General Evaluation of C-W bases

Eugene Chudakov (Hall D)
Fernando Barbosa (Fast Electronics Group)
Jack Segal (Hall A/C)

Advantages

❑ **No HV cables**. Helps if there is no space

❑ **High rate capability** without extra power lines for the last dynode

❑ **Lower manufacturing costs**. However, there are maintenance costs

Drawbacks

❑ **Noise is difficult to control**. CW bases are noisy by nature of their operating principle. This affects the trigger threshold

❑ **High failure rate**. As an example, hundreds of boards have been replaced in Hall D and they continue to fail - about 50-100 the last year.

❑ **Cost of strict assembly requirements or robust mechanical assembly exceeds any savings in labor**.

❑ **Limitations of industrial production**. Manufacturers have no experience for such high sensitive HV circuits

❑ **The LV power to the CWs and the controls requires considerable resources**.

Evaluation of NPS HV Base Designs

❑ **CW design requires more work**. Current reviews are primarily based on the circuit design and limited testing of the prototypes; extensive tests of many ready-for-production units is lacking; the full electrical and mechanical testing of the units is not considered; an engineering run of the ready-for-production units is mandatory. Using Arduino processors in a high radiation environment near the target is questionable

> ➤ The true cost of CW bases needs to consider the following: development costs (several iterations), cost of components (usually low), cost of fabrication with very strict cleaning and inspection requirements for assembly (military grade), conformal coating of HV components/PCB, extensive testing for electrical and mechanical performance, maintenance (replacement in the hall)

❑ **The Hall C NPS development has less than half the channels in the FCAL**. Given the low channel count, cost should not be a concern but reliability and low noise should, as this affects the trigger threshold level as well

❑ **Hamlet/Vladimir's active base is very attractive** and other active bases may be considered. Because these are available, full tests should be performed to determined the specification levels required at high rates (AC/DC coupling, shaping, etc.)

Conclusion: C-W implementation not recommended for NPS