# Jan 25th

### Background data and dead time

The background data that has been collecting since 5:00 pm was recorded and saved. Every test to this point has had a dead time of over 99% but the data has been clearly collecting for more than that due to very high counts. There is clearly something wrong with the calculation of live time. The computer was restarted, which had no effect. The issue is likely to do with the program because it is clearly counting more than the recorded live time suggests. On an inactive port the program recorded no data (as expected) and 0% dead time. With an inaccurate live time calculation it will not be possible to determine if pileup is occurring when testing with a source. Without an indication of pileup it is possible that all of the data collected with a source would be shifted to higher energies.

One theory is that the live time that is being shown is actually the dead time. The recorded live time for the background radiation was <<1% which would make sense if it was the dead time. Background events are much less frequent and spread out than with a source so there should be a very small dead time.

If the displayed live time is in fact the dead time, it should be much higher with a source than with just background. To test this a highly active 22Na source was placed directly against the detector. As expected, the "live time" increased much faster leading us to conclude that it was in fact the dead time.

### Neutron source

The NaI detector was brought to the AmBe neutron source tank. The detector was placed in the tank for 5 minutes. The detector was place back in the lead casing in the lab. Data was recorded every 5 minutes for 25 minutes to determine the best activity to use. The rate of dead time noticeably decreased over time which is not surprising, considering the 25 minute half life of 128I.

### Simple data analysis

The files were transferred to a lab member's laptop for analysis in Excel and MATLAB. The bins of known peaks were recorded in Excel. A MATLAB script was started to determine the change in dead time and count rate between tests.

# Fab 6th