RF Cavity Testing Software

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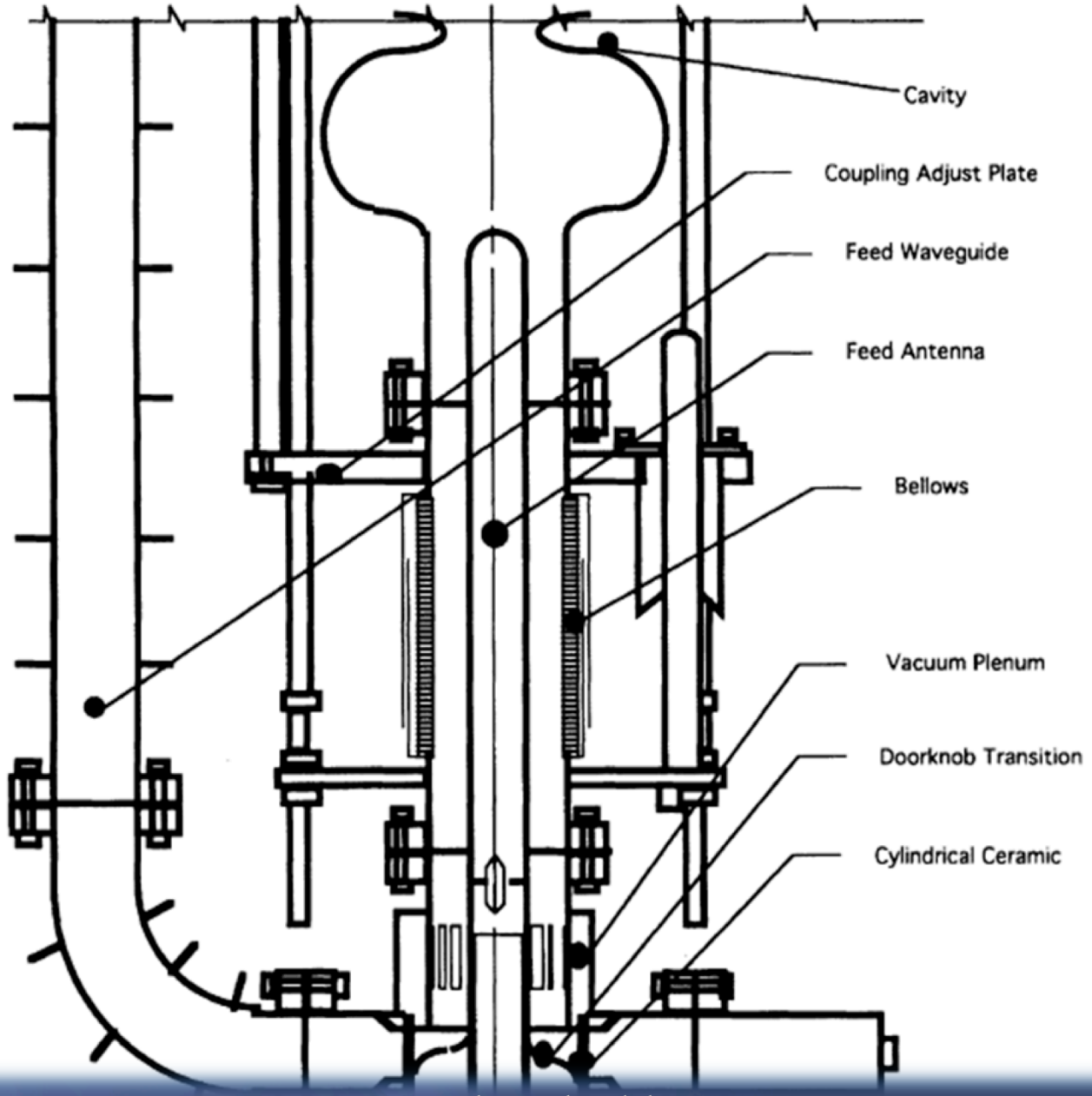

Cavity
Coupling Adjust Plate
Feed Waveguide
Feed Antenna
Bellows
Vacuum Plenum
Doorknob Transition
Cylindrical Ceramic

RF Cavity Testing : *Things to note*

- Monitoring liquid Helium levels
- Cavity Temperature
- Radiation levels
- Q_0 Vs. E
- Determining Quench locations

Monitoring Liquid Helium

- Liquid Helium boiling point ≈ 4K
- Lambda point/superfluid transition ≈ 2K

- Heat is conducted throughout the Dewar
- Fields within cavity create heat

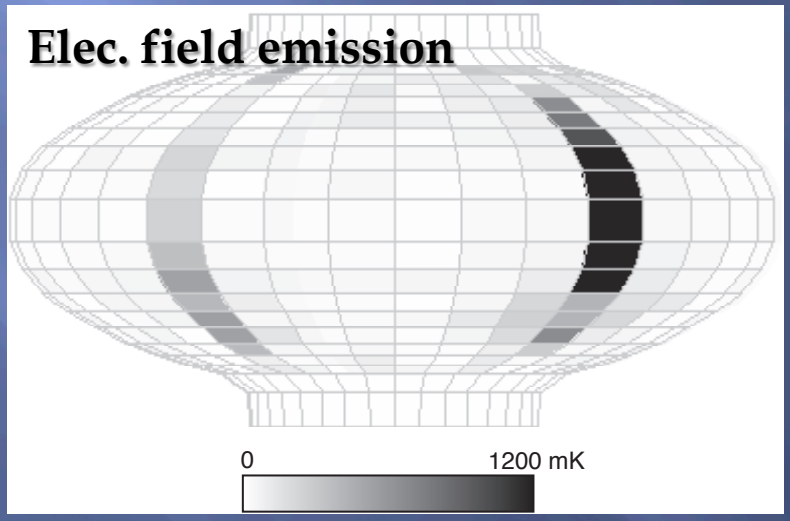
- Program should read and provide LHe levels at given intervals

Monitoring Radiation

- Field emitters
  1. μm size defects emit electrons in high E-fields. These electrons are then accelerated in the E-fields and hit the cavity walls

Cavity Temperature

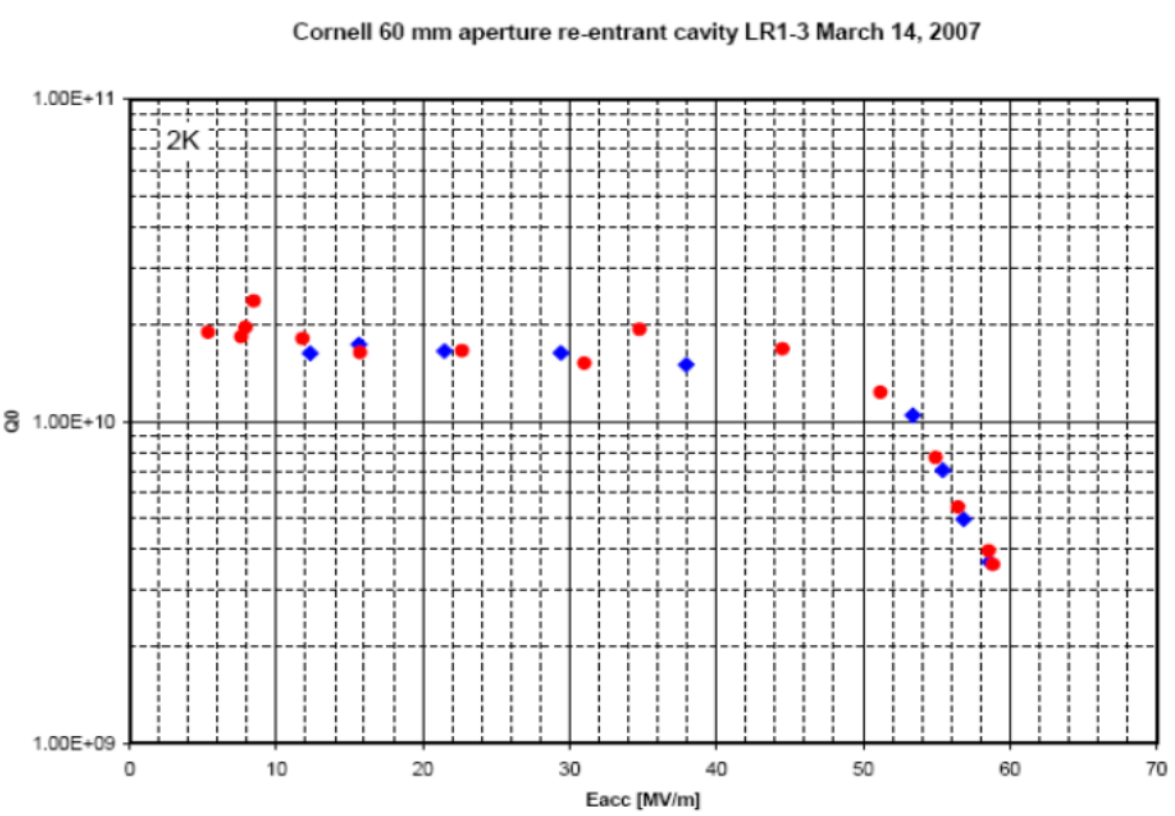
- Cavity must remain below T_C for superconductivity
- Temperature fluctuations are good indicator of inconsistencies
- Program should provide constant temperature measurements



Graphical User Interface (GUI)

- Easy to use
- Efficient without hindering computer performance

Q vs E


Cornell 60 mm aperture re-entrant cavity LR1-3 March 14, 2007
2K
1.00E+11
1.00E+10
1.00E+09
Q0
0
10
20
30
40
50
60
70
Eacc [MV/m]

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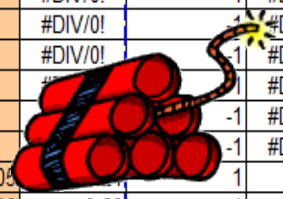
File Home Insert Page Layout Formulas Data Review View

Protected View This file originated from an Internet location and might be unsafe. Click for more details. Enable Editing

B54 =2*3.14*B32*E47*F54/L54

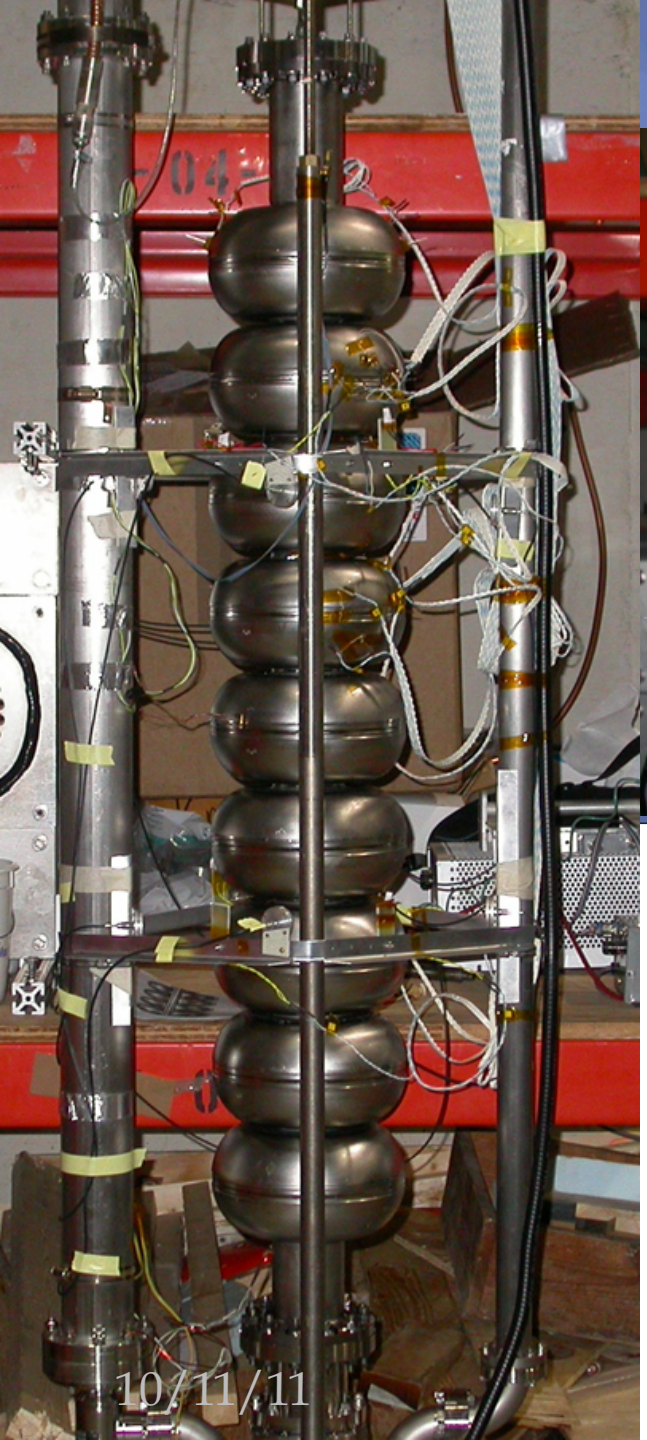
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
55	3.11	7.94E+08	6.59E-03	7.41E-04	3.09E-03	1.58E-05	1.68E-03	0.20	-1	0.19	0.19	1.55	2.85	3.92	0.01	4.04E-01	7.41E-04
56	3.21	1.10E+09	4.05E-03	8.09E-04	1.35E-03	1.68E-05	1.03E-03	0.29	-1	0.27	0.28	1.19	1.75	3.43	0.01	4.04E-01	8.09E-04
57	3.13	1.75E+09	2.06E-03	7.78E-04	5.00E-04	1.60E-05	5.19E-04	0.44	-1	0.34	0.39	0.71	0.88	3.03		4.00E-01	7.78E-04
58	3.07	2.82E+09	1.02E-03	7.75E-04	1.46E-05	1.54E-05	2.55E-04	0.77	-1	0.79	0.78	0.43	0.43	2.69		4.04E-01	7.75E-04
59	3.10	4.13E+09	7.06E-04	4.73E-04	1.01E-05	1.57E-05	1.79E-04	0.69	-1	0.79	0.74	0.30	0.30	2.35		4.00E-01	4.73E-04
60	3.09	5.21E+09	5.45E-04	5.10E-04	4.76E-07	1.56E-05	1.38E-04	0.94	-1	0.94	0.94	0.23	0.23	2.07	0.01	0.40	5.10E-04
61	3.06	5.16E+09	5.45E-04	3.65E-04	5.19E-07	1.53E-05	1.38E-04	0.69	-1	0.94	0.82	0.23	0.23	2.04		4.00E-01	3.65E-04
62	3.11	5.31E+09	5.45E-04	5.45E-04	4.58E-08	1.58E-05	1.37E-04	1.00	-1	0.98	0.99	0.23	0.23	1.98		4.04E-01	5.45E-04
63	3.34	3.13E+09	1.08E-03	8.56E-04	5.64E-07	1.82E-05	2.69E-04	0.80	-1	0.96	0.88	0.45	0.46	1.93		4.00E-01	8.56E-04
64	3.45	3.32E+09	1.08E-03	1.14E-03	2.38E-06	1.94E-05	2.69E-04	1.06	1	1.10	1.08	0.46	0.46	1.91	0.03	4.04E-01	1.14E-03
65	2.48	#DIV/0!				1.00E-05		#DIV/0!	-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00	1.82	0.01		
66	2.78	#DIV/0!				1.26E-05		#DIV/0!	-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00		0.01		
67	2.96	#DIV/0!				1.43E-05		#DIV/0!	-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00		9.00E-03		
68	3.14	#DIV/0!				1.61E-05		#DIV/0!	-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00		9.00E-03		
69	3.30	#DIV/0!				1.78E-05		#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!	0.00		1.00E-02		
70	3.39	#DIV/0!				1.88E-05		#DIV/0!	-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00		1.60E-02		
71	3.45	#DIV/0!				1.94E-05				#DIV/0!	#DIV/0!	#DIV/0!	0.00		2.30E-02		
72	3.57	#DIV/0!				2.08E-05			-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00		2.30E-02		
73	3.67	#DIV/0!				2.20E-05			-1	#DIV/0!	#DIV/0!	#DIV/0!	0.00		5.30E-03		
74	2.10	1.74E+10	7.46E-05	9.16E-05	9.76E-07	7.17E-06	1.92E-05		1	1.26	1.25	0.03	0.03	1.79E+00	9.50E-03	4.04E-01	9.16E-05
75	1.42	1.68E+10	3.59E-05	2.03E-05	3.56E-07	3.28E-06	9.26E-06	0.60	-1	0.82	0.71	0.02	0.02	1.7937		4.00E-01	2.03E-05
76	2.57	1.74E+10	1.11E-04	1.36E-04	1.68E-06	1.08E-05	2.89E-05	1.24	1	1.28	1.26	0.05	0.05	1.7965	1.00E-02	4.04E-01	1.36E-04
77	2.78	1.67E+10	1.34E-04	1.56E-04	1.34E-06	1.26E-05	3.51E-05	1.17	1	1.22	1.20	0.06	0.06	1.7976	1.20E-02	4.00E-01	1.56E-04
78	2.98	1.50E+10	1.71E-04	1.82E-04	5.36E-07	1.45E-05	4.46E-05	1.07	1	1.12	1.09	0.08	0.08	1.7988	9.00E-03	4.04E-01	1.82E-04
79	3.13	1.31E+10	2.14E-04	1.99E-04	6.74E-07	1.60E-05	5.65E-05	0.93	-1	0.89	0.91	0.10	0.10	1.7996	1.20E-02	4.00E-01	1.99E-04
80	3.22	1.14E+10	2.61E-04	2.02E-04	3.15E-06	1.69E-05	6.90E-05	0.79	-1	0.80	0.79	0.12	0.12	1.8005	1.70E-02	4.00E-01	2.02E-04
81	3.33	9.70E+09	3.41E-04	2.16E-04	1.24E-05	1.81E-05	8.94E-05	0.66	-1	0.68	0.67	0.15	0.15		1.50E-02	4.00E-01	2.16E-04
82	3.50	6.72E+09	5.40E-04	5.48E-04	5.06E-07	2.00E-05	1.37E-04	1.01	1	1.06	1.04	0.23	0.23		1.30E-02	4.04E-01	5.48E-04
83	3.58	5.46E+09	7.01E-04	5.71E-04	6.87E-06	2.09E-05	1.78E-04	0.82	-1	0.82	0.82	0.30	0.30	1.8068	1.80E-02	4.04E-01	5.71E-04
84	3.66	3.99E+09	1.07E-03	5.93E-04	6.74E-05	2.18E-05	2.69E-04	0.59	-1	0.60	0.60	0.43	0.46	1.8097	2.70E-02	4.04E-01	5.93E-04
85	1.79	1.62E+10	5.40E-05	6.00E-05	8.50E-08	5.20E-06	1.48E-05	1.11	1	1.08	1.10	0.03	0.03		3.60E-02		
86	1.77	1.63E+10	5.50E-05	5.70E-05	7.00E-08	5.10E-06	1.44E-05	1.04	1	1.07	1.06	0.02	0.02				
87	1.79	1.62E+10	5.70E-05	6.00E-05	4.60E-07	5.20E-06	1.48E-05	1.05	1	1.20	1.13	0.02	0.03				
88	1.79	1.62E+10	5.70E-														
89	0.00	#DIV/0!								#DIV/	#DIV						
90	0.00	#DIV/0!								#DIV/							
91																	

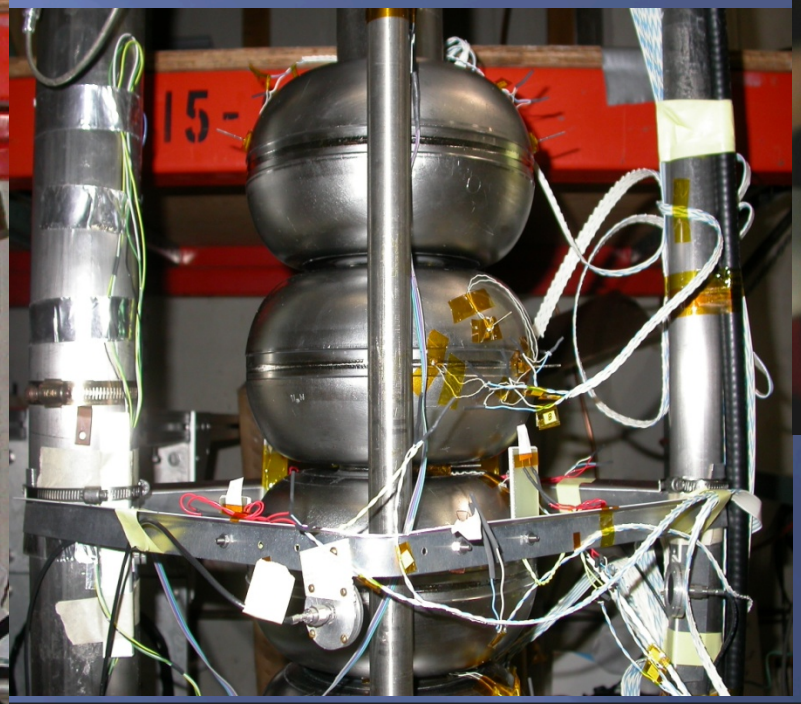


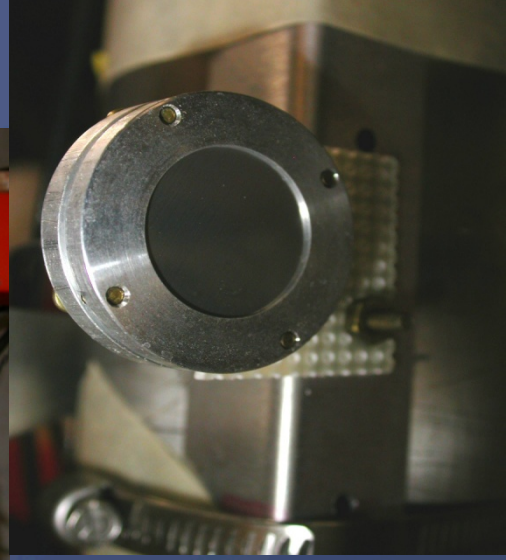
Summary Fil Q vs E Cooldown Pumpdown Data Q vs Temp

Ready 100%

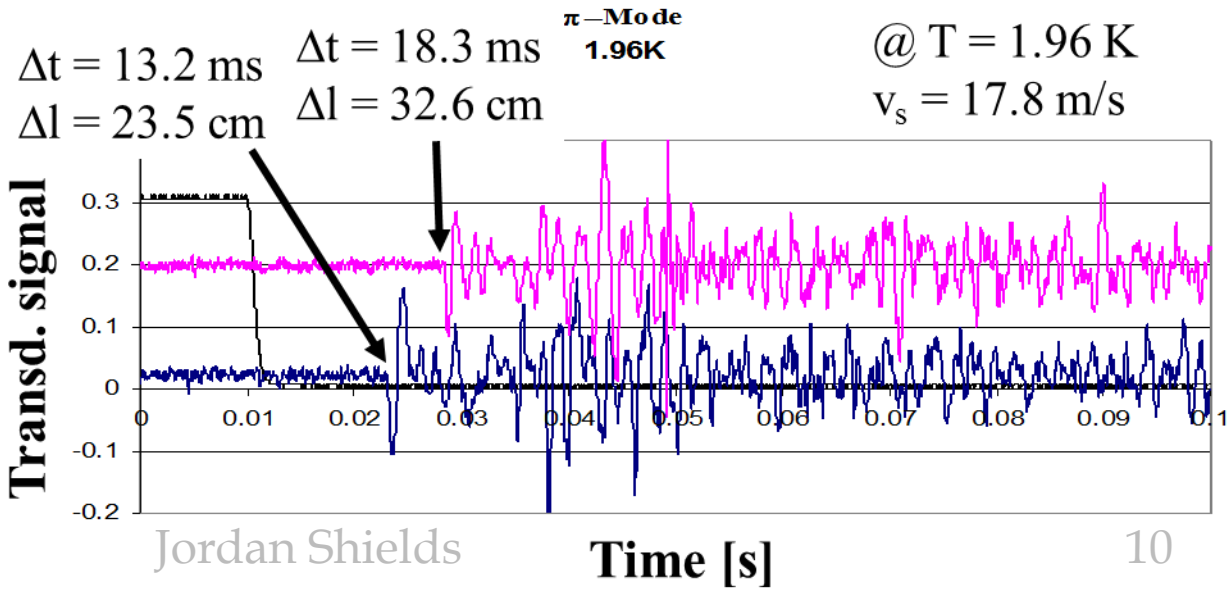
Determining Quench Locations







Oscillating Superleak Transducers (OST)



Summary

- Provide regular updates and plots for LHe/Radiation levels as well as temperature
- Q vs. E plot done in Matlab
- GUI that is both easy to use and efficient
- Optimization for determining quench locations