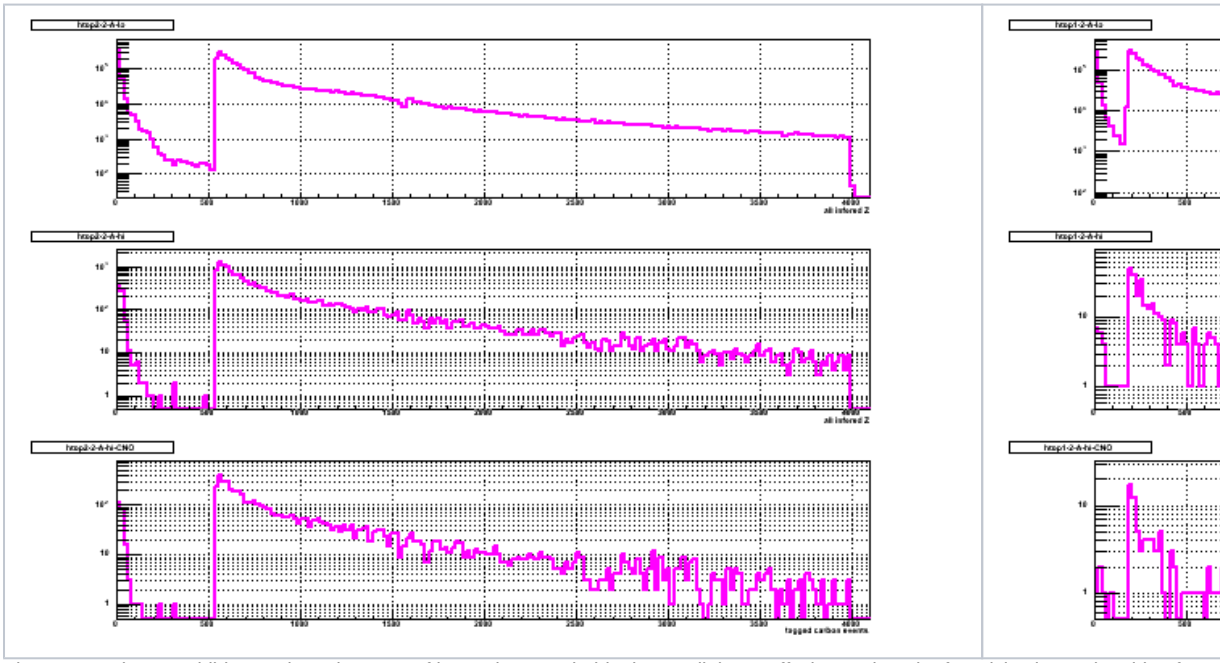
25 Mar 08 GCR Meeting Notes

- NRL
  - Current status of Threshold calibrations (Zach, Sasha)
  - Very rough draft of GCR calibration procedures (Mark)
- LPTA
  - Can GCRcalib help to calibrate ACD HI charge scale? (Fred)
    I modified the code I used to analyse the GCR events in opssim2 data, and added the reading of digi events (now it reads merit, gcr and digi files). I obtained the spectrum of each PM of each tile when GCRcalib is able to infer a value for the atomic number Z. The plots below show the low-range and high-range spectrum (top and medium plots, resp.) for all species, and the high-range spectrum for events tagged as carbons (bottom plots). This is for the PMT A of the central tile at the top of the ACD (left panel) and of the central tile (2nd row, 3rd column) of an ACD side (right panel). The collection time is 43h.

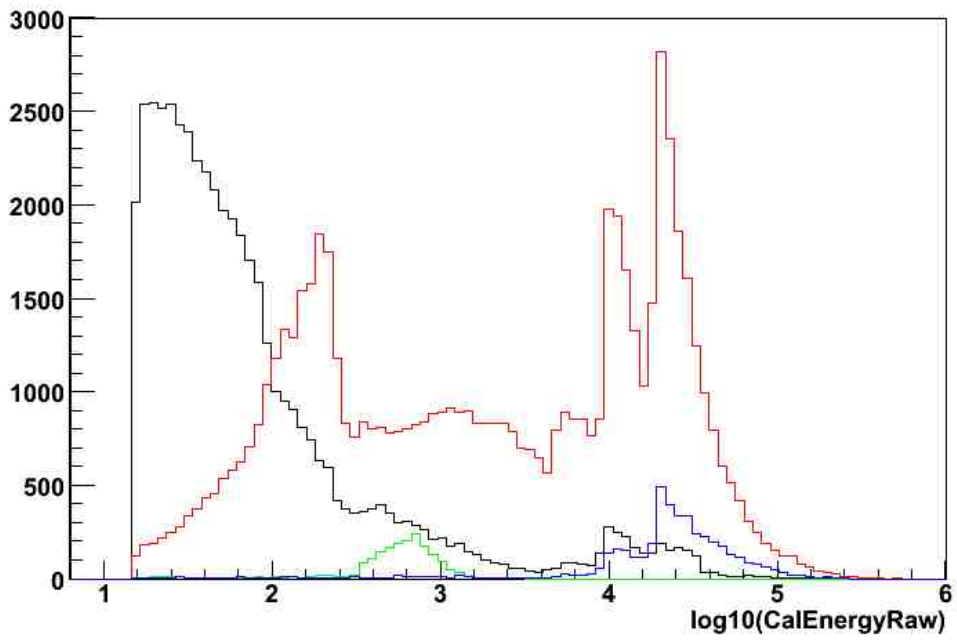


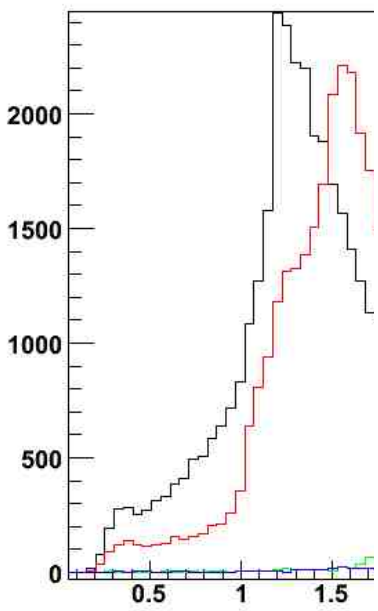
    The spectra do not exhibit any clear signature of heavy ions, probably due to all the "stuff where a bunch of particles leave the side of the ACD and cause a pile up of charge" (E. charles), especially in high-energy events. So the next step will be to correlate these results with AcdTrkHitPoca in ACD recon, in order to only keep the hits which have a suitable DOCA to Tkr1 track.
  - Including protons and heliums in GCRcalib throughput (Johann)
    In order to evaluate the possibilities to extract protons and He for use in GCRCalib, we looked at the various OBF trigger rates, using ~881 sec. from the BigRun simulations (id est ~440 merit files). The resulting table shows the rate of EM (e+/e-/gamma), Protons, Helium, and Ions (Z>2) events passing each filters and each pair of filters:

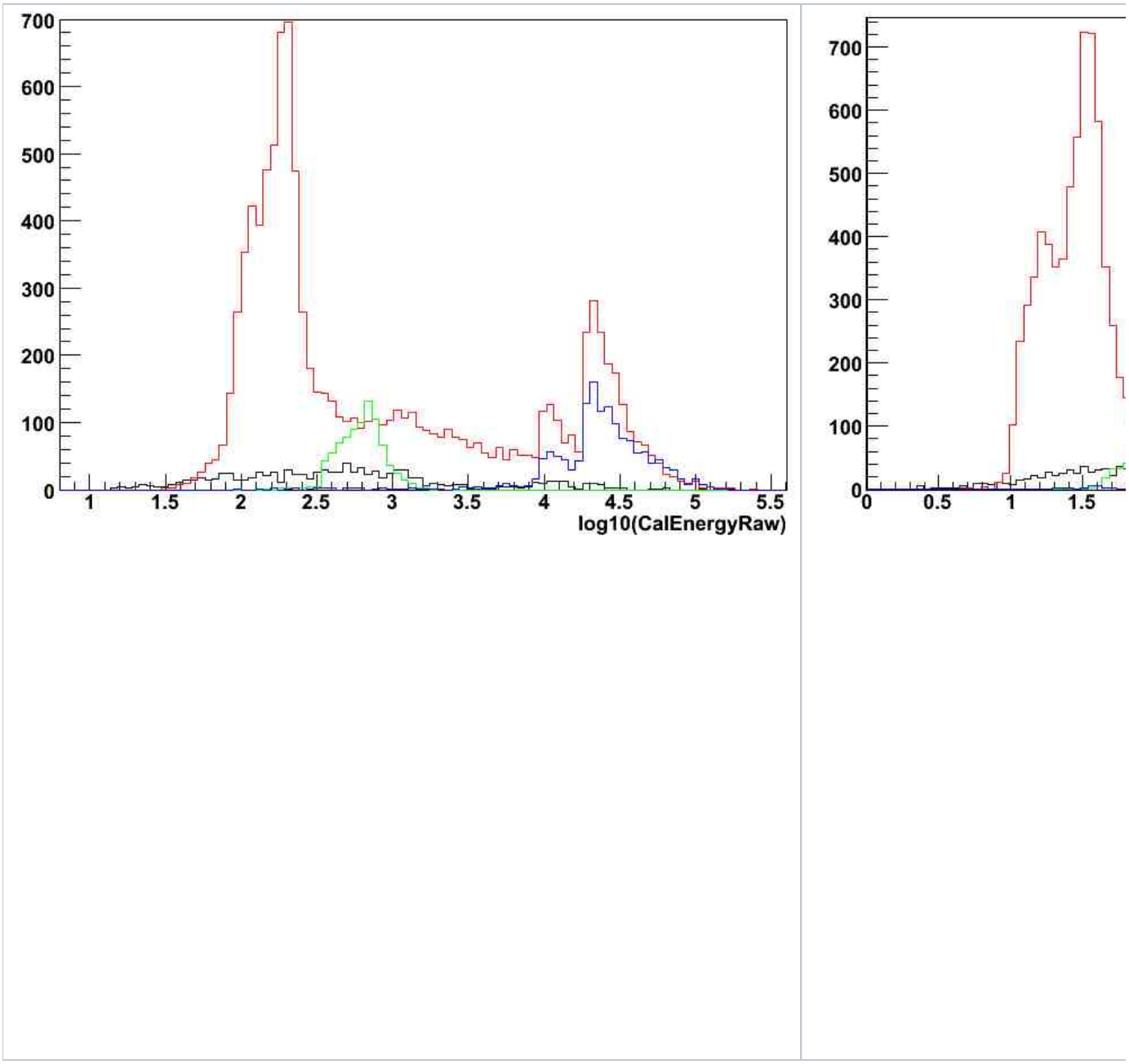
em p He ions	GAM	HFC	DFC	MIP
GAM	306.82 95.66 2.82 6	0 0 0 0.23	1.55 0.41 0.01 0.03	0.25 0.43 0 0.01
HFC		0 0.55 0.01 2.24	0 0.01 0 0.01	0 0 0 0
DFC			19.52 13.74 1.85 0.35	0.2 1.13 0 0
MIP				0.45 1.55 0 0.01

Thus, it seems natural to concentrate on GAM and DFC filters, which do not share many events and so could be added in principle. For these 2 filters, we looked at the distribution of events for 2 set of cuts: **a)Top** CalEnergyRaw>15&&TkrNumTracks>0, and **b)Bottom** same plus abs(1-CalELayer0/CalELayer1)<0.3&&abs(1-CalELayer2/CalELayer1)<0.3 . **The color code is : em, protons***,* **helium***,* **ions**. The results are:

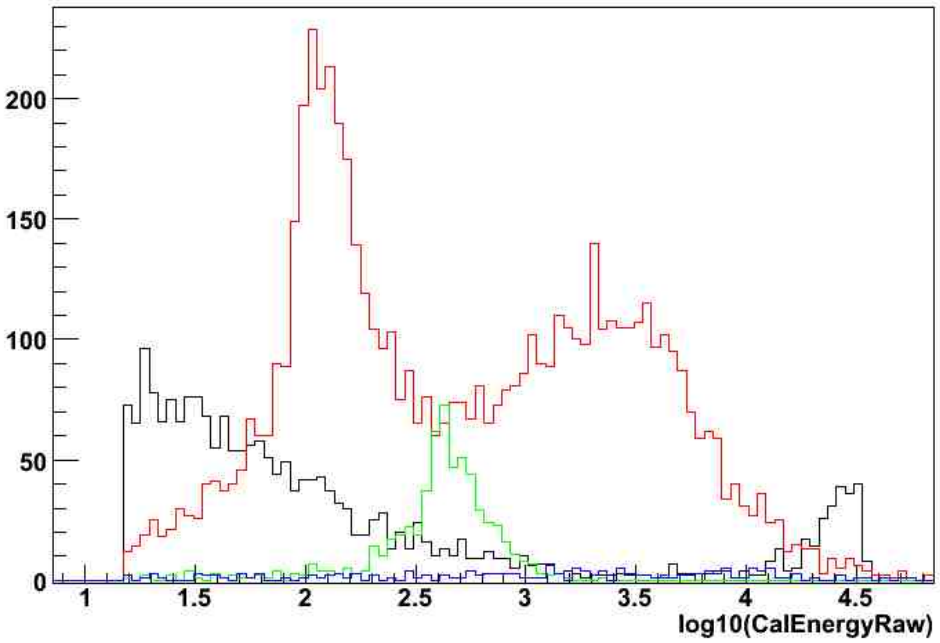
For GAM filter :

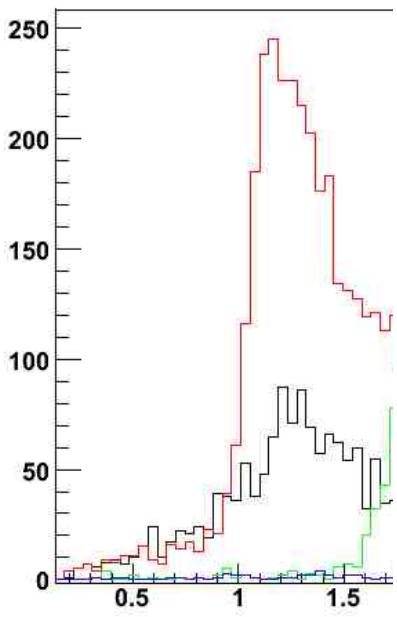

3000
2500
2000
1500
1000
500
0
1
2
3
4
5
6
log10(CalEnergyRaw)

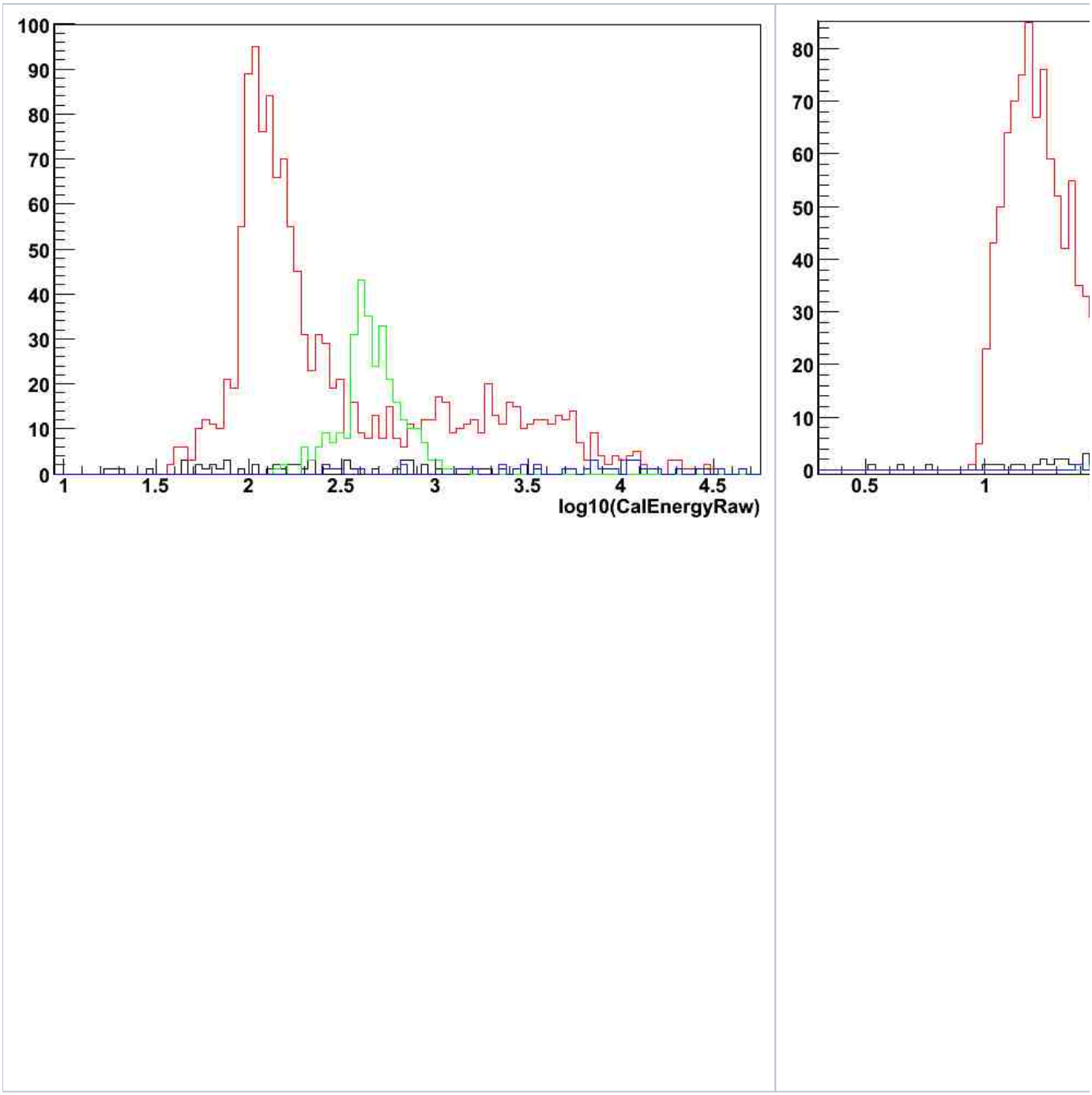

2000
1500
1000
500
0
0.5
1
1.5



For DFC filter :

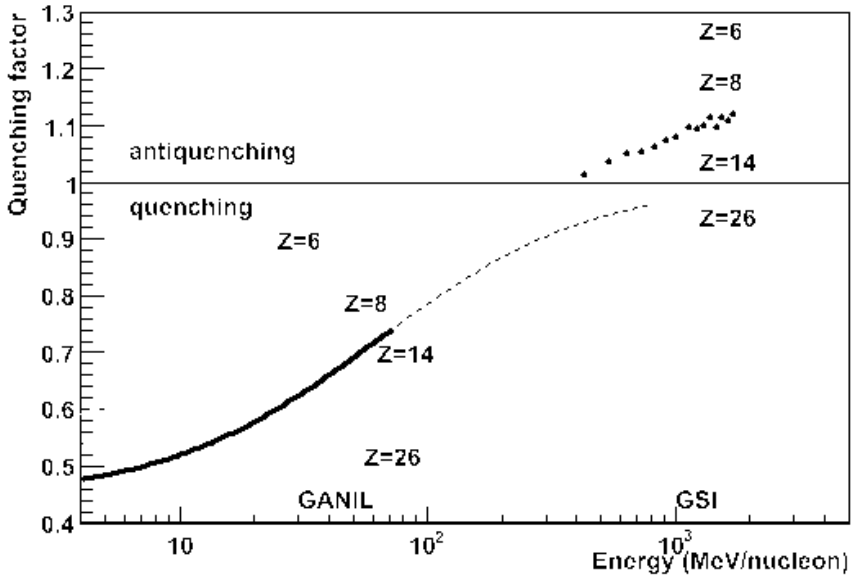

200
150
100
50
0
1
1.5
2
2.5
3
3.5
4
4.5
log10(CalEnergyRaw)


250
200
150
100
50
0
0.5
1
1.5



One can see that the energy ratio cuts do the expected job at removing the e+- and gammas. On the other hand, these cuts strongly affect the rate of He events. We propose that these cuts be
not applied until after the GCR reconstruction, in order to make use of the path-length-corrected energies, which should narrow the spectra.

- - Quenching models for Gleam (Fred)
    I played with the ROOT macro that Benoit used to get figure 11 of the GSI paper. This figure is reproduced below, where I extrapolated the dL/dE curves (proposed by Parlog et al., and fitted to GANIL results) to the highest energies.



As can be seen, the quenching values measured at GSI are in good agreement with the theoretical curves for iron, but not for the lightest ions where antiquenching effect is important. The plan is now to modify these curves so that they reach a plateau for carbon above ~700 MeV/n, and see the effect of this rescaling for all species. In this work I will add all meaningful measurements available (at 1.0GeV/n and 1.7GeV/n).

- SLAC
  - BT electrons (Yvonnepdf ppt)