DAS DET DEV Note April 14, 2003
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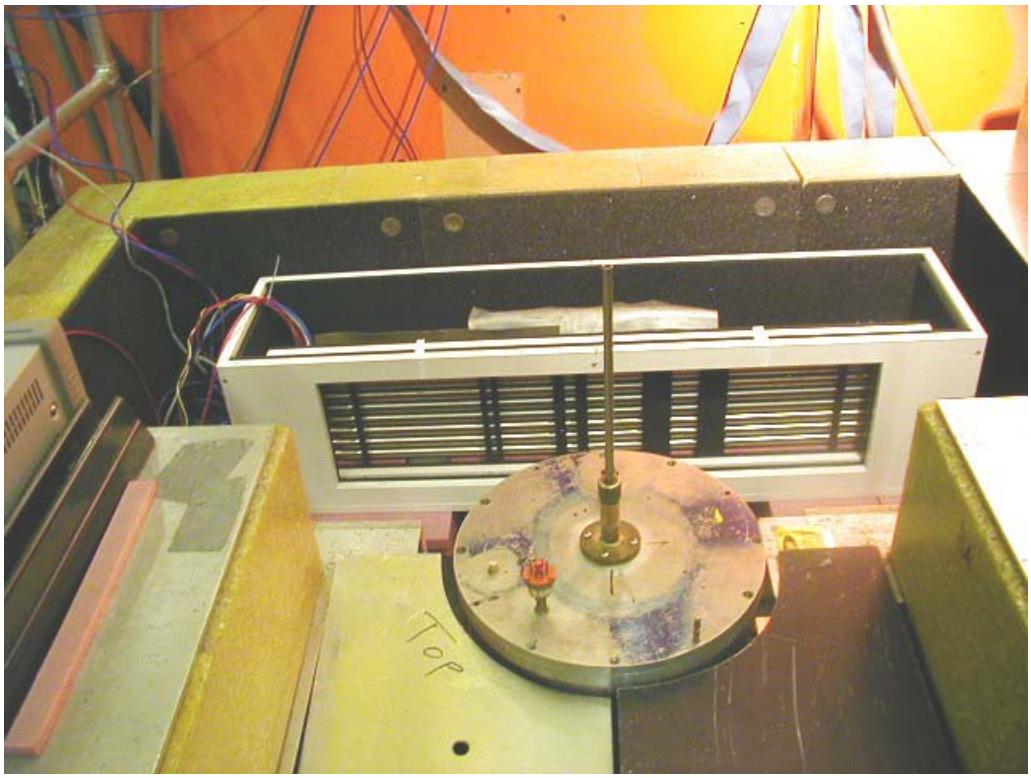
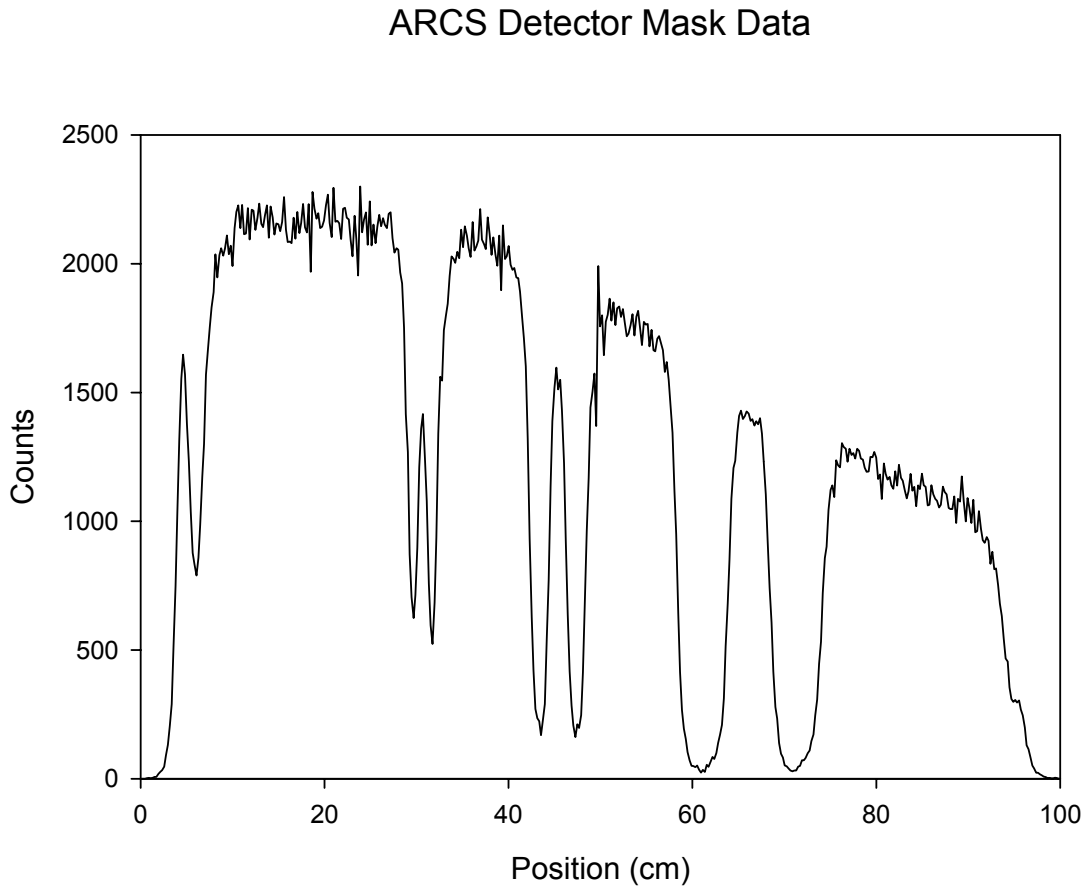
We completed some resolution measurements for LPSDs on the QUIP beam line at IPNS. The LPSDs were 101-cm-long with a 97-cm active length. The tube diameter was 2.54 cm, and the ^{3}He partial pressure was 10 atmospheres.

The resolution measurements were made using a special mask with 5-cm, 2-cm, and 1-cm wide absorbers. These absorbers allowed us to calculate the modulation transfer function for these tubes. The absorbers are shown in the following picture. There was a 1-cm-wide absorber 4-cm from each end of the active length, a 1-cm doublet with a 1-cm gap, a 2-cm doublet with a 2-cm gap, and a 5-cm doublet with a 5-cm gap. During the measurements the 1-cm doublet was 90 degrees from the beam to minimize parallax. This compromised the data for the 1-cm absorber that was farthest away from the doublet.



The next figure shows a histogram of counts vs. position for the tube on electronics channel 1 at 2000V. As can be seen, the absorbers are easily resolved.

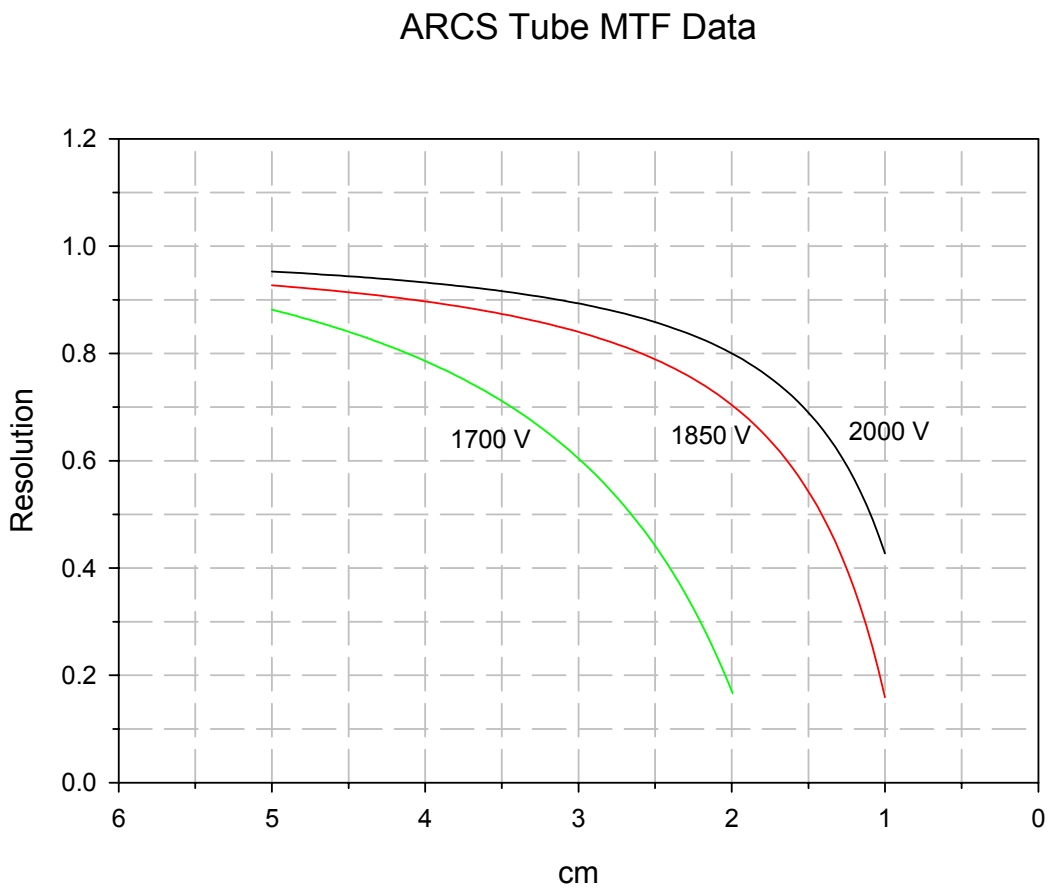


Calculating the MTF using peak-trough/ peak + trough we get the following results. This was for the tube on electronics channel 1. For these data the pulse integrals were sampled at 1 μs and there were no base line corrections.

Absorber (cm)	1700 V	1850 V	2000 V
1	Unresolved	0.16	0.43
2	0.18	0.70	0.79
5	0.88	0.93	0.96

Fits to these data are shown below. The same function was used to fit the 1700V data but only two points were resolvable and the shape is questionable. If we were to repeat this measurement we would use triplets instead of doublets and include a 3-cm absorber triplet to improve the fit.

As you can see the 50% resolution levels are at 2.7 cm, 1.4 cm, and 1.2 cm for 1700, 1850, and 2000V respectively.



These data show that 1.5-cm resolution is achievable at 1,850 V, which is important because the rate capability of a tube decreases with increasing bias voltage. The next step will be to collect data with baseline corrections and to measure the tube rate capability as a function of voltage. The instrument scientists will then be able to optimize the performance of the tubes for their application.