

SVT Status

Hall B Engineering Run

Detector Support Group

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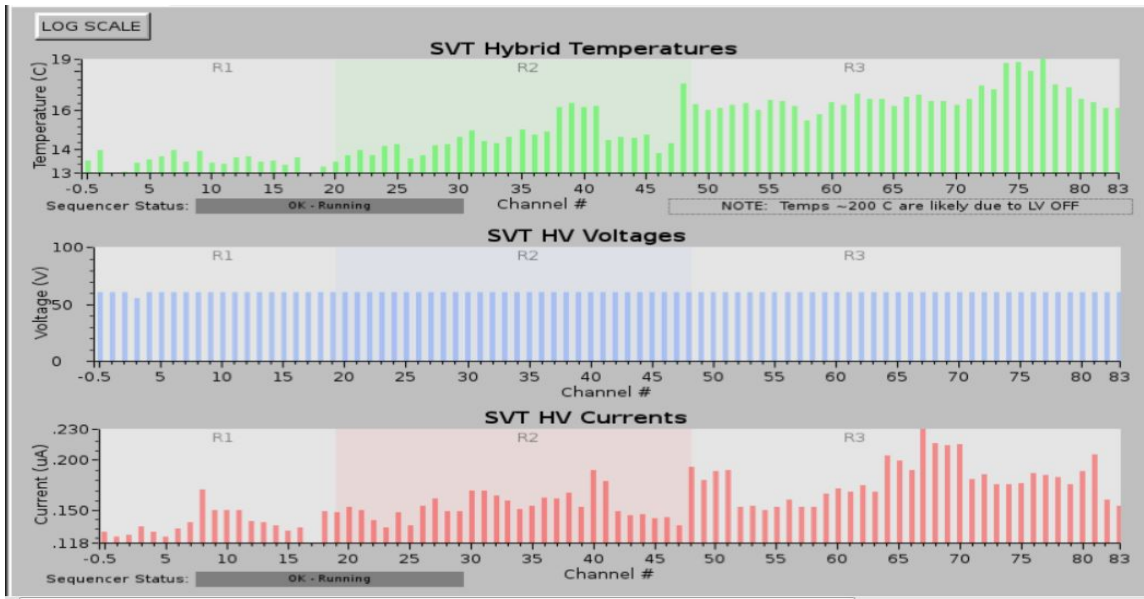
SVT 12/8/2017 Incident

- First day of beam to Hall B.
 - Scraping of the beam occurred in Hall B beamline.
 - SVT received a high dose of radiation.
 - Radiation received exceeded the SVT expected total lifetime dose.

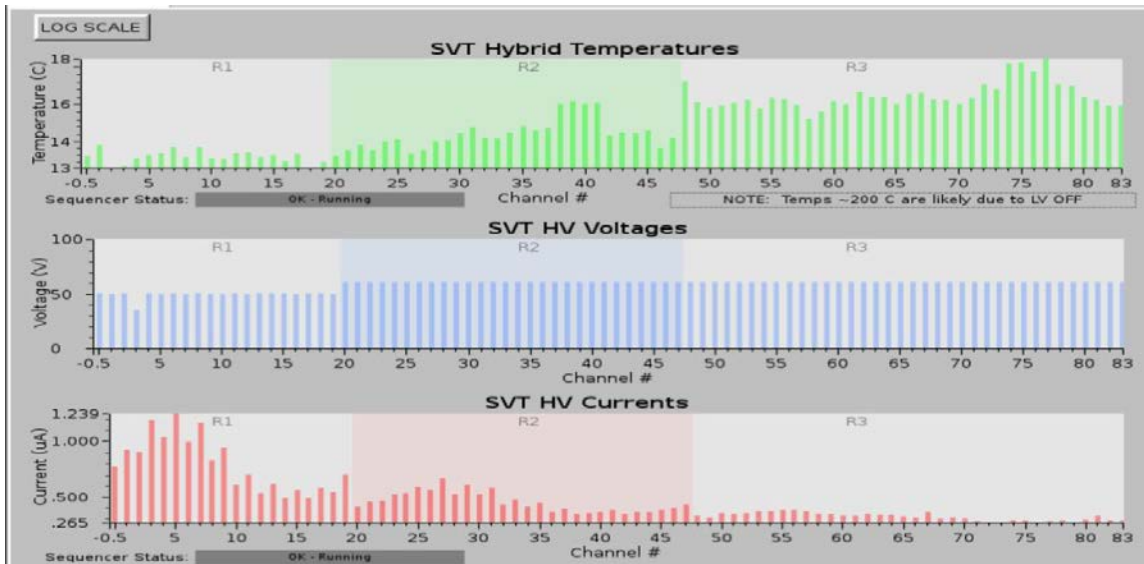
Radiation Damage to SVT

- Radiation damaged the silicon sensors
 - Increases leakage current
 - Reduces signal to noise ratio
 - Less efficient tracking
- SVT Region 1 (closest to beamline) has largest leakage current.

Sensor Leakage Current



Date	12/07/2017
R1 High Voltage	60 V
R1 Hybrid Temp	~ 13°C
R1 HV Current	~.135μA (Avg)



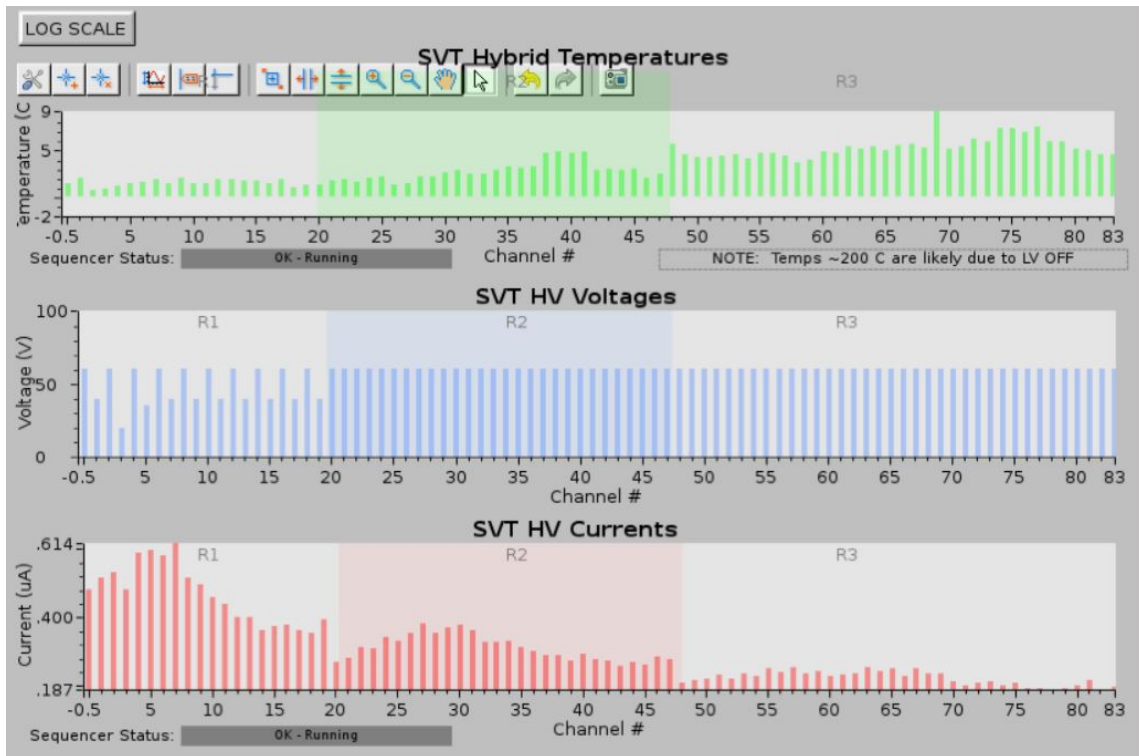
Date	12/17/2017
R1 High Voltage	50 V
R1 Hybrid Temp	~ 13°C
R1 HV Current	~.8μA (Avg)

Effort to Improve SVT Performance

- Reducing the sensor operating temperature decreases leakage current.
 - Reduced cold plate chiller temperature.
 - Heat exchanger with additional chiller added to cool N₂ gas
 - MFC added to N₂ gas cooling.
 - RTD on order to measure cooled N₂ gas temperature

Sensor Leakage Current

After Cooling System Improvements



Date	1/30/2017
R1 High Voltage	60V (T)/40V(B)
R1 Hybrid Temp	~ 1.5°C
R1 HV Current	~.46μA (Avg)

Conclusion

- SVT sensors damaged due to high radiation dose.
- Reducing sensor temperature decreased leakage current.
- Leakage current is still $\sim 4X$ higher with cooling.
- Current will increase with time due to radiation exposure.