

Hall B Magnet Issues Engineering Run - Week 2

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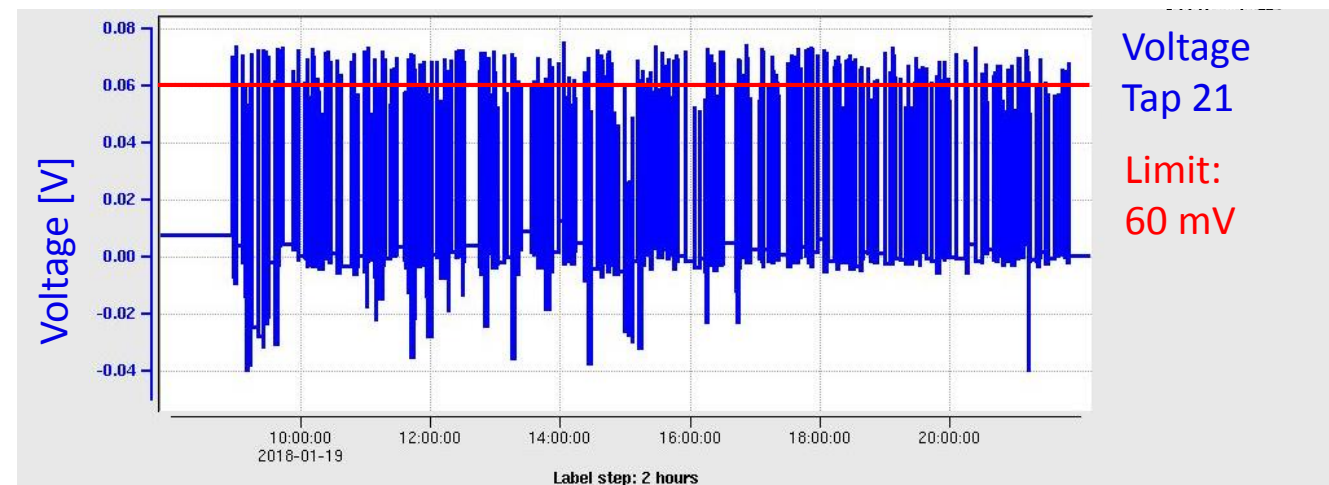
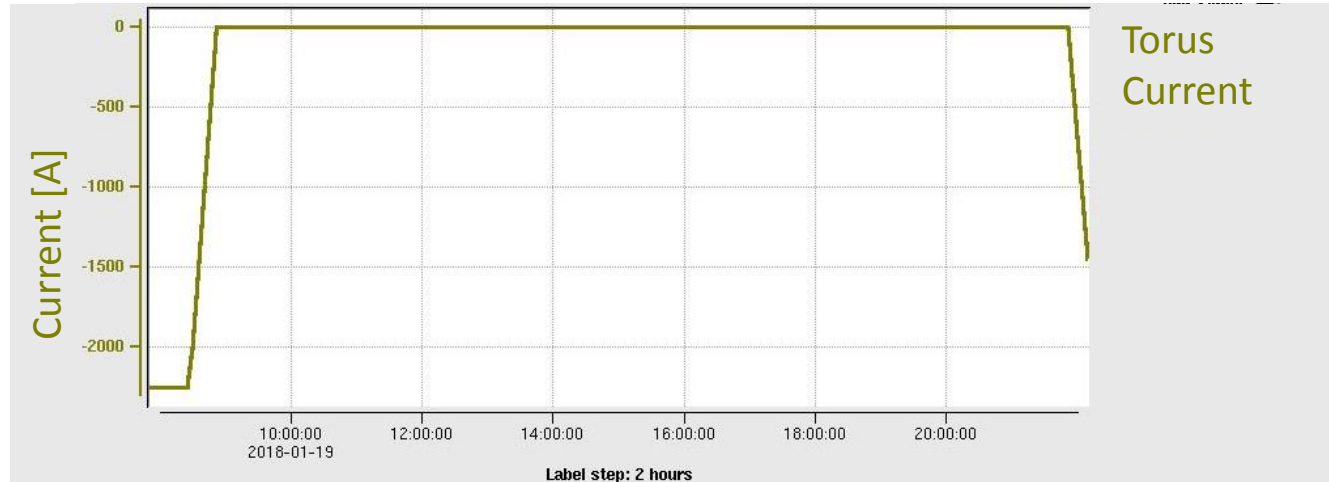
Detector Support Group

January 24, 2018

Torus Cryo Sum Interlock Trip on January 19, 2018

- Torus was already at 0 [A] due to an earlier planned ramp to 0 [A].
- Voltage Tap 21 (VT21) monitoring voltage across vapor-cooled lead B (VCL B) went above 60 [mV] threshold for longer than 650 [ms].
- VT21 was noisy as soon as Torus current reached 0 [A] due to floating ground of its power supply.
- Solution: conditions for current coded into interlock.
 - Controlled ramp down will only be triggered when VT21 is over-threshold if absolute current is greater than 10 [A].

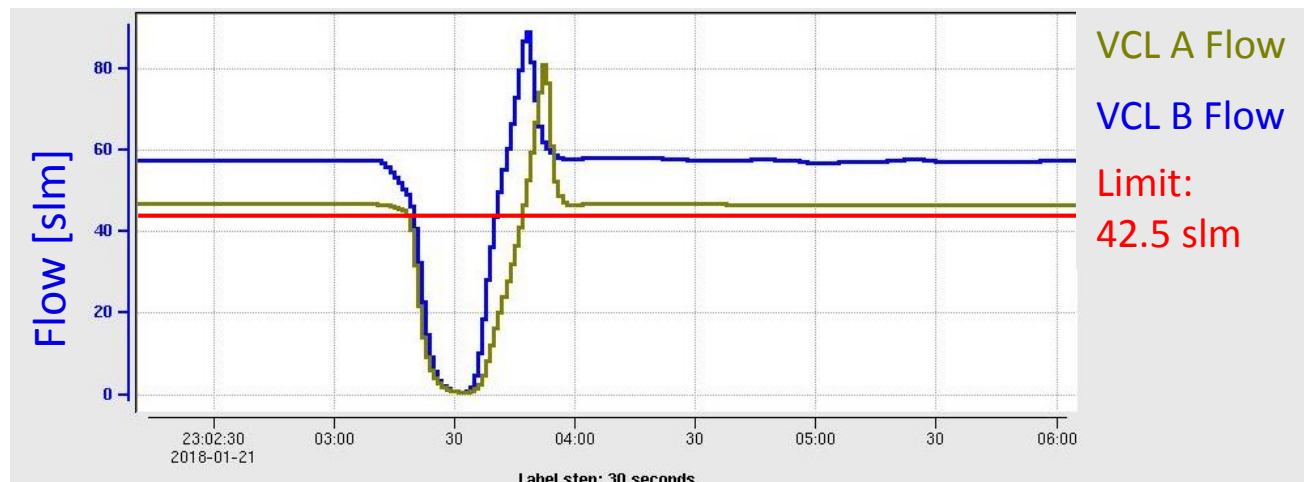
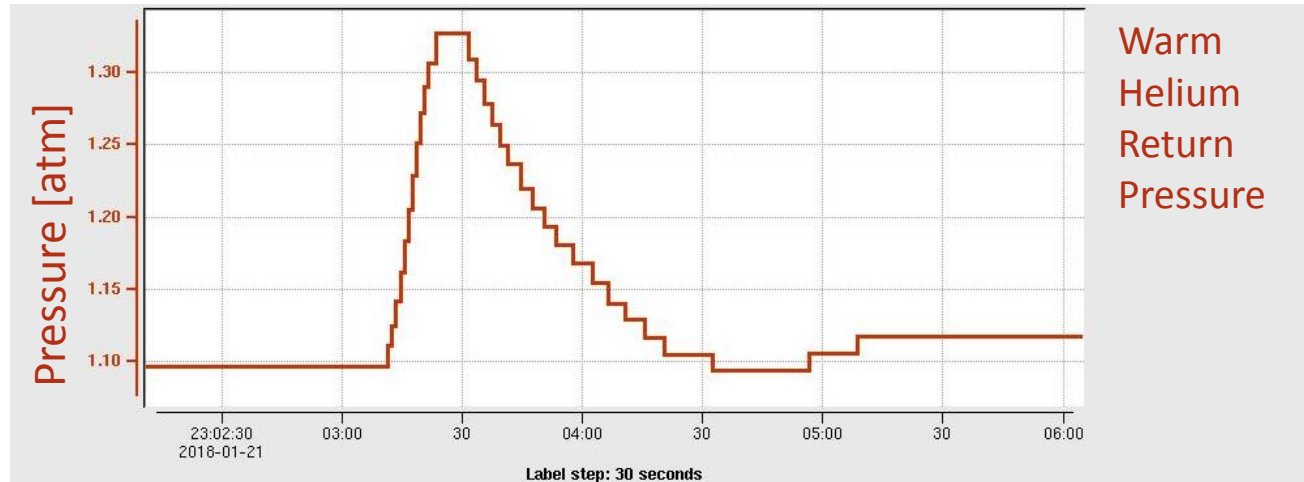
VT21 and Torus Current on January 19, 2018



VCL Flow Interlock Trip on January 21 ,2018

- Solenoid's VCL flow dropped below 42.5 [slm] threshold, causing controlled ramp down.
 - Decreased VCL flow for Hall B Magnets caused by increase in warm helium return pressure because of Hall A magnets' trip.
- Solenoid ramped back to previous current set point when flow and pressure returned to normal.

Warm Helium Return Pressure and VCL Flows on January 21 ,2018



Solenoid PLC Issue Found in Investigation Into VCL Flow Interlock Trip

- Torus and Solenoid should temporarily allow venting helium to atmosphere to be able to maintain VCL flow if conditions that caused interlock occur.
 - PLC routine that opens valve only does so if absolute current in magnet is greater than 10 [A].
- Torus operated as expected on January 21, 2018.
 - Valve opened to atmosphere to allow VCL flow to be unaffected by warm helium return pressure.
- Solenoid had controlled ramp down.
 - Logic that opens valve to allow helium to vent to atmosphere did not look at absolute current.
 - Condition in routine would only work if at positive polarity
 - Solenoid was at negative polarity.
 - Routine corrected on January 22, 2018.