TRIUMF nEXO SiPM Studies

Fabrice Retière
Carl Rethmeier
Lloyd James
Paul Lopes Gomes

August 10, 2015
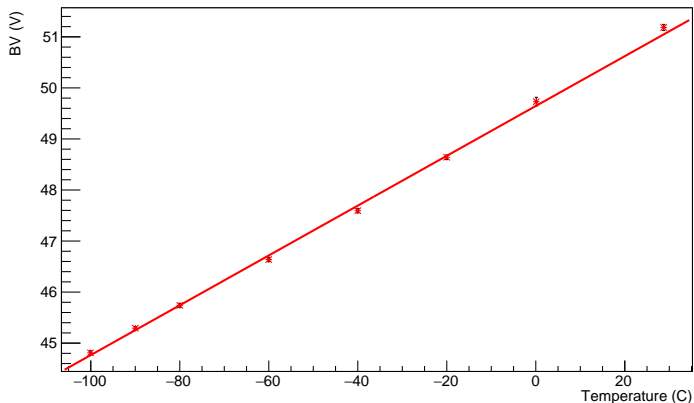
VUV3 Breakdown Voltage

Figure : Breakdown Voltage against Temperature for VUV3 device.
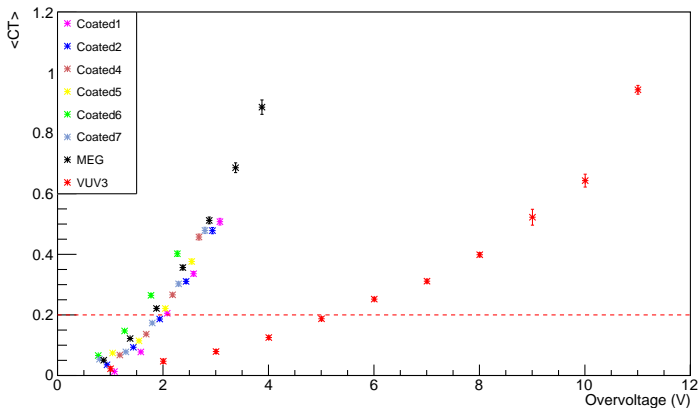
Cross-talk

Figure : Crosstalk rate against overvoltage for different devices.
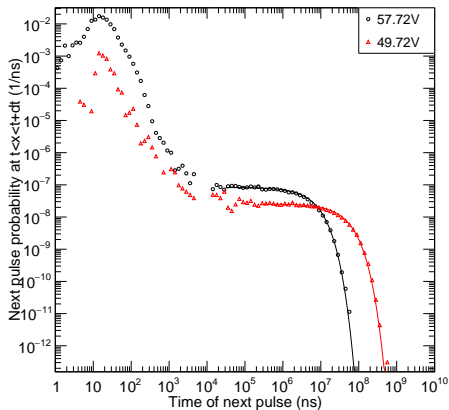
Delta-t Distribution

Figure : Delta-time distribution for VUV3 device. Fit params are : 49.72V - prob. 0 AP = 1; dark rate = 25.3Hz. 57.72V - prob. 0 AP = 0.48; dark rate = 173Hz.
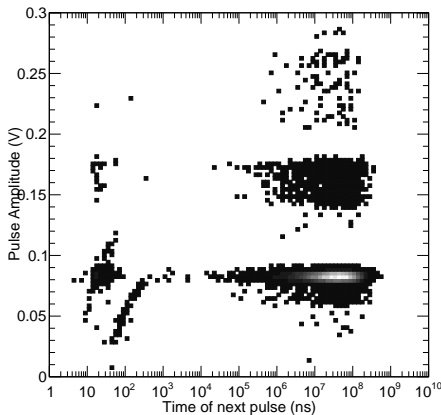
Pulse Amplitude vs Time - VUV3

Figure : Amplitude of pulses against the time between the pulse and the previous pulse.
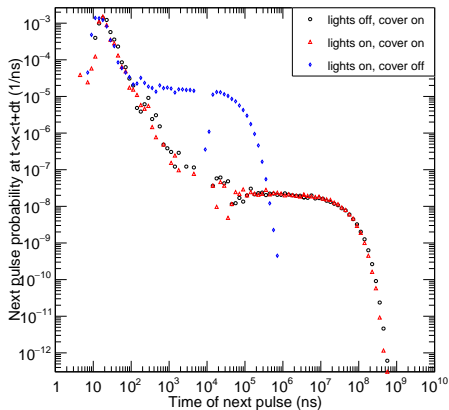
Light Leak

Figure : Delta-time distribution showing that while there is light leak into the box, with the steps taken to cover the box there is no longer a leak.

In determining the source of the inconsistency in PE measurements:

- It was determined that cooling was a factor, and we proceeded to test its connection with the beamsplitter. This was motivated by the anticorrelation has that been observed.
- Temperature sensors were installed in the setup to keep track of temperature at different places in the box.
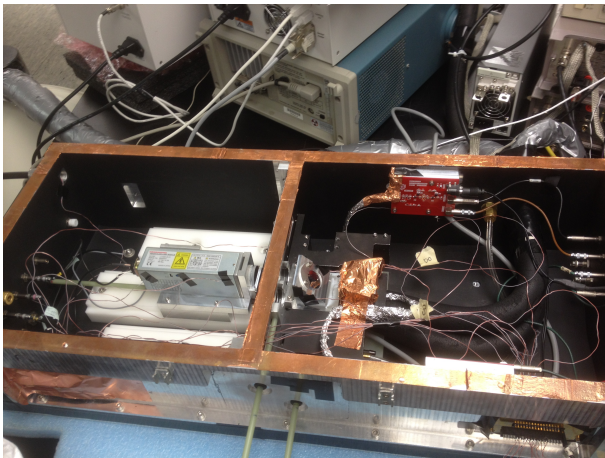
Temperature Sensors

Figure : 10 thermocouples were installed in various locations around the box so that temperature could be recorded in each location over time.
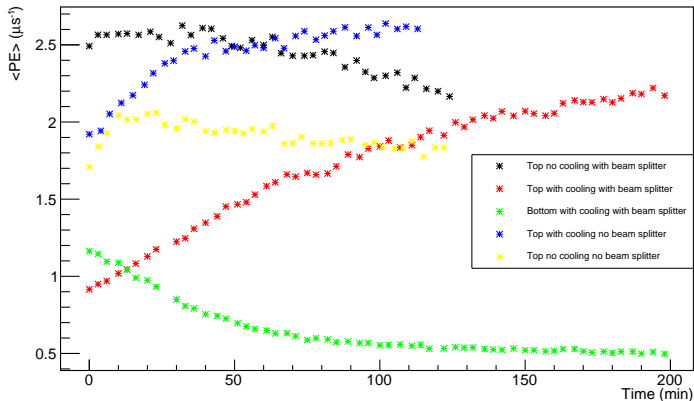
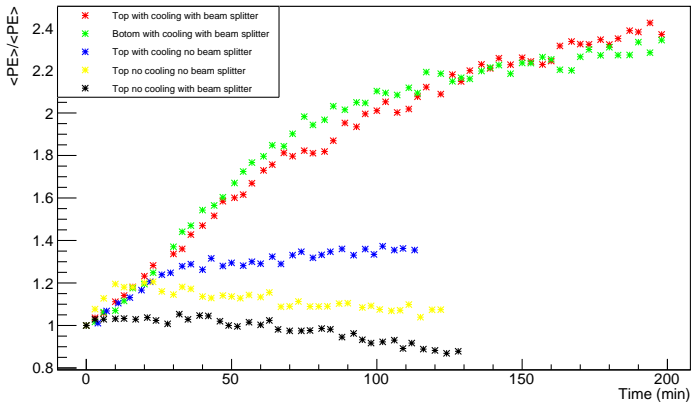Figure : PE variation over 200 minutes in different cooling conditions.

Lamp Troubleshooting

Figure : Variation of ratio of PE to initial PE over 200 minutes in different cooling conditions.

Automation

- Remote control of the power supply / picoammeter was implemented and interfaced with the scope DAQ software so that voltage scans can now be done automatically.

- Remote reading of temperature data from the 10 thermocouples was implemented so that temperature throughout the box can be continously monitored and recorded.