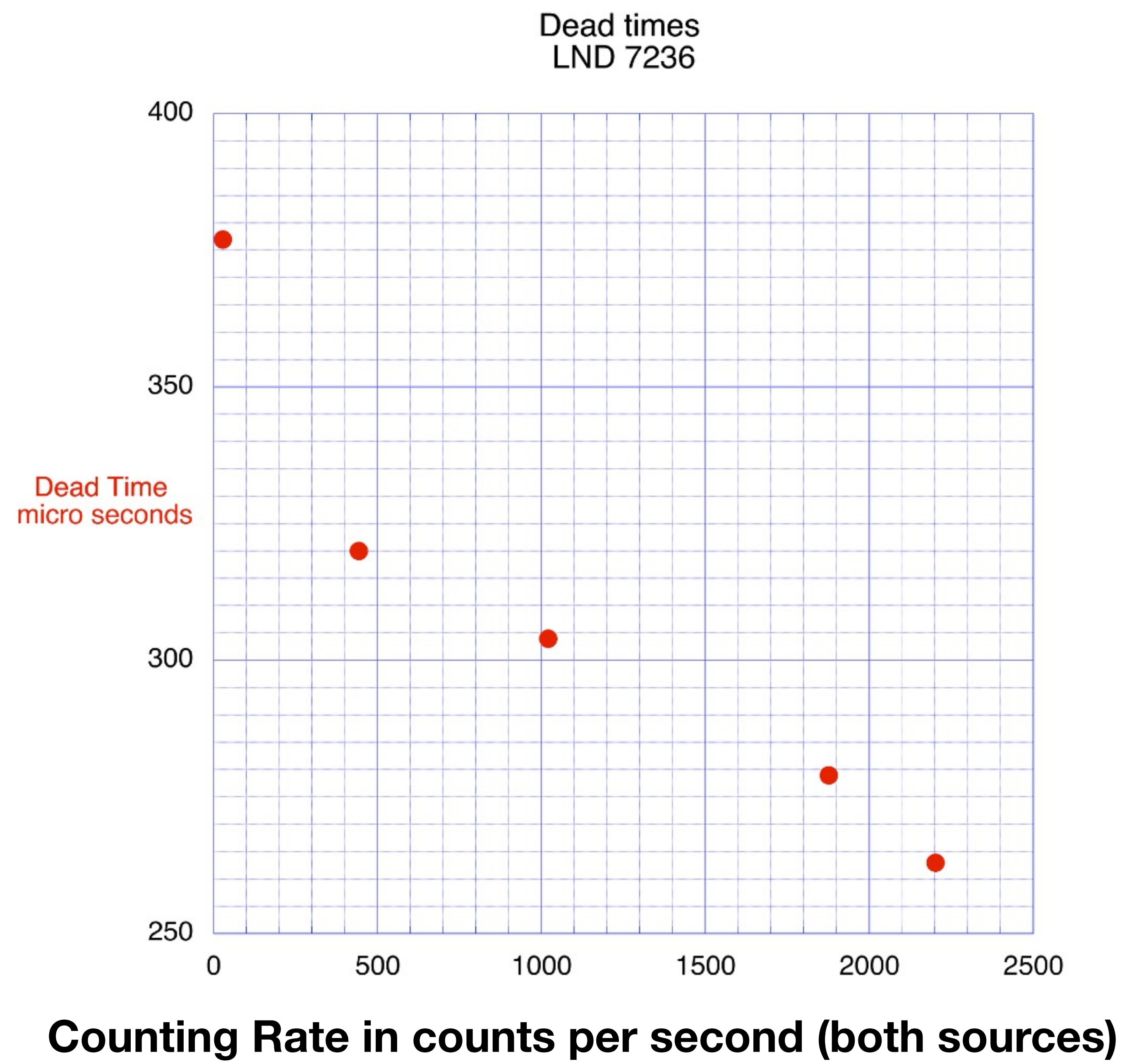
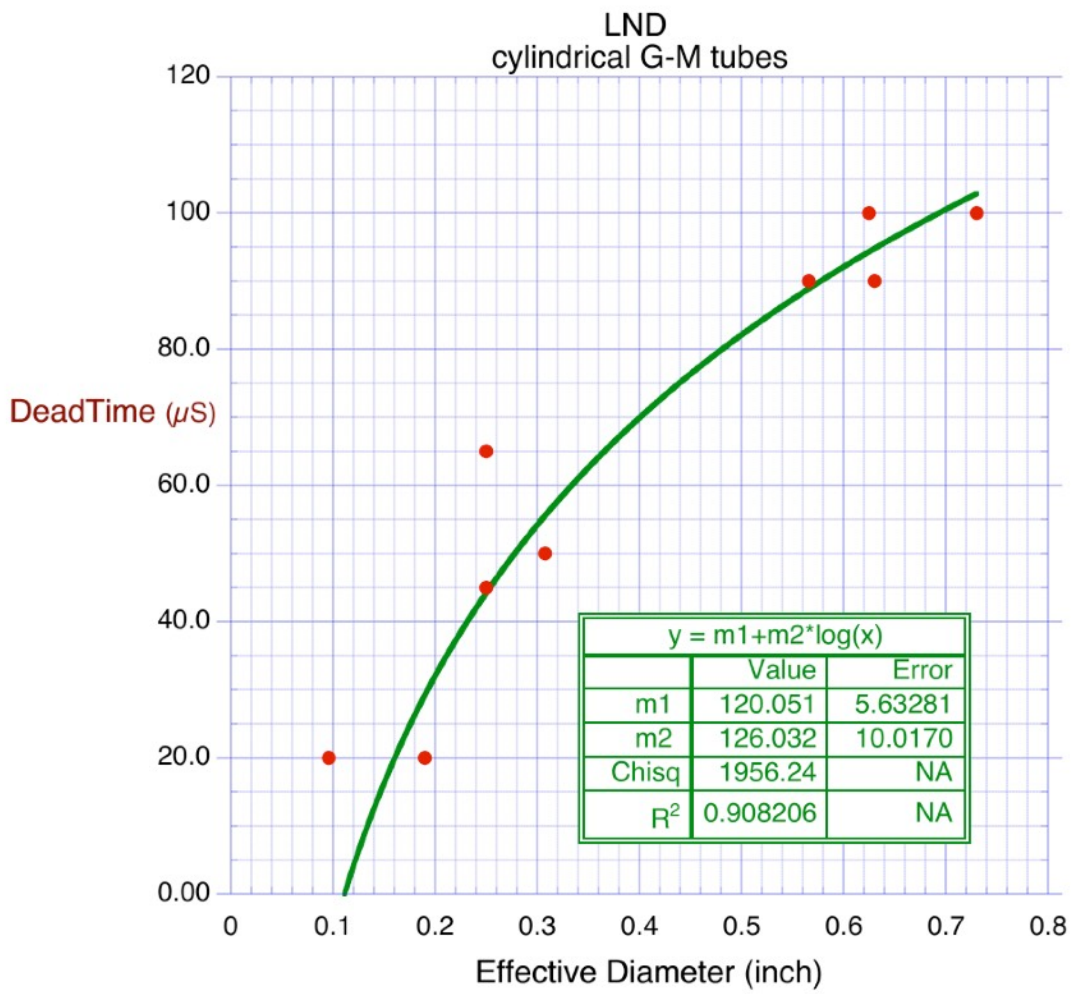
Dead Time in G-M Tubes revisited

The usual methods of measuring DT is oscilloscope observing the recovery, and using two approximately equal sources. In order to conveniently observe the recovery, a high counting rate is necessary. The two source method's accuracy is determined by the Poisson distribution, so again, necessarily, a large number of counts. As a result very few students and teachers discover that the DT is a function of counting rate. Since the majority of experiments involve a large rate variation (e.g. decay and attenuation by absorption), high accuracy demands measuring the variation.

Using the two source method I’ve found the DT of a typical lab. counter tube (LND 7236) over the range ~2200 => 17 counts per second.

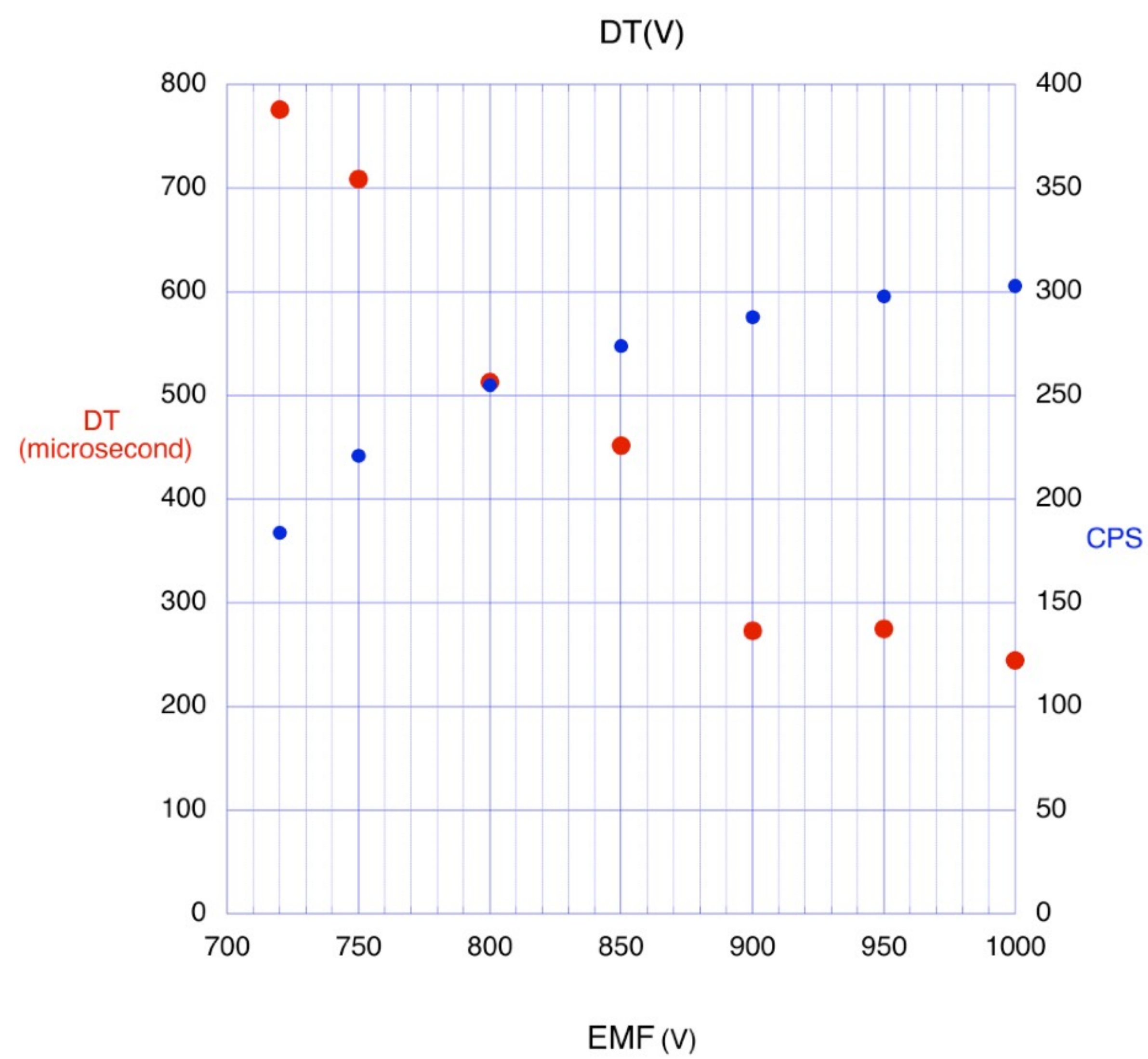


The cause of this change is revealed by data from LND of similar tubes of varying diameter.



LND catalog #6-81/1

Another effect, not usually examined, is the effect of the applied EMF. I measured the DT over the electrification range 720 => 1kV. Note the increased counting rate in the graph below. This is due to the increased pulse height with increased EMF.



If you have any questions, do write bernard@cleyet.org