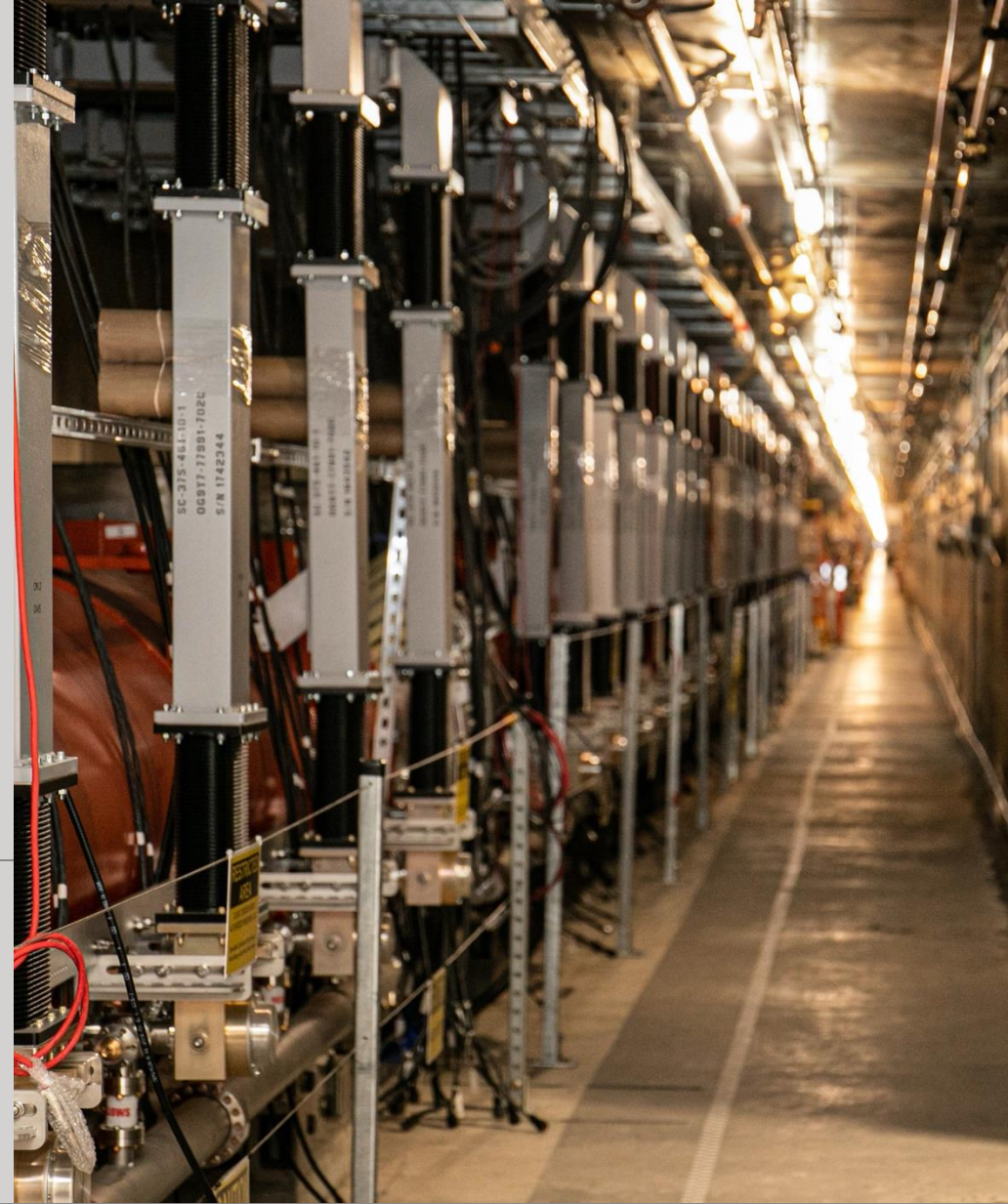


CM01 Field Emission Workshop

Welcome and Logistics

Sebastian Aderhold

January 28 2025



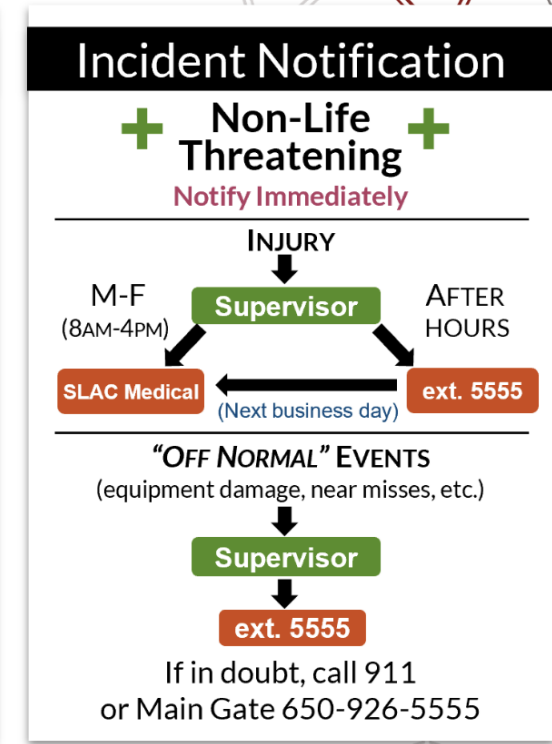
Emergency information

Fire

- Evacuate - Be aware of building exits
- Follow building residents to the assembly area
- Do not leave until you are accounted for, and have been instructed to do so

Earthquake

- Remain in building - duck, cover, and hold position
- When shaking stops, evacuate building via a safe route to the assembly area
- Do not leave until you are accounted for, and have been instructed to do so



Incident Notification

Dial **911** or **9-911** from any SLAC landline:

- Connects you to the dispatch center
- Activates an alarm at SLAC Main Gate

Welcome!

- CM01 plays crucial role as injector cryomodule. Field emission onset was sudden, unexpected and to date unexplained.
- Tried to gather experts from various related fields (SRF, injectors, cathodes, simulations, operations, vacuum, plasma processing,...)
- We want to focus heavily on discussion with a few presentations on other experiences as well as slide prompts.
- Appreciate everybody taking time to attend (in-person, online, different time-zones, a lot going on,...)

Logistics

- Coffee breaks in front of the conference room. Feel free to use outside seating.
- Lunch in the SLAC cafeteria for our external in-person attendees is on us.
- Rooms:
 - We have this room and the neighboring (identical) room both full days for breakout discussion where needed. Third room in the building (048 Cedar) some of the time.
 - Each room will be connected to a virtual equivalent breakout room on Zoom, all in the same meeting that you are already connected to.
- Zoom rules:
 - Please use the “raise hand” feature, we will try to address those in order.
 - If you have plots or parts of talks that would aid the discussion or help make a point, please let me know and we can let you share your screen.

Workshop scope

Questions we would like to try 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?

Workshop scope - continued

Questions we would like to try 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?

Agenda

Tuesday 1/28

08:00	Registration <i>Building 48 - Redwood Conference Room, SLAC</i> 08:00 - 08:30
	Welcome and introduction to the workshop <i>Sebastian Aderhold</i> <i>Building 48 - Redwood Conference Room, SLAC</i> 08:30 - 09:00
09:00	Summary of CM01 situation and history <i>Sebastian Aderhold</i> <i>Building 48 - Redwood Conference Room, SLAC</i> 09:00 - 10:00
10:00	Coffee break <i>Building 48 - Redwood Conference Room, SLAC</i> 10:00 - 10:30
11:00	Experience with FE at other facilities <i>Building 48 - Redwood Conference Room, SLAC</i> 10:30 - 12:00

12:00	Lunch <i>Building 48 - Redwood Conference Room, SLAC</i> 12:00 - 13:00
13:00	Breakouts: Breakout discussion <i>Building 48 - Redwood Conference Room, SLAC</i> 13:00 - 15:00
14:00	
15:00	Coffee break <i>Building 48 - Redwood Conference Room, SLAC</i> 15:00 - 15:30
16:00	Joint discussion <i>Building 48 - Redwood Conference Room, SLAC</i> 15:30 - 16:30

Agenda

Wednesday 1/29

08:00	Diagnostic methods <i>Building 48 - Redwood Conference Room, SLAC</i> 08:00 - 08:40
09:00	Simulations <i>Building 48 - Redwood Conference Room, SLAC</i> 08:40 - 09:20
	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
11:00	Breakouts <i>Building 48 - Redwood Conference Room, SLAC</i> 10:30 - 12:00

12:00	Lunch <i>Building 48 - Redwood Conference Room, SLAC</i> 12:00 - 13:00
13:00	Remediation methods <i>Building 48 - Redwood Conference Room, SLAC</i> 13:00 - 13:40
14:00	Potential root-causes for FE <i>Building 48 - Redwood Conference Room, SLAC</i> 13:40 - 14:40
	Coffee break <i>Building 48 - Redwood Conference Room, SLAC</i> 14:40 - 15:00
15:00	Summary discussion and closeout <i>Building 48 - Redwood Conference Room, SLAC</i> 15:00 - 16:00
16:00	