CM-1 Status

ILC Cryomodule meeting

22 November 2011

E. Harms/FNAL

Recent Measurements

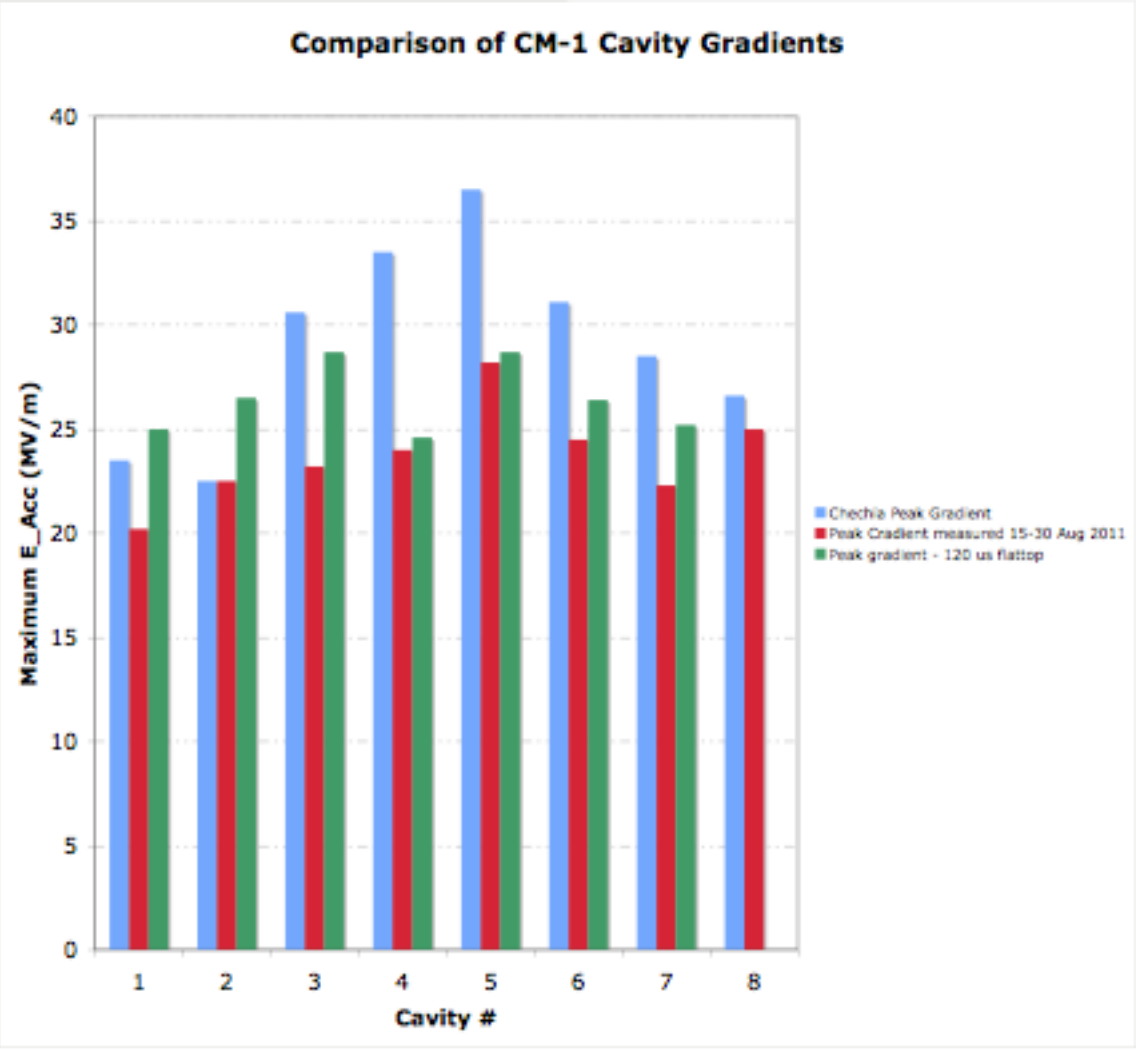
- Peak Gradient and Q_L as a function of flattop length
- LFDC - see Yuriy's slides
- LLRF
- Investigate/search for localized field emission

Vary Flattop Length

- Operating parameters
  - 5 Hz operation
  - Fill time = 500 μs (typical)
  - Vary flattop from 120 μs to 620 μs
  - One cavity on resonance at a time
- Record
  - Q_L drop
  - Limit of cryogenic stability
  - Peak stable gradient
  - Quench or other limit
  - Diagnostic signals
    - HOM response and temperatures
    - FEP
- Motivation - discern cause of 'high heat load' in poorly performing cavities
  - HOM heating/multi-pacting?

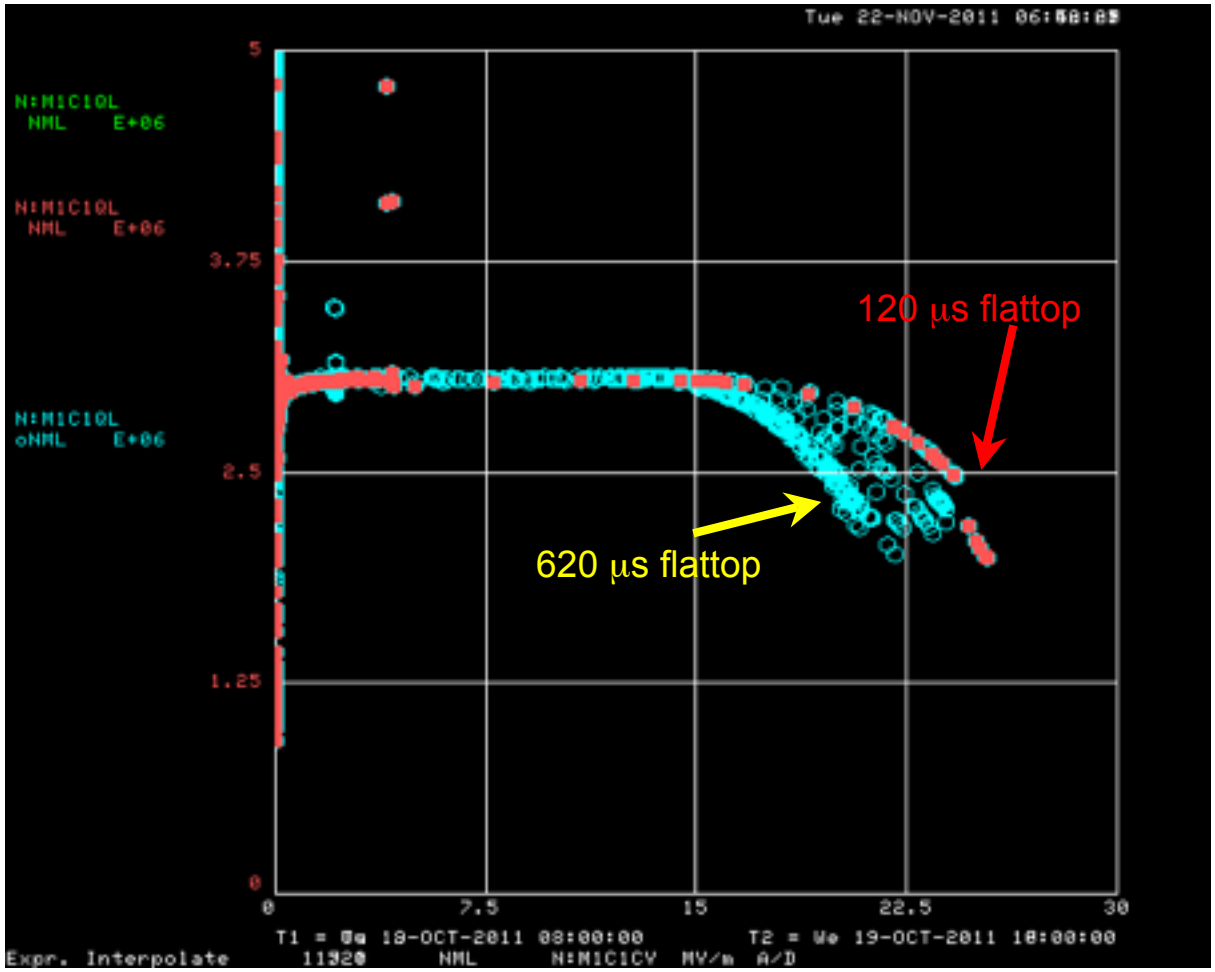
Vary Flattop Length

- Peak gradients all increased (green compared to red)
- No clear indication of increased HOM heating on suspect cavities
- Quench limit generally inversely proportional to flattop length
- Some cavities limited by available RF power



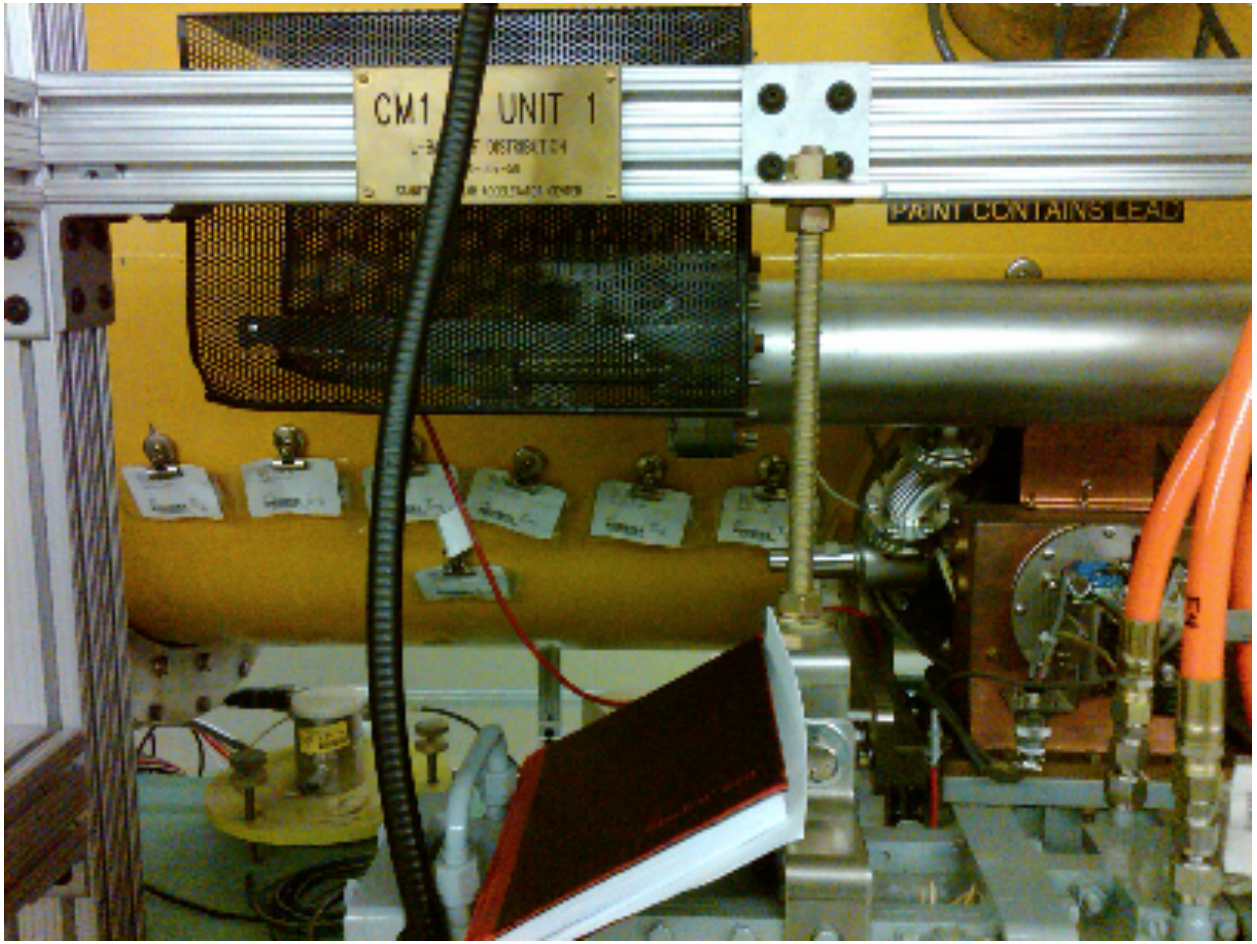
Vary Flattop Length

- Cavity #1
  - Variation of Q_L and peak gradient with flattop length
  - 100 μs increments in flattop length
  - Onset of Q_L drop from 14 - 17 MV/m
  - Peak gradient increased from 21 to 25 MV/m



Search for Localized Field Emission

- Personnel dosimetry installed near Cavity #1
  - 20 badges
  - Cavity #1 only on resonance
  - ~3 hours of operation near peak gradient, full flattop
  - Only minimal response, mainly near upstream end (way from coupler)
  - Repeat with more running time



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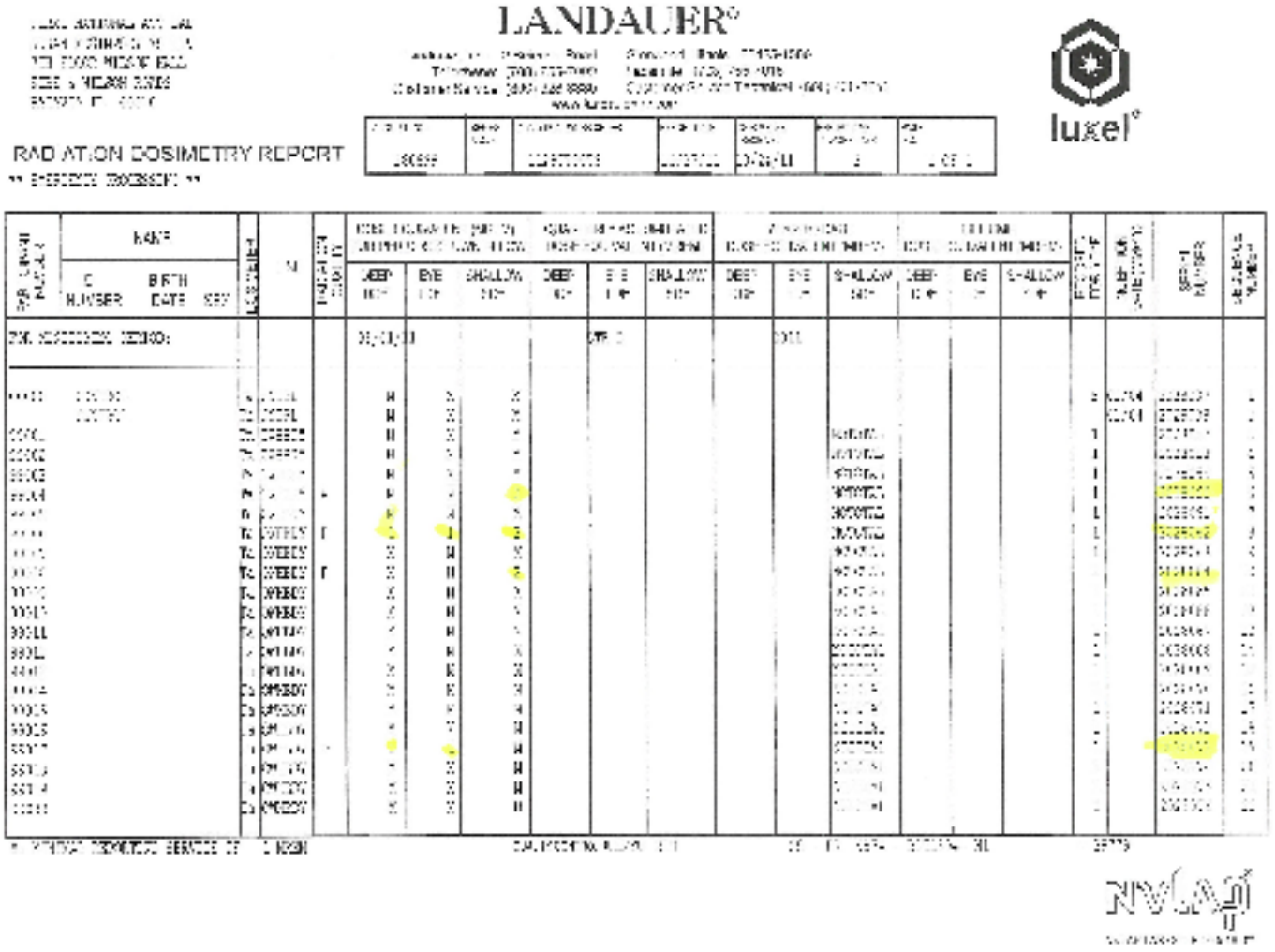
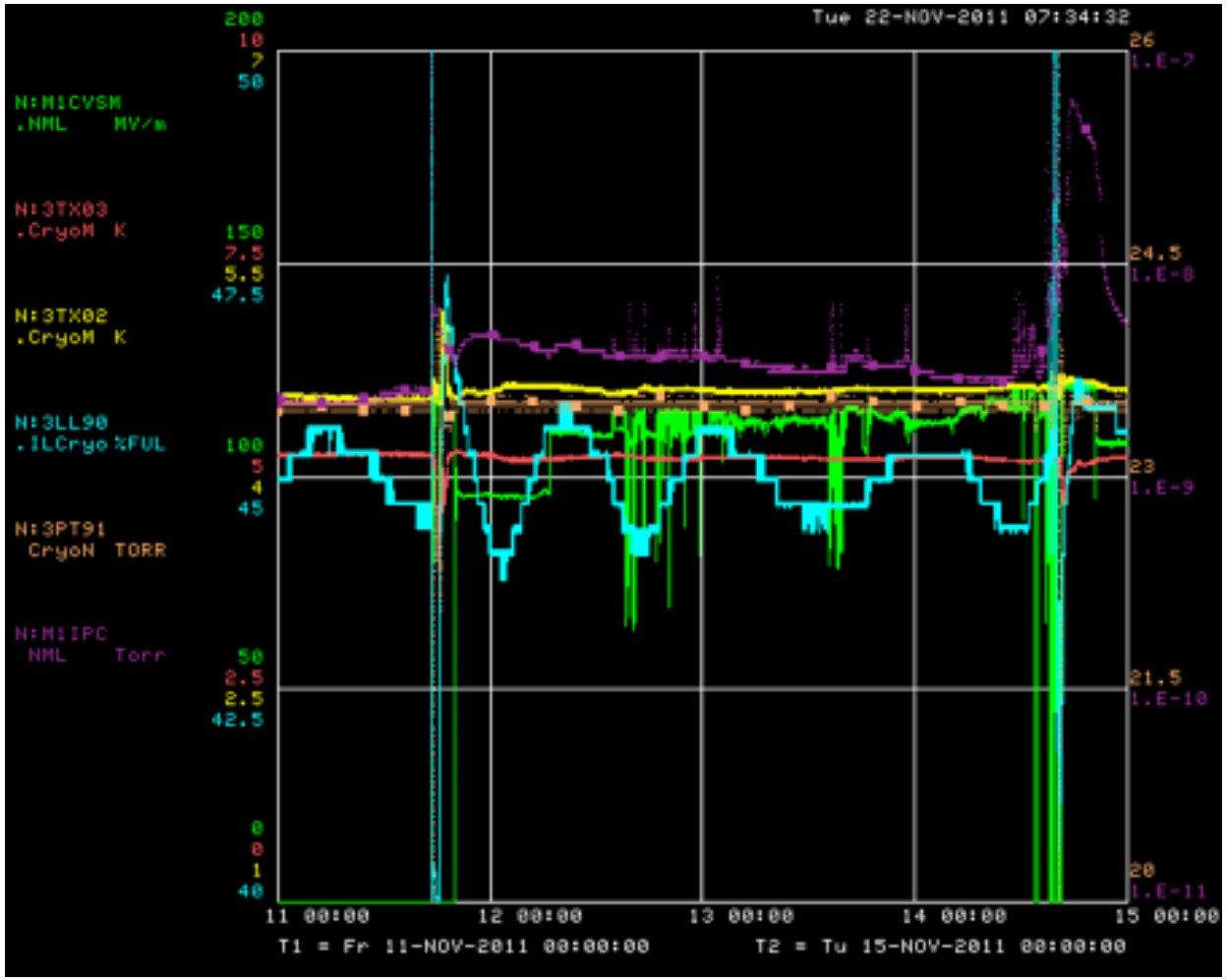


Sustained Operation

- The longest period of continuous operation has been 68 hours. Limitations
  - Water issues
  - Coupler vacuum at high power and repetition rate
  - Off-site power ‘glitches’



Remaining Work

- Detailed HOM study - multipacting?
- Phase adjustment to put all cavities in accelerating phase
- 100 hour+ sustained operation
- P-X 2-cavity 8 ms pulse test
- Thermal cycle
- Other suggestions?

Schedule

- LLRF work this week
- LFDC ongoing
- Prepare and conduct 8ms 2-cavity test
  - Early December
  - ~2 weeks
- Thermal cycle late December (Christmas holiday)
- Cool down and resume operation early January
- Final tests first half of January
  - Including Piezo break CM-1 tests
- Begin warm-up - late January

Post Mortem

- Once module is warm and open inspect
  - Cavity #8 tuner
  - Thermal intercepts on Cavities 1, 3, 7, especially HOM cans
  - Piezo on #7