

CM01 Field Emission Workshop

Sebastian Aderhold

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Agenda change

Wednesday 1/29

08:00	5 - Diagnostic methods <i>Building 48 - Redwood Conference Room, SLAC</i>	08:00 - 08:40
09:00	6 - Simulations <i>Building 48 - Redwood Conference Room, SLAC</i>	08:40 - 09:20
	7 - CM01 operations with FE <i>Building 48 - Redwood Conference Room, SLAC</i>	09:20 - 10:00
10:00	Coffee break <i>Building 48 - Redwood Conference Room, SLAC</i>	10:00 - 10:30
	15 - Remediation methods <i>Building 48 - Redwood Conference Room, SLAC</i>	10:30 - 11:10
11:00	9 - Potential root-causes for FE <i>Building 48 - Redwood Conference Room, SLAC</i>	11:10 - 12:00
12:00	Lunch <i>Building 48 - Redwood Conference Room, SLAC</i>	12:00 - 13:00
13:00	10 - Summary discussion and closeout <i>Building 48 - Redwood Conference Room, SLAC</i>	13:00 - 14:30
14:00		



Diagnostic Methods / Measurements

- Comment from Tom via email yesterday: Discuss venting and pumping down beam line on either side of CM01
- Radiation measurements so far only with GM-tubes
 - Benefit of doing other measurements? Gamma spectroscopy? Measure in multiple angles around CM?
- Potential methods to detect contamination (hydro-carbons, cesium,...) in-situ?

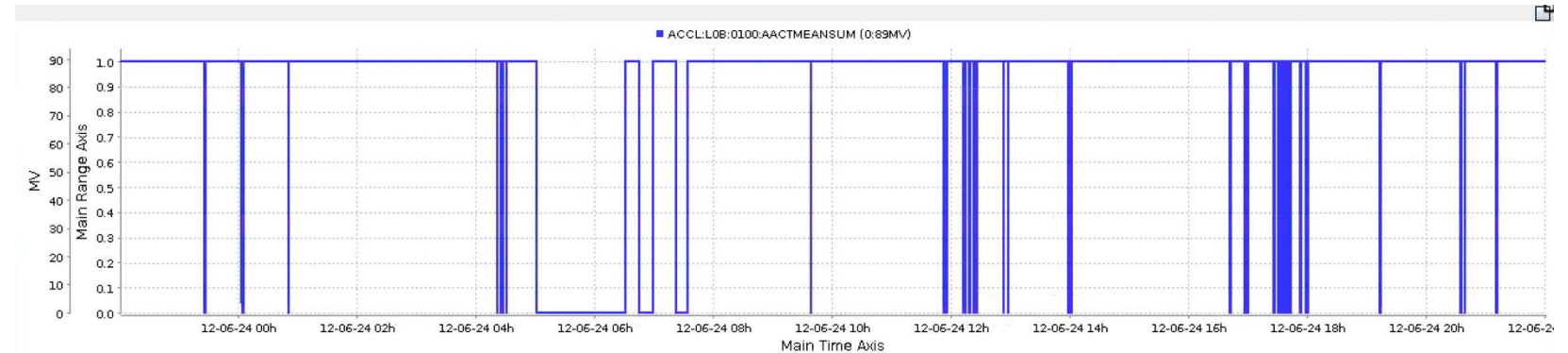
Simulations

- Simulation of ion migration beyond what we heard from Dave yesterday. Any experience or references?
- Correction on energy deposited by gun dark-current in first few CM01 cavities as mentioned yesterday
- How could we benefit from simulation of FE behavior similar to recent work at CEA and INFN (e.g. presented at TTC23)?

CM01 operations with FE

- The risks of running cavities with 'high' field emission
 - Short term and long term
- RF shutoff in CM01 by BCS

	Phase	
1	108.0	4.6 degrees
2	-9.2	0.0 degrees
3	-94.3	0.0 degrees
4	-19.3	0.0 degrees
5	161.9	0.0 degrees
6	-102.0	-8.0 degrees
7	-103.5	-21.9 degrees
8	5.8	21.9 degrees



Remediation methods

- Plasma processing
 - Ways to tell that processing was successful before the actual RF test?
- Helium processing
- Pulsed processing

Potential root causes

- Based on what we have seen and discussed so far, are there any 'preferred theories'?
 - Particulates, hydrocarbons, cesium, latent contamination from assembly or installation,...

Summary

The questions we tried to find answers to

- Are there similarities to field emission problems at other accelerator facilities?
- Can we determine the root-cause for the field emission onset in CM01?
 - Latent particle contamination from assembly, new contamination with external particulates, hydro-carbons, cesium migration from the gun cathode, adsorbed gases from cooldown,...?
- Which diagnostic methods would be suitable to be applied on the cryomodule while installed in the tunnel (invasive or non-invasive)?
- What kind of simulations can we run to better understand the situation?

Summary - continued

The questions we tried to find answers to

- Is there an optimal way to operate the cryomodule post field-emission onset? Should the amplitudes be lower or could they be higher than the current values?
- We are currently considering full replacement or plasma processing. What other potential avenues have been applied to recover cryomodule performance from field-emission? What are the associated risks for each method?
- Even if a root-cause can not be found, are there ways to prevent something similar from happening again? What are potential mitigations for risks of a repeat if CM01 is replaced with a new cryomodule?
- Are there spatial patterns for field emission over the full machine and within cryomodules in the LCLS SC linac?