

DSG NPS Collaborators' Meeting Update

Aaron Brown and the Detector Support Group July 15, 2021



Contents

- LabVIEW Hardware Interlock System Program
- Keysight D-sub Extension Cable Fabrication
- Crystal Zone Thermal Simulation
- Conclusion





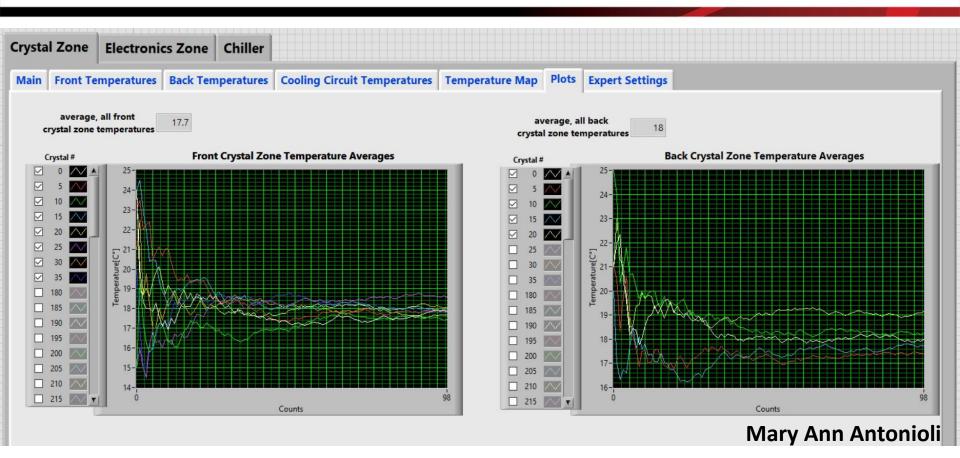
LabVIEW Hardware Interlock System Program

Crystal Zo	one Electron	nics Zo	ne C	Chiller							Mary Ann Antonioli			
Main Fro	s Back	Back Temperatures			Cooling Circuit Temperatures				Temperature Map Plots Ex			t Settings		
	Front Crystal Zone Temperatures [°C]													
	average, all front crystal zone temperatures													
	crystal	temp.	avg.	std. dev.	status	crystal	temp.	avg.	std. dev.	status				
	o	20.0	22.5	3.5		540	18.0	21.5	4.9					
	5	11.0	17.5	9.2	\bigcirc	550	22.0	16.5	7.8	\bigcirc		ondition	Status	
	10	11.0	14.0	4.2	\bigcirc	560	17.0	21.0	5.7				Color	
	15	23.0	18.5	6.4		570	16.0	15.5	0.7		Average	e temp. ≥ high- it	Red	
	20	25.0	20.5	6.4		684	19.0	18.5	0.7		high lim			
	25	15.0	17.0	2.8		689	23.0	24.0	1.4		-	e temp. between gh and high-low	Yellow	
	30	23.0	22.0	1.4		694	17.0	20.0	4.2		high-hig limits			
	35	23.0	21.5	2.1		699	16.0	19.0	4.2			town in	Green	
• Valu	 Values shown are randomly generated for testing and debugging Average temp. in operating range 													
• Aver	 Averages are rolling average of 100 values 											Average temp. between low-high and low-low limits		
• Stan	 Standard deviation calculated for each new average 											Average temp. ≤ low- low limit		





LabVIEW Hardware Interlock System Program

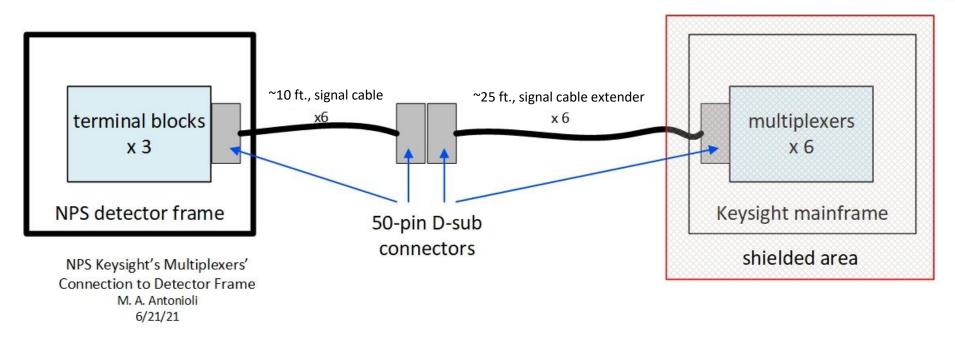


 Live plots of front and back crystal zone average temperatures (random numbers)

7/15/2021



Keysight D-sub Extension Cables

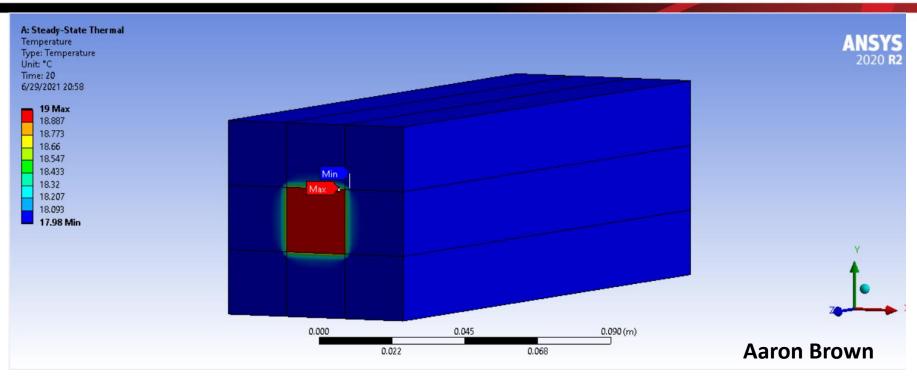


- Need to know cable routing plan from detector to shielded area
- Keysight-supplied cables are not long enough
 - Will need for extension cables, patch panel and feedthroughs
 - Can fabricate full-length cables once cable length is determined





Crystal Zone Thermal Simulation

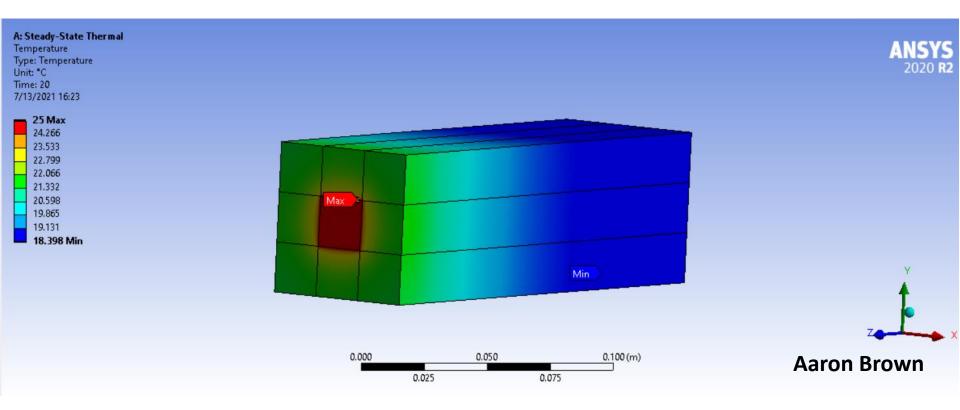


- ANSYS thermal simulation of 3x3 block of PbWO₄ crystals
 - Temperature on face of central block is set to 19°C
 - Using thermal conductivity of the crystals (2.4 W·m⁻¹K⁻¹ in x- and y-axes, 2.0 W·m⁻¹K⁻¹ in z-axis)
- Simulation used to understand how heat moves through crystals and what can be expected from crystal to crystal





Crystal Zone Thermal Simulation



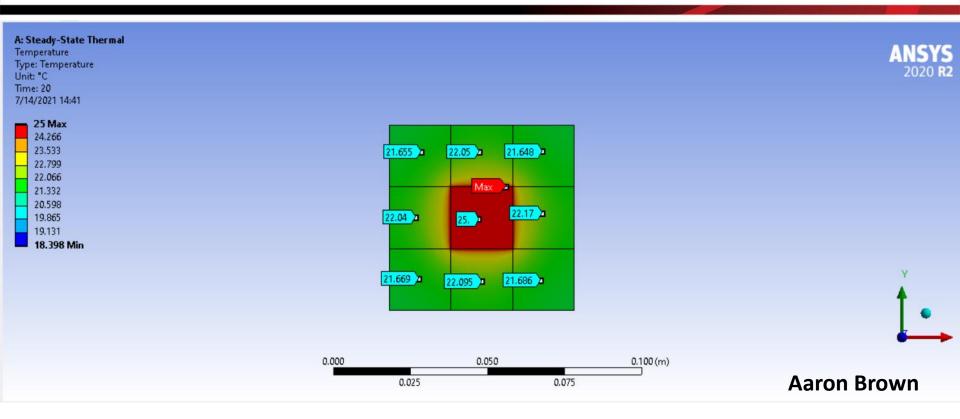
- ANSYS thermal simulation of 3x3 block of PbWO₄ crystals
 - Temperature increased from 19°C to 25°C

7/15/2021

Temperature increased to display a more obvious heat spread



Crystal Zone Thermal Simulation



 Front view (x,y) of 3x3 block of crystals with temperature on central crystal at 25°C





Conclusion

- Current work
 - Hardware Interlock System program development (Mary Ann Antonioli)
 - Crystal zone thermal analysis (Aaron Brown, Brian Eng)





Thank You!





