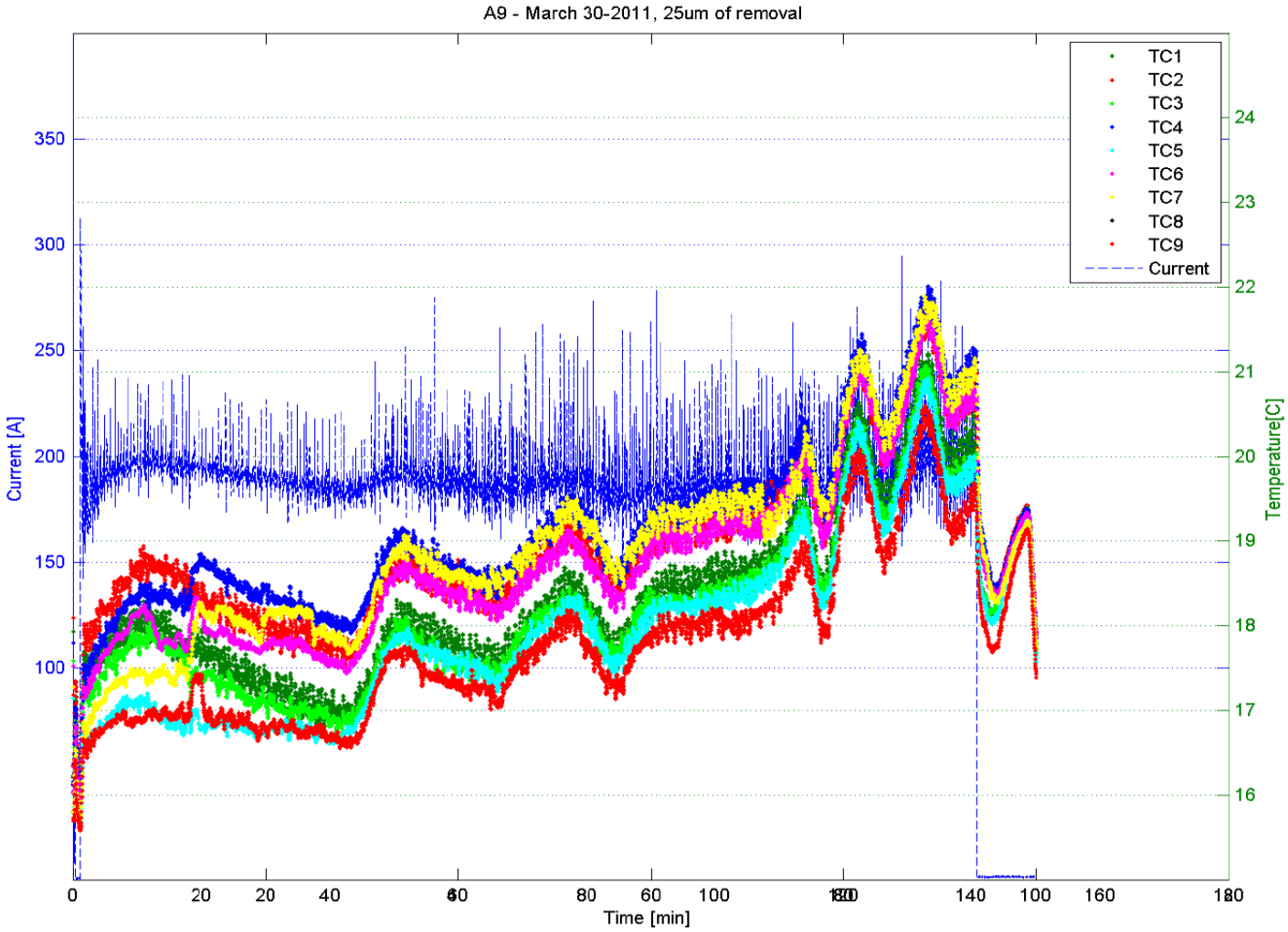
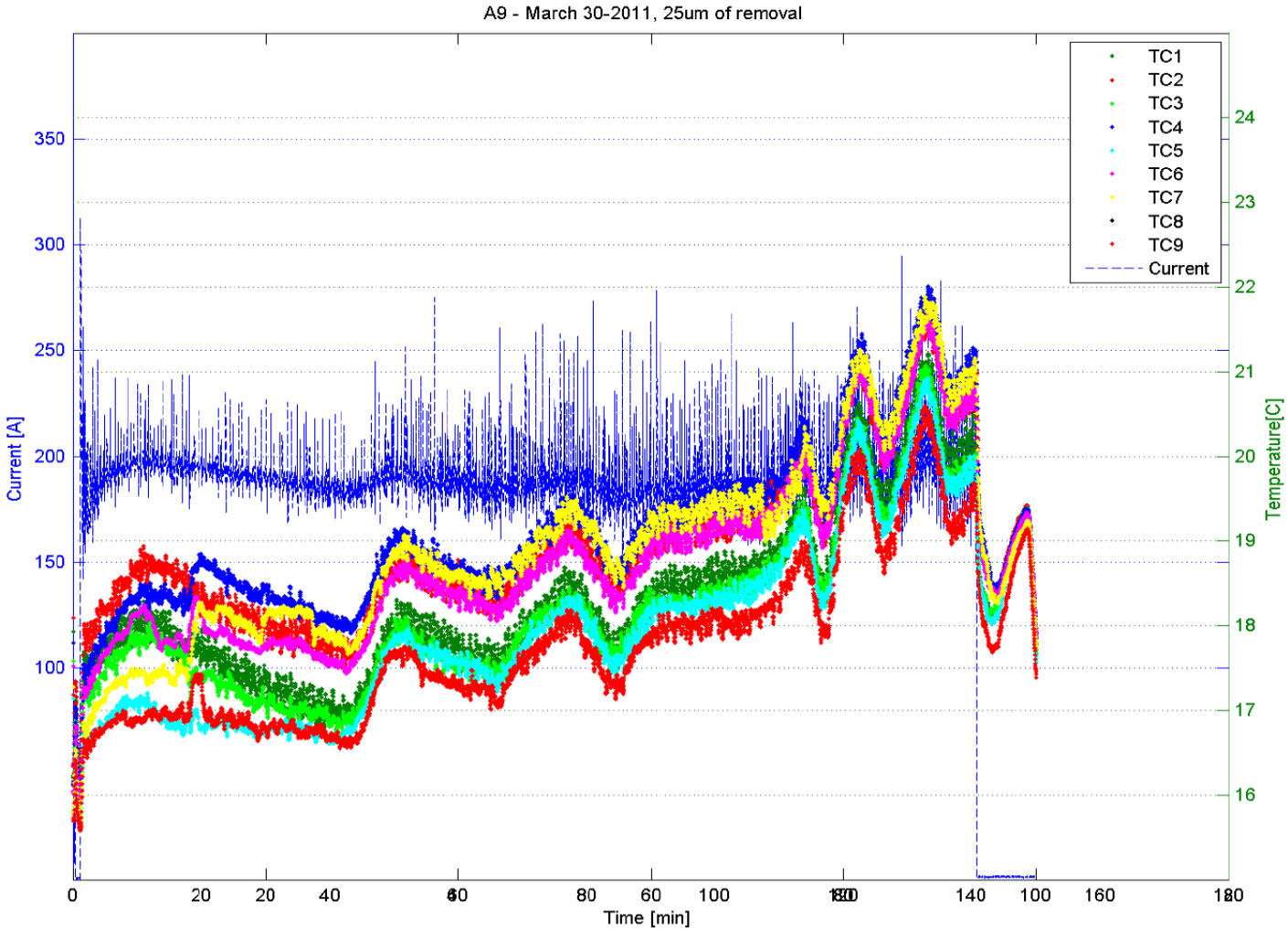
ILC Activities at Cornell
June 7, 2011



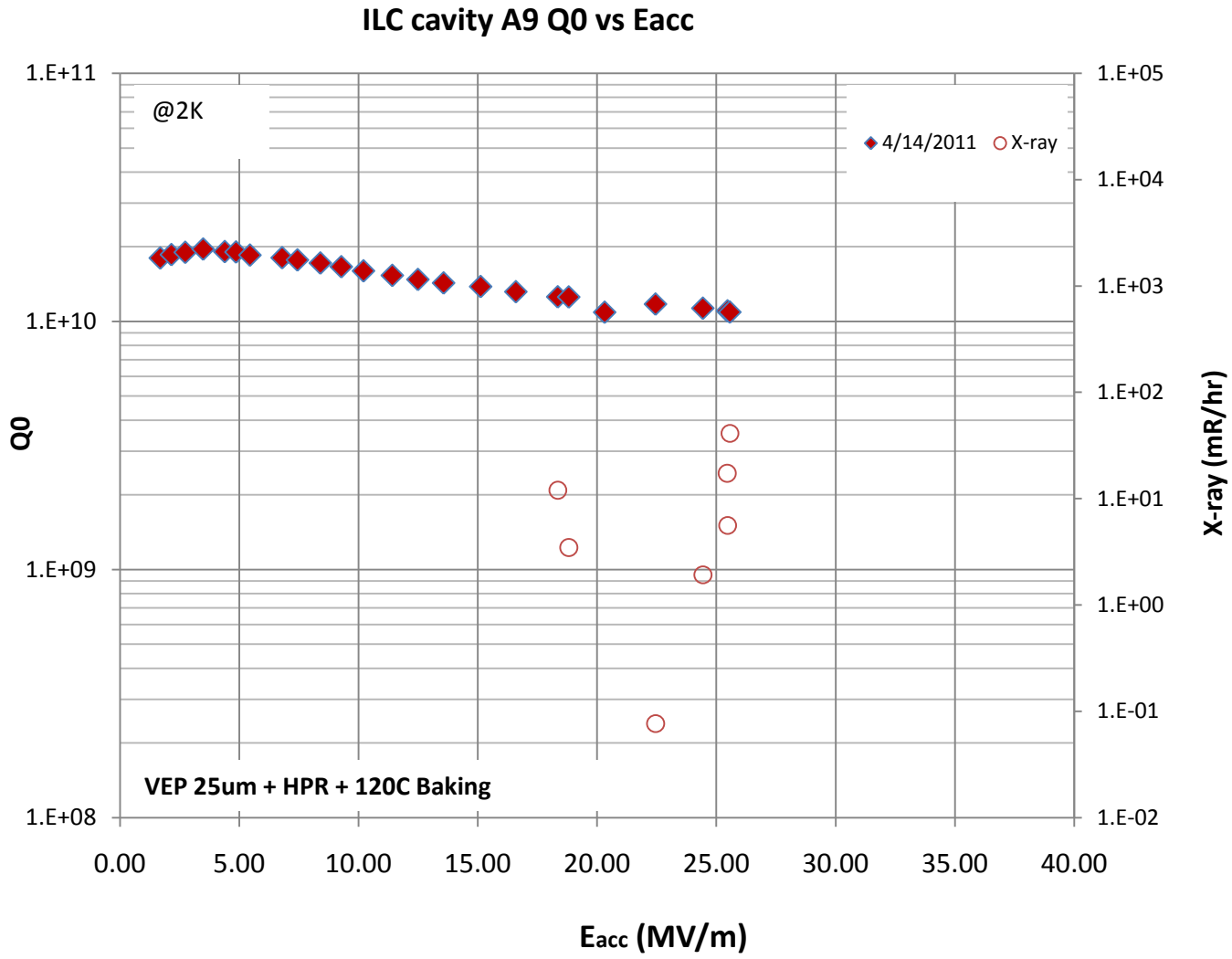
Temp and Current vs. Time

Cavity testing: ILC cavity 9-cell A9

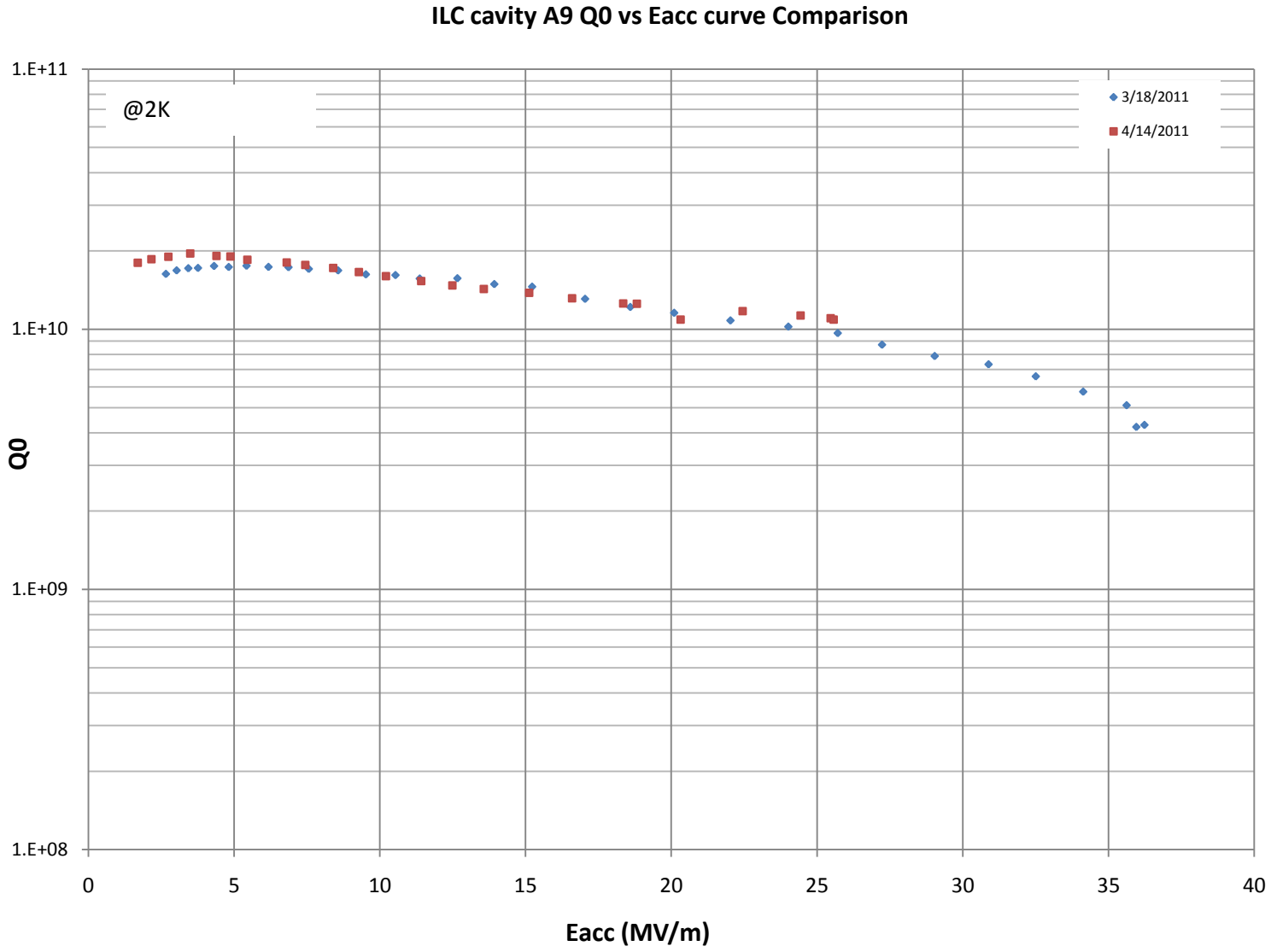
The cavity was VEP'd 25 micron with 17 volts;
To improve Q value by increasing EP voltage from 14 to 17.
The temperature < 22 °C.



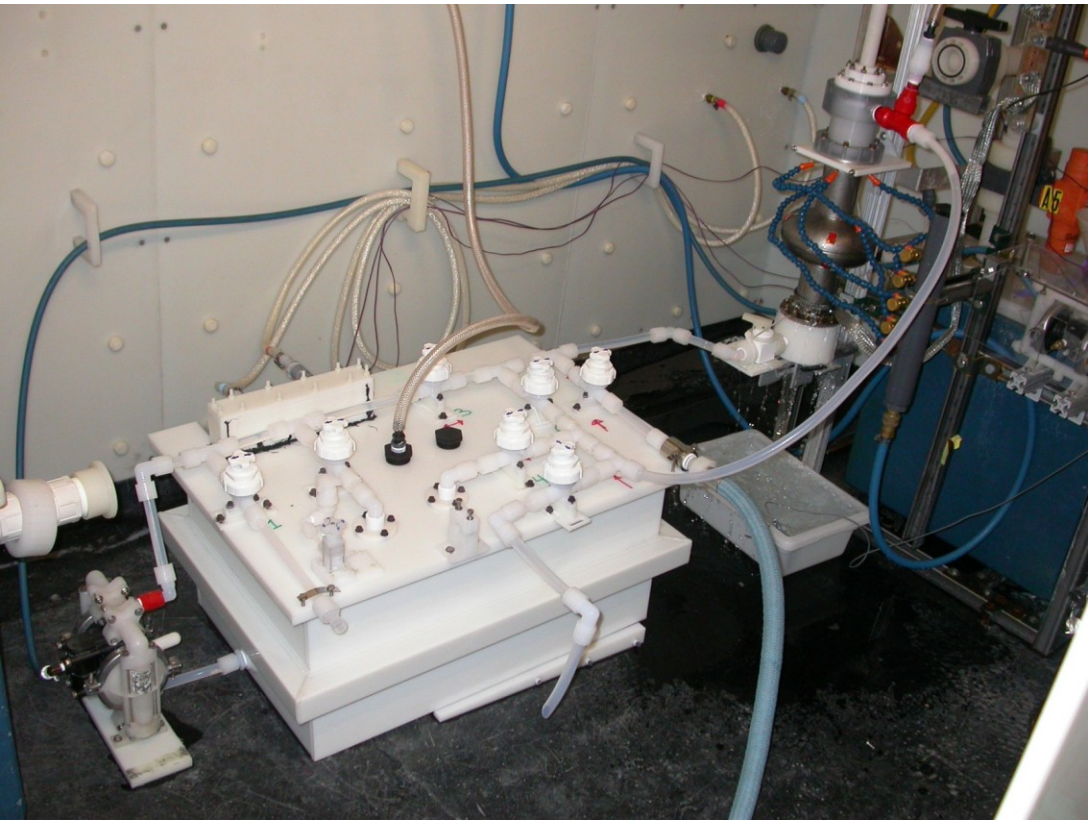
Temp and Current vs. Time

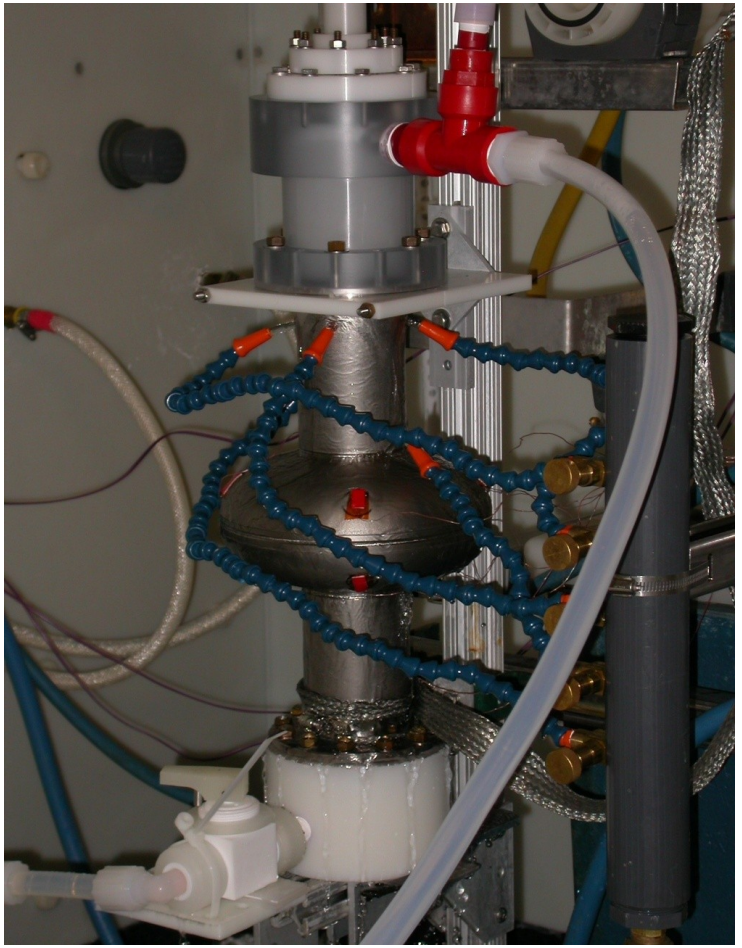


The cavity quenched at 25.5 MV/m.
The OST data suggests the cavity quenched at cell#1, the first bottom cell, equator region.
The next plan of this cavity is optical inspection


ILC cavity A9 Q0 vs Eacc curve Comparison
@2K
3/18/2011
4/14/2011
1.E+11
1.E+10
1.E+09
1.E+08
Q0
0
5
10
15
20
25
30
35
40
Eacc (MV/m)

VEP system at Cornell University with Recirculation

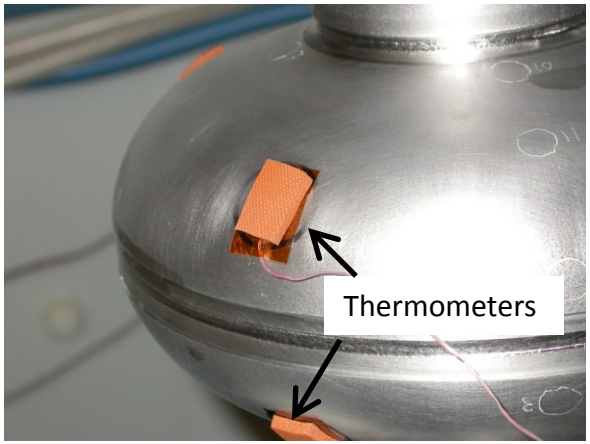


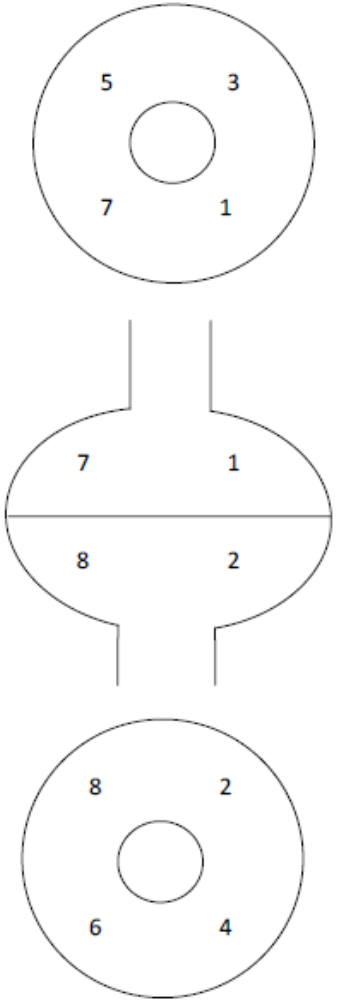


VEP 2.1: Recirculation

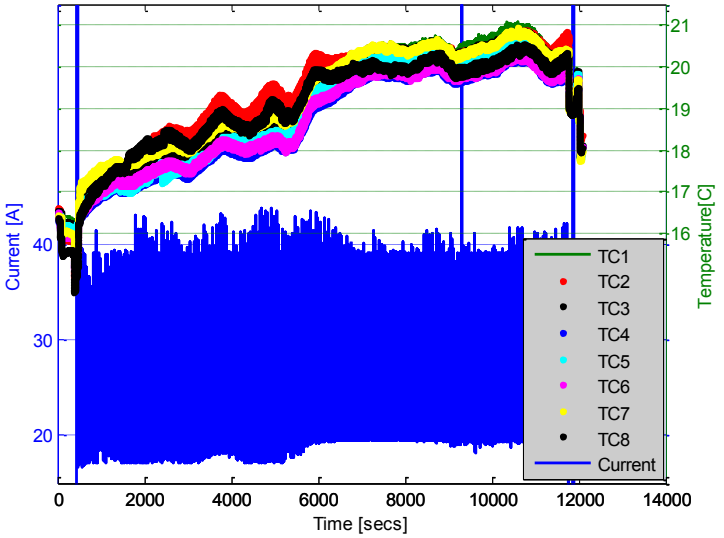
Temperature Oscillations: Experimental Setup

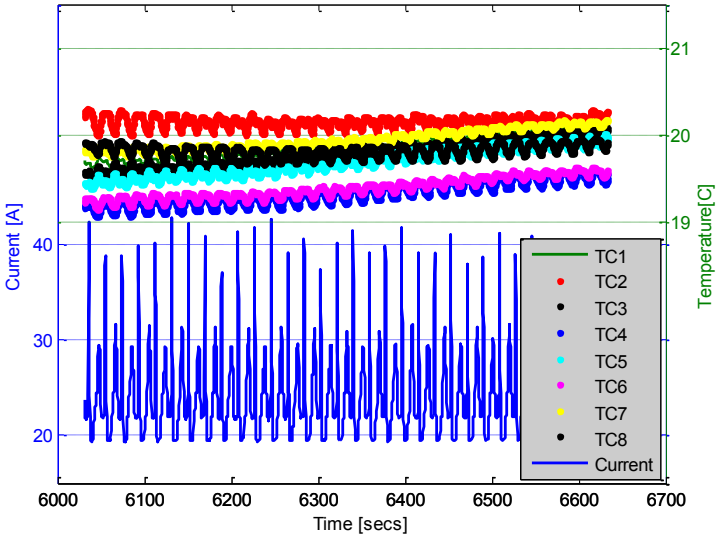
- Resolution of thermocouples: 0.02°C
- Agitation: 0.85Hz
- Acid Recirculation(1Hz)
- Location of thermocouples ->
- 60 second window
- Sample rate of
  - TC: 1.5 Hz
  - Current: 5 Hz



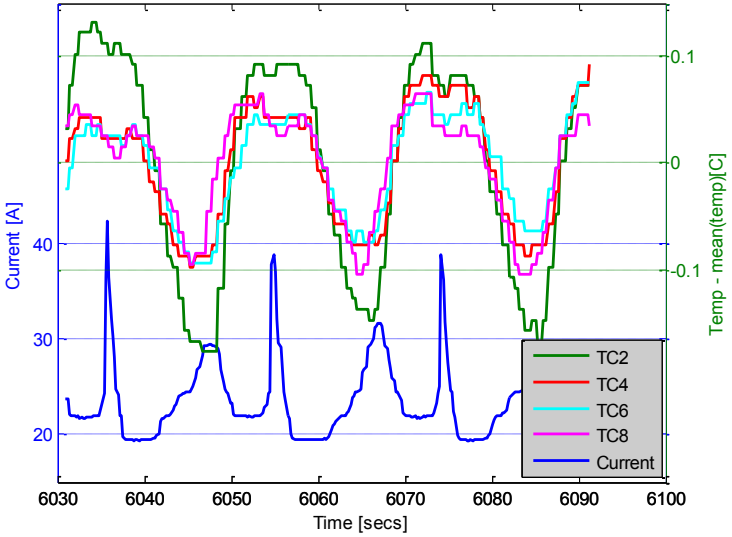


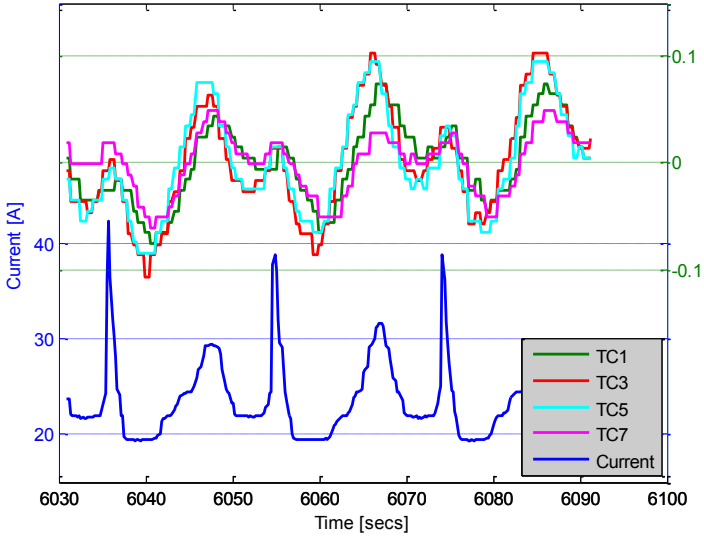
Temperature Oscillations: Asymmetry





VEP of AES2-1





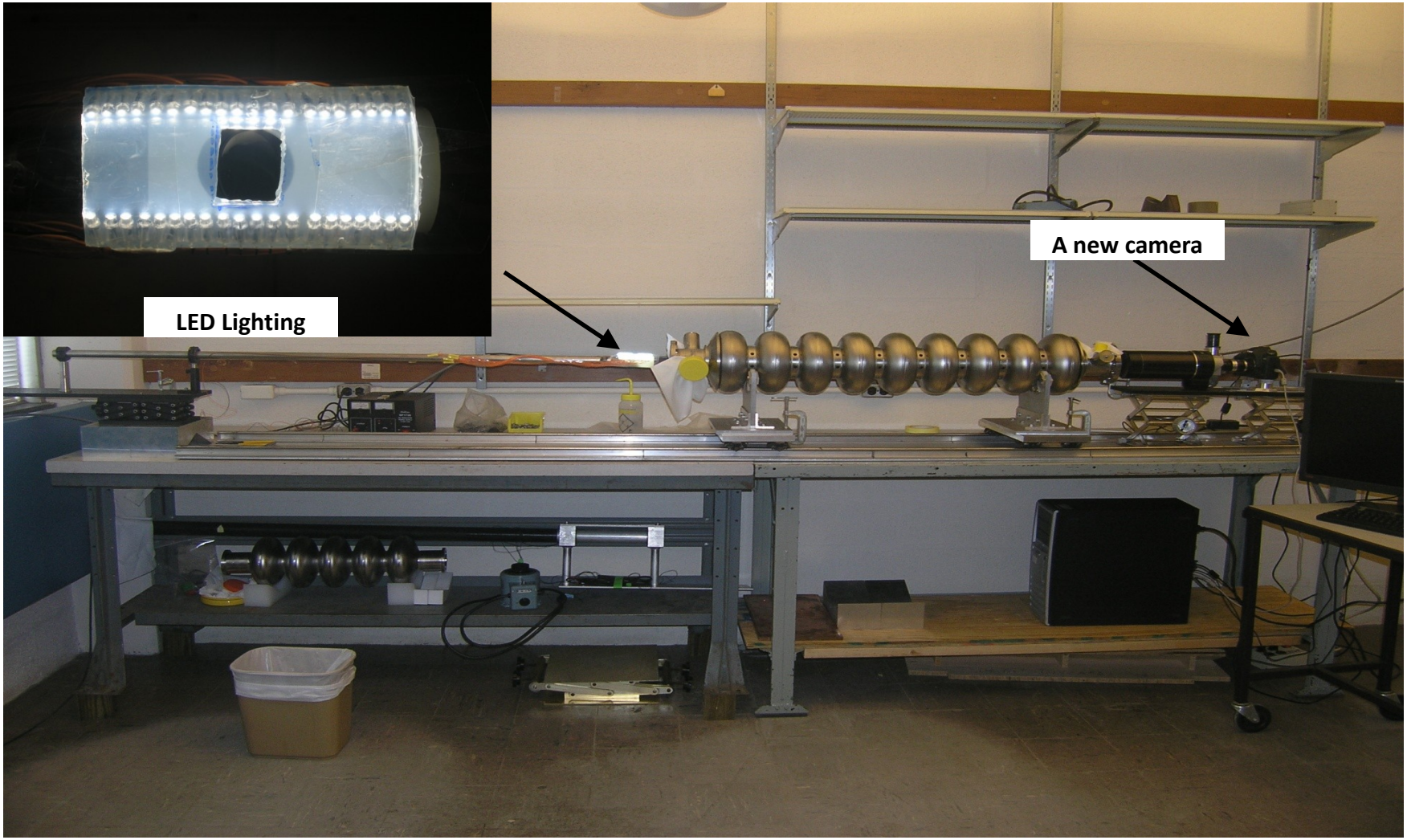
Temperature Oscillations: Bottom Cup

Temperature Oscillations: Top Cup

Interpretation

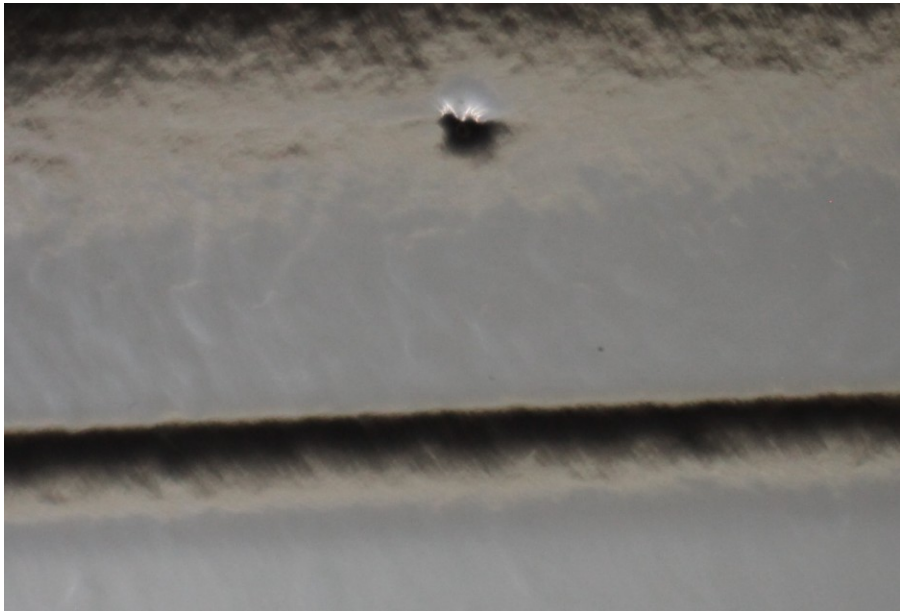
- Frequency of top ≈ 2 * frequency of bottom
- No obvious correlation between temperature & electrolyte motion
- Upper cup
  - T increase correlated for Type 1 & Type 2 current spike
- Lower Cup
  - T increase correlated with Type 2 current spike
  - T *decrease* correlated for Type 1 current spike
- Meter stick for VEP development
  - Top and bottom oscillations must be identical
- Further analysis on temperature/current correlation

Optical inspection at Cornell University



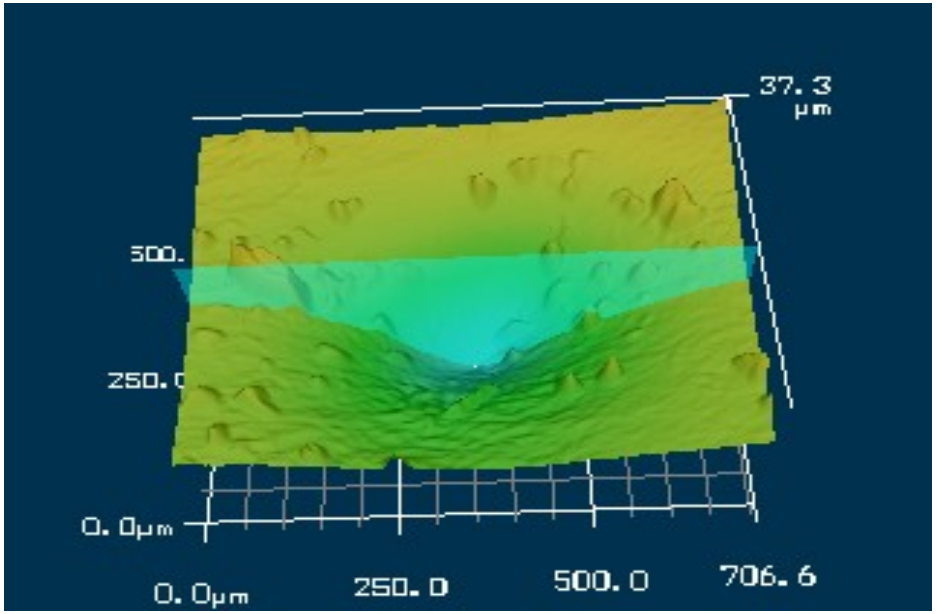
A new 21.1 megapixels digital camera
The resolution of system is 5 micron.
A new bright lighting source (40 LED bulbs)
By changing different arm and head, this system is able to make surface replica.

Cavity inspection result and surface profilometry scanning

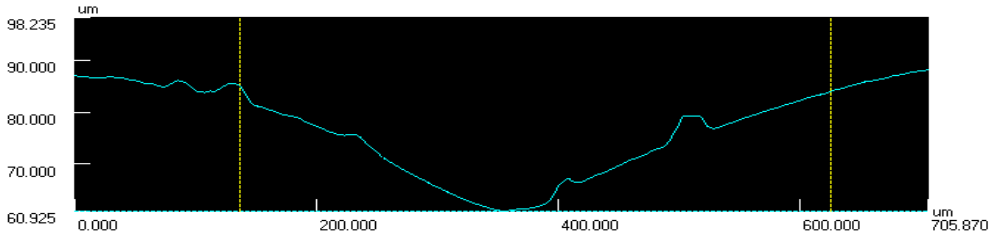


Optical inspection image from AES5 cell#1

The cavity quenched at 25MV/m



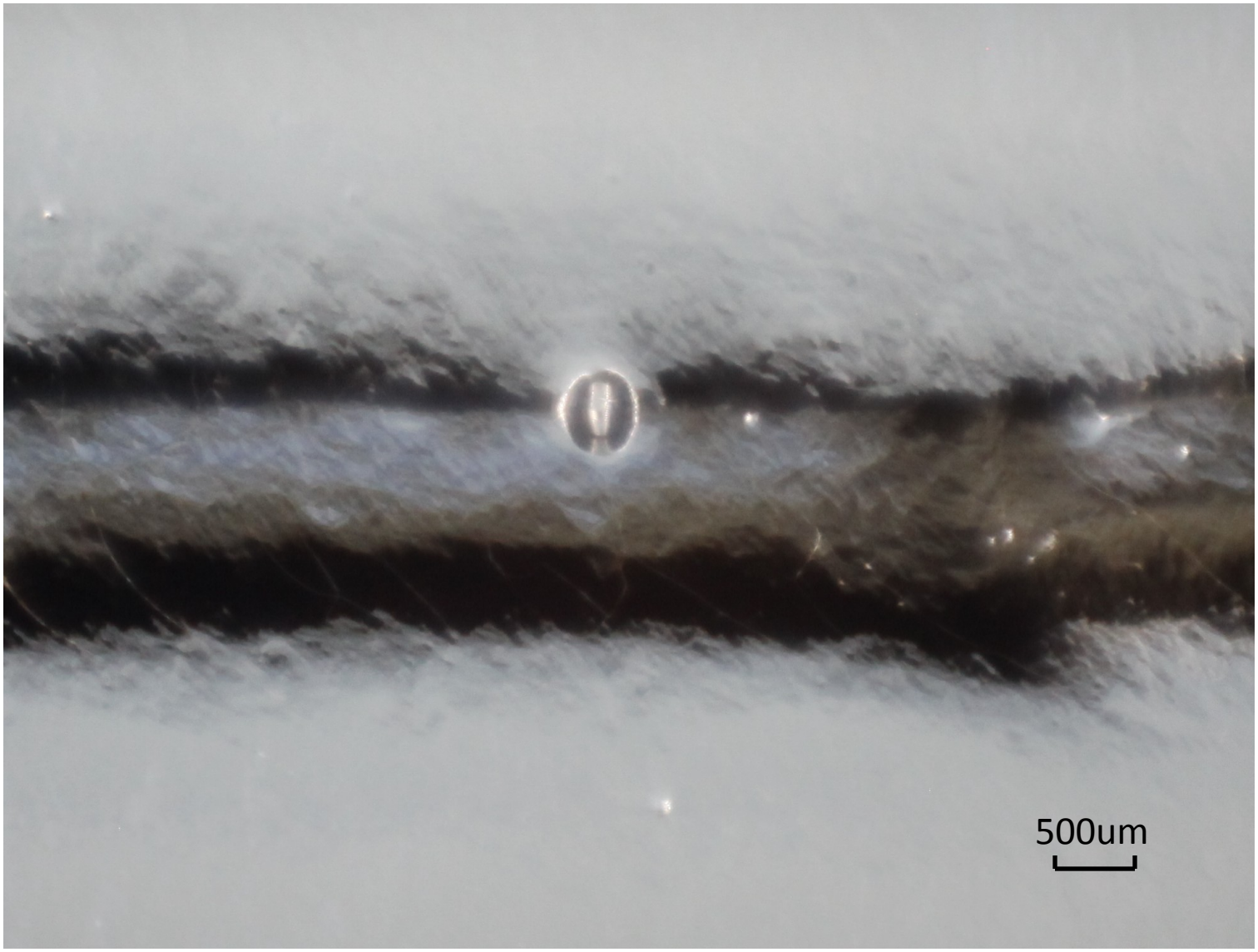
3D surface scanned on replica by Laser confocal microscope at Fermilab



the profile of pit

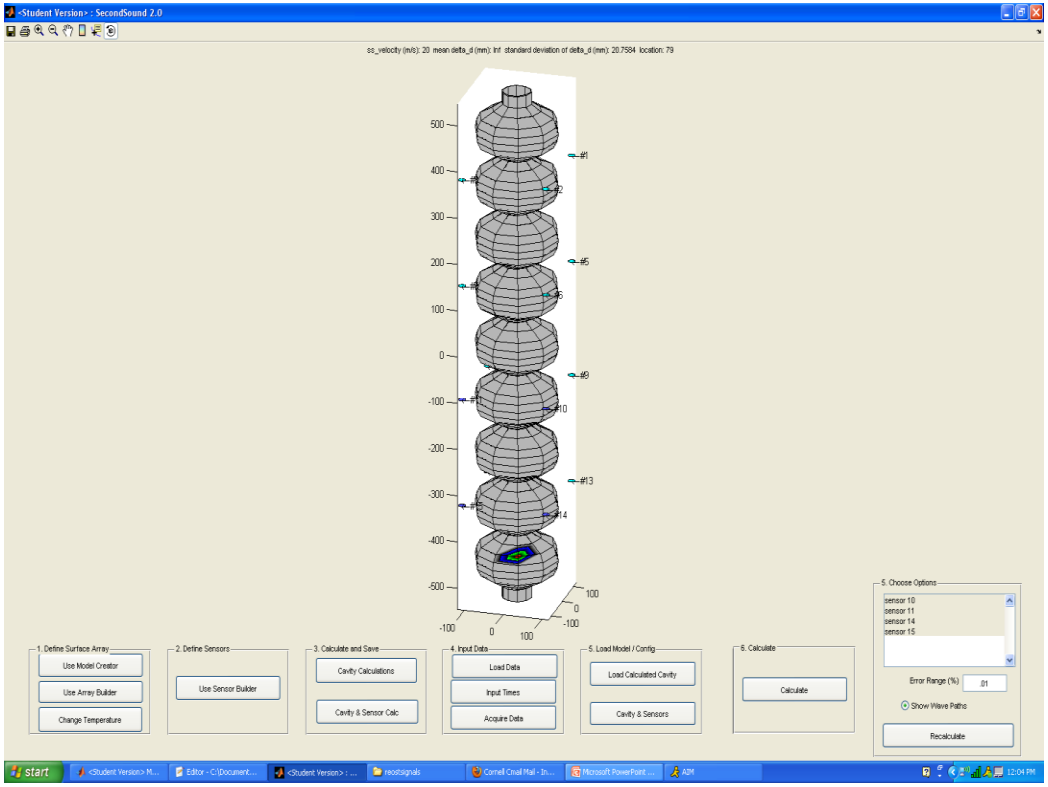
A pit was found in ILC 9-cell cavity AES5 cell#1,
90 micron in depth,
700 micron in diameter.

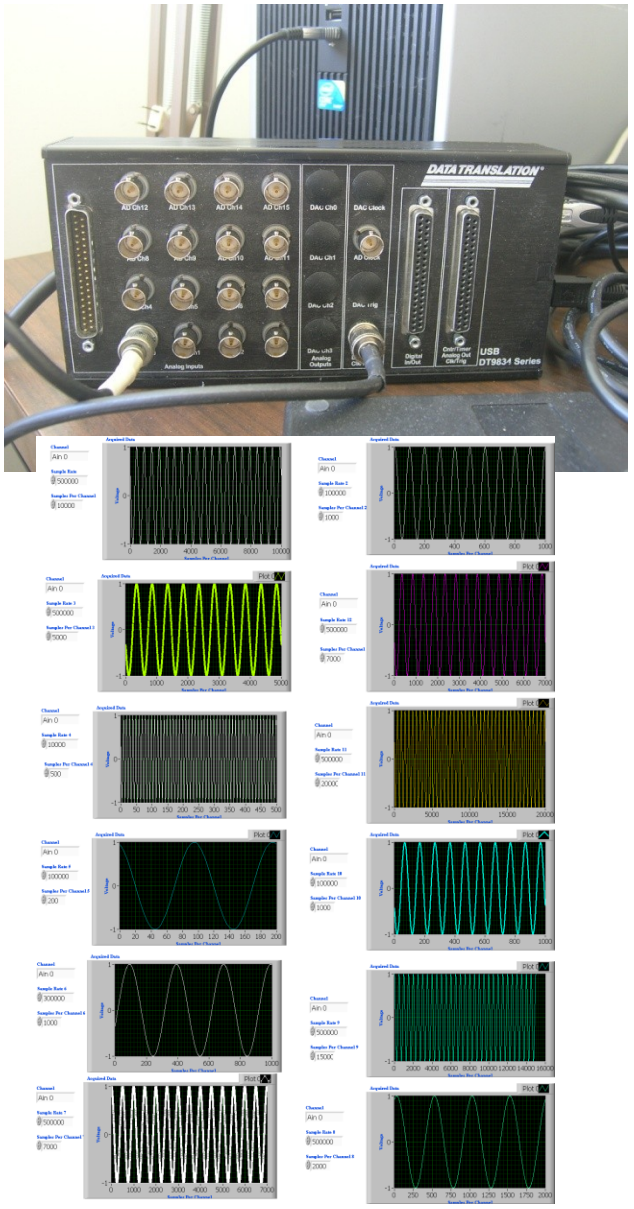
Optical inspection image from A10 cell#4



The cavity quenched at 23MV/m

OST system at Cornell





During the latest 9-cell cavity test, the 16 OST sensor shows clear signal, the program helps to calculate the quench location

In the future, we will use 16 channels data acquisition card to capture signal simultaneously