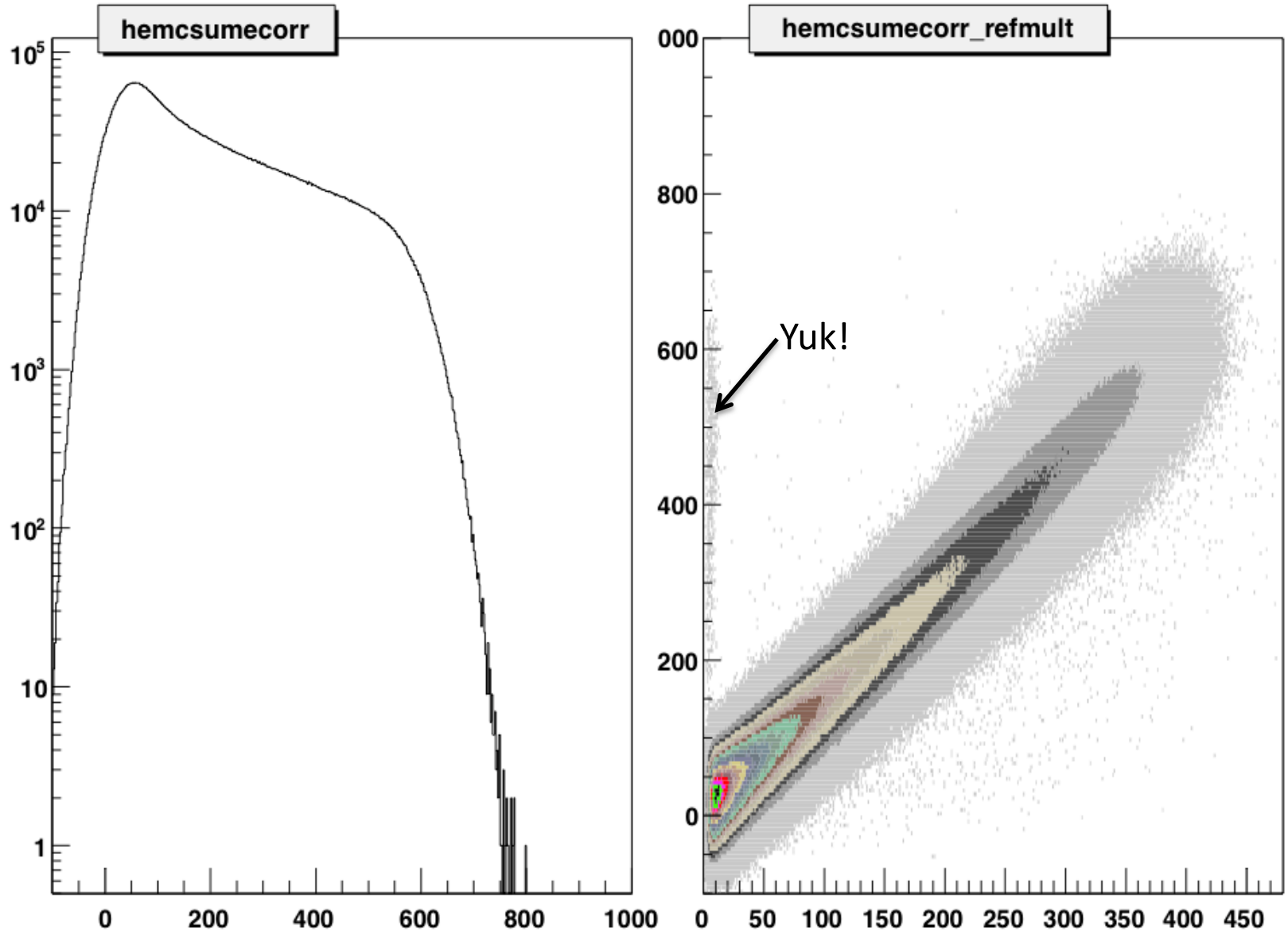
At the moment, I am shifting the pedestals for the big shifts
and leaving the gains alone...

This is not enough....

to do this right, we really need updated BEMC tower peds/gains....

```
//-------------------------------------------------------------
Float_t aread::GetBEMCsumE(){
    float   sume= emcsume;
    if (kDataSet==19){                              // 7.7 GeV Run-10
        if (runid<=11124063){ sume +=   -1.43; } else
        if (runid<=11135075){ sume +=   35.36; } else
                            { sume +=  -25.98; }
    } else if (kDataSet==20){                 // 11.5 GeV Run-10
        if (runid==11156007){ sume += -100.2;  }
        if (runid==11156008){ sume += -100.2;  }
    } else if (kDataSet==23){                 // 19.6 GeV Run-11
        if (runid<=12114114){ sume +=   15.90; } else
        if (iday <=  115   ){ sume += -265.40; } else
        if (iday >   115   ){ sume +=    8.95; }
    }
    return  sume;
}
```

Pushing on anyway for 62.4 (no big pedestal jumps seen)

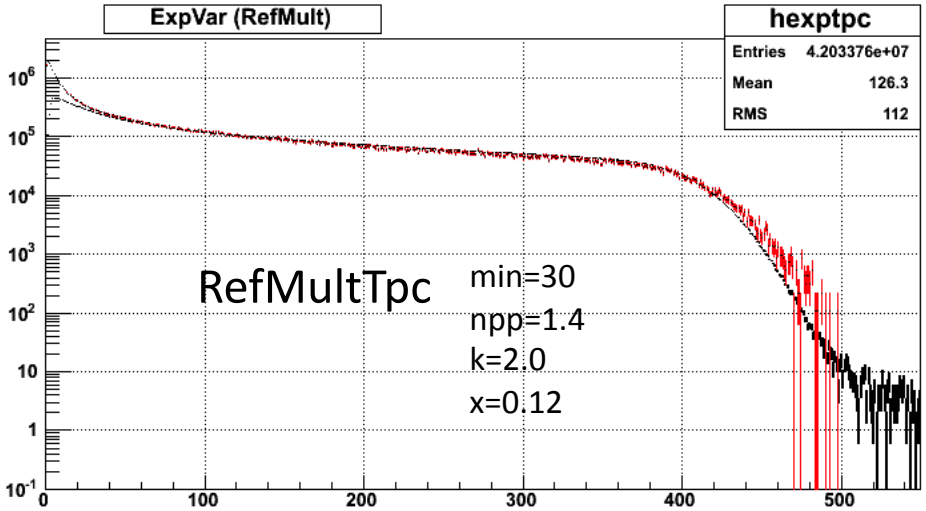


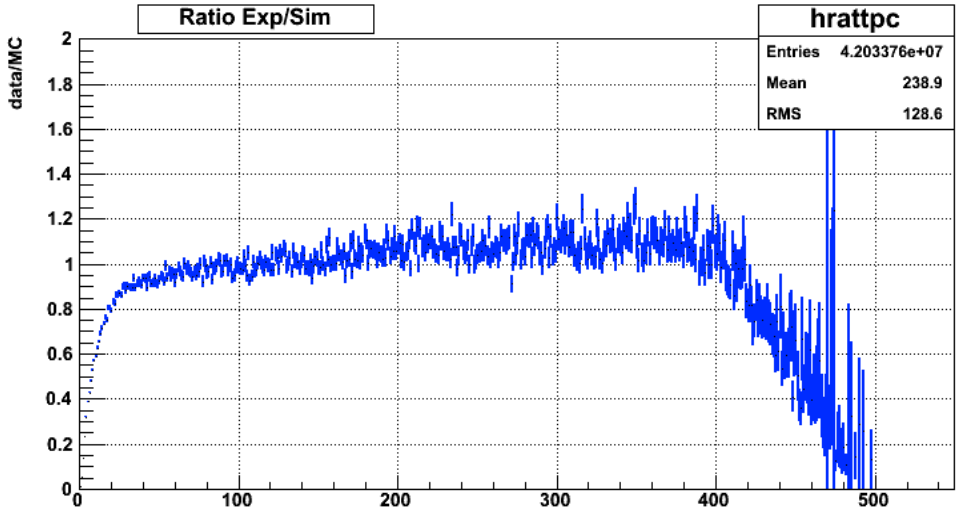
Run Hisoshi's Glauber codes *(thanks Hiroshi!)*

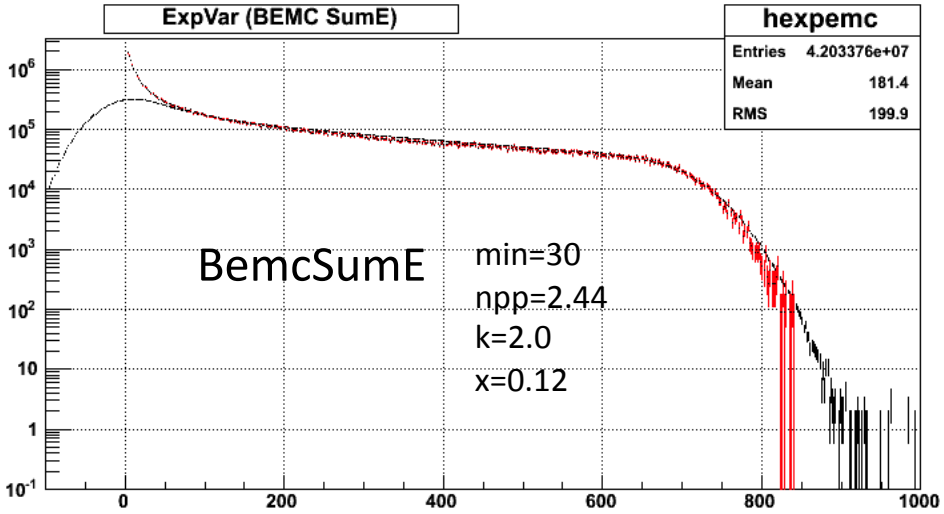
500k fast glauber events: Npart vs Ncoll

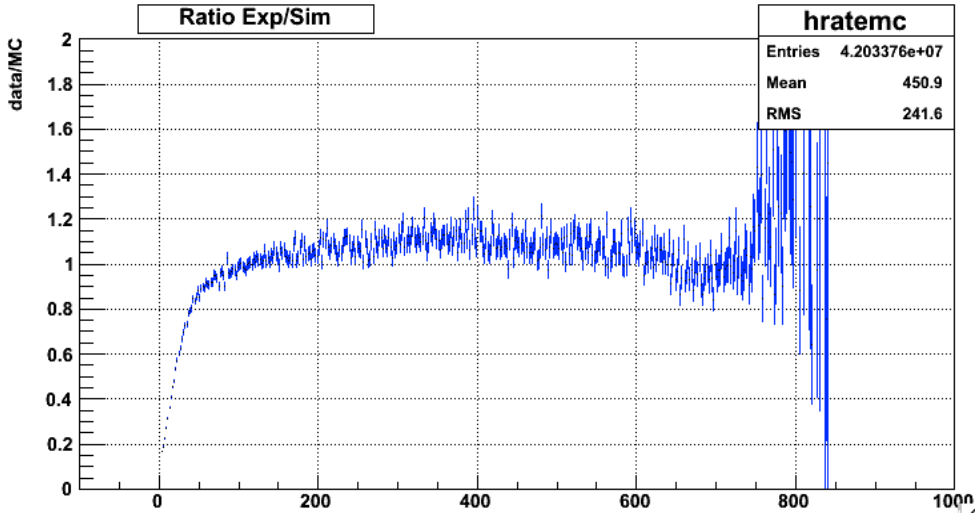
then "scan" in NbdFitMaker to find (npp,k,x) parameters

unlike for refmult, now npp is just a pure fitting parameter









This is just the very first try – probably can be improved.....

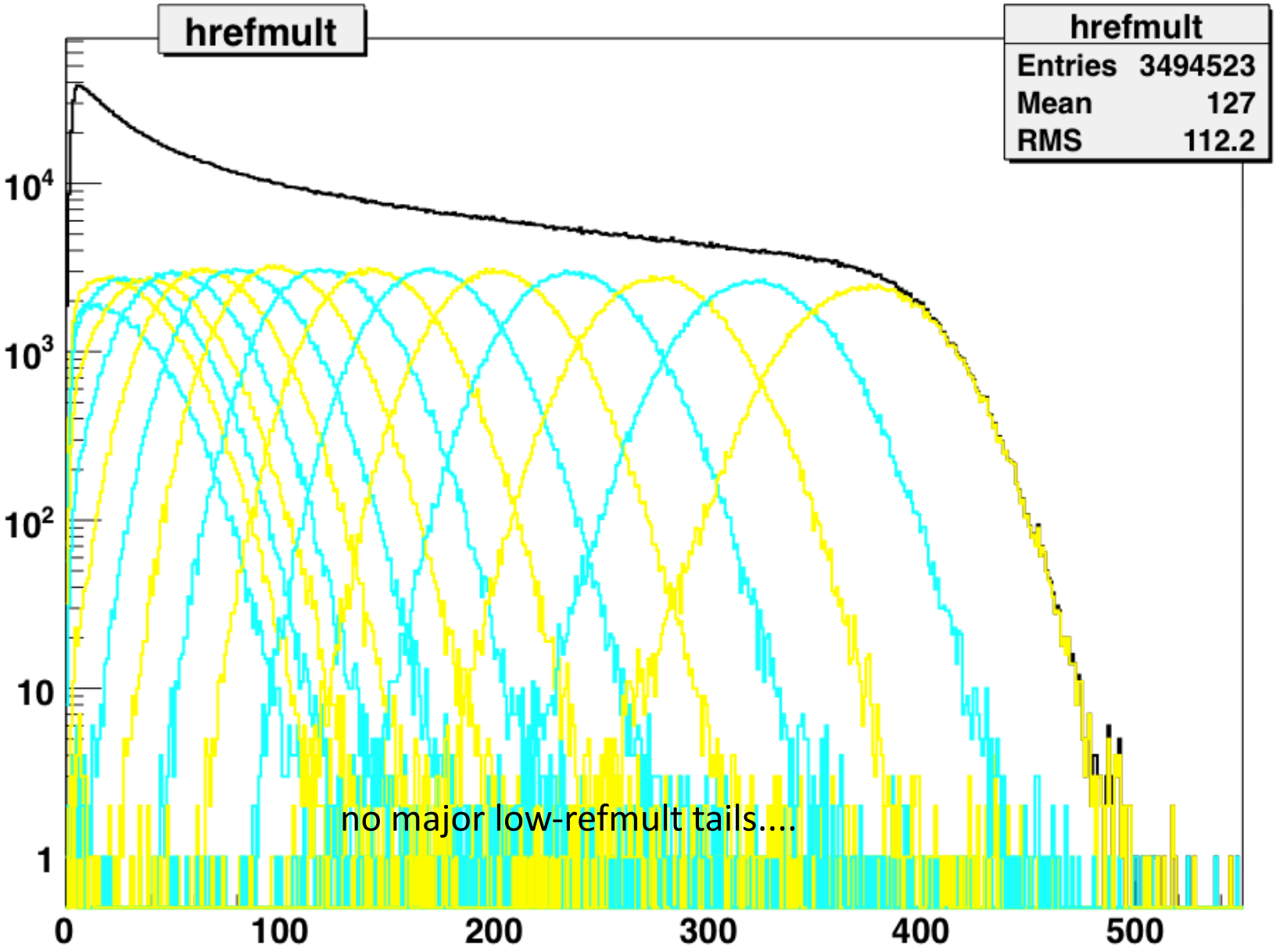
Resulting Cuts (by integrating the sim spectrum)

AuAu 62.4 Run-10

Centrality (%)	RefMultTpc	BemcSumE (GeV)
75-80	23	17
70-75	30	23
65-70	38	33
60-65	47	45
55-60	57	59
50-55	70	77
45-50	84	99
40-45	101	125
35-40	119	157
30-35	140	193
25-30	164	235
20-25	192	285
15-20	224	343
10-15	260	413
5-10	301	493
0-5	351	591

again, this is just the first stab – do not use these cuts yourself!

Refmult following BemcSumE centrality selection



Method seems promising, but we really need improved tower calibrations to proceed