JLab Update

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April 30, 2014

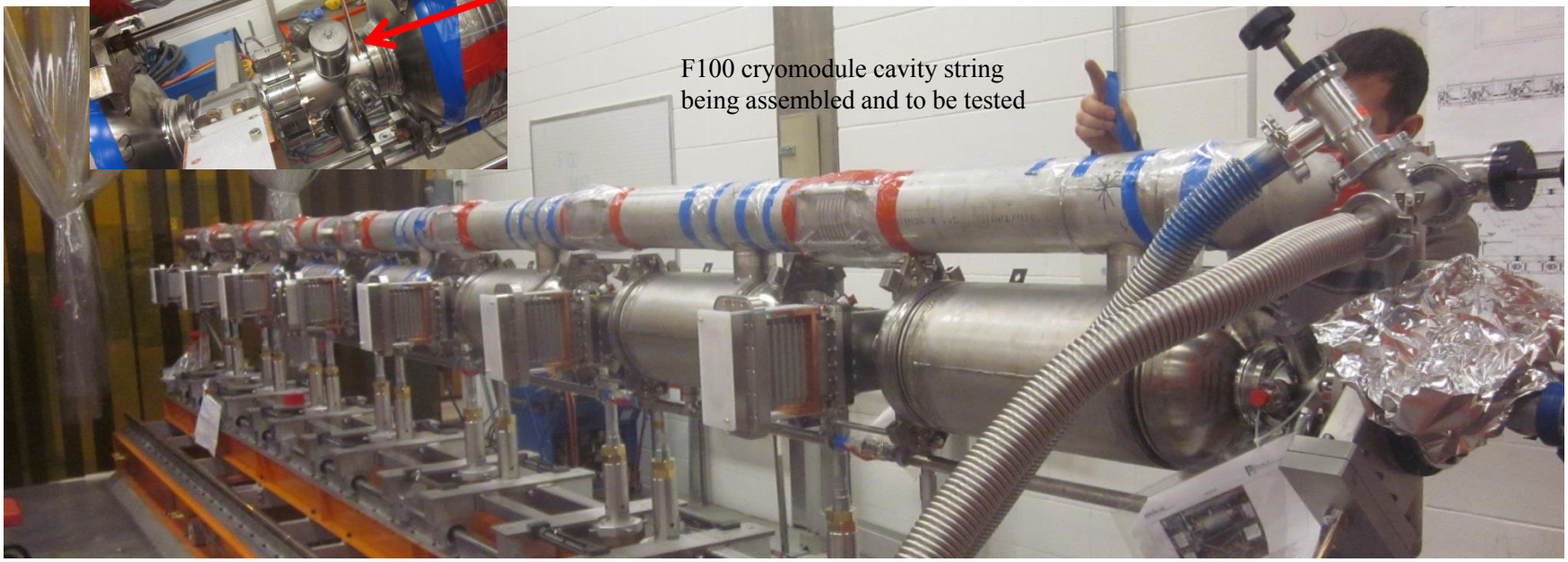
4th LCC ILC Cavity Group Meeting

High Gradient SRF Themes

- Understand and reduce field emission
  - Cavity vertical testing at Epk 100 MV/m
  - Gradient and Q0 degradation due to field emission from vertical testing to operation in cryomoudle
    - CEBAF upgrade cavity experiences
- Improve efficiency at high and very high gradient
  - New shape – higher R/Q and lower Hpk/Eacc
  - Large-grain material
  - Frozen-in flux (and response to thermal cycling)

JLab Status: Field Emission Instrumentation

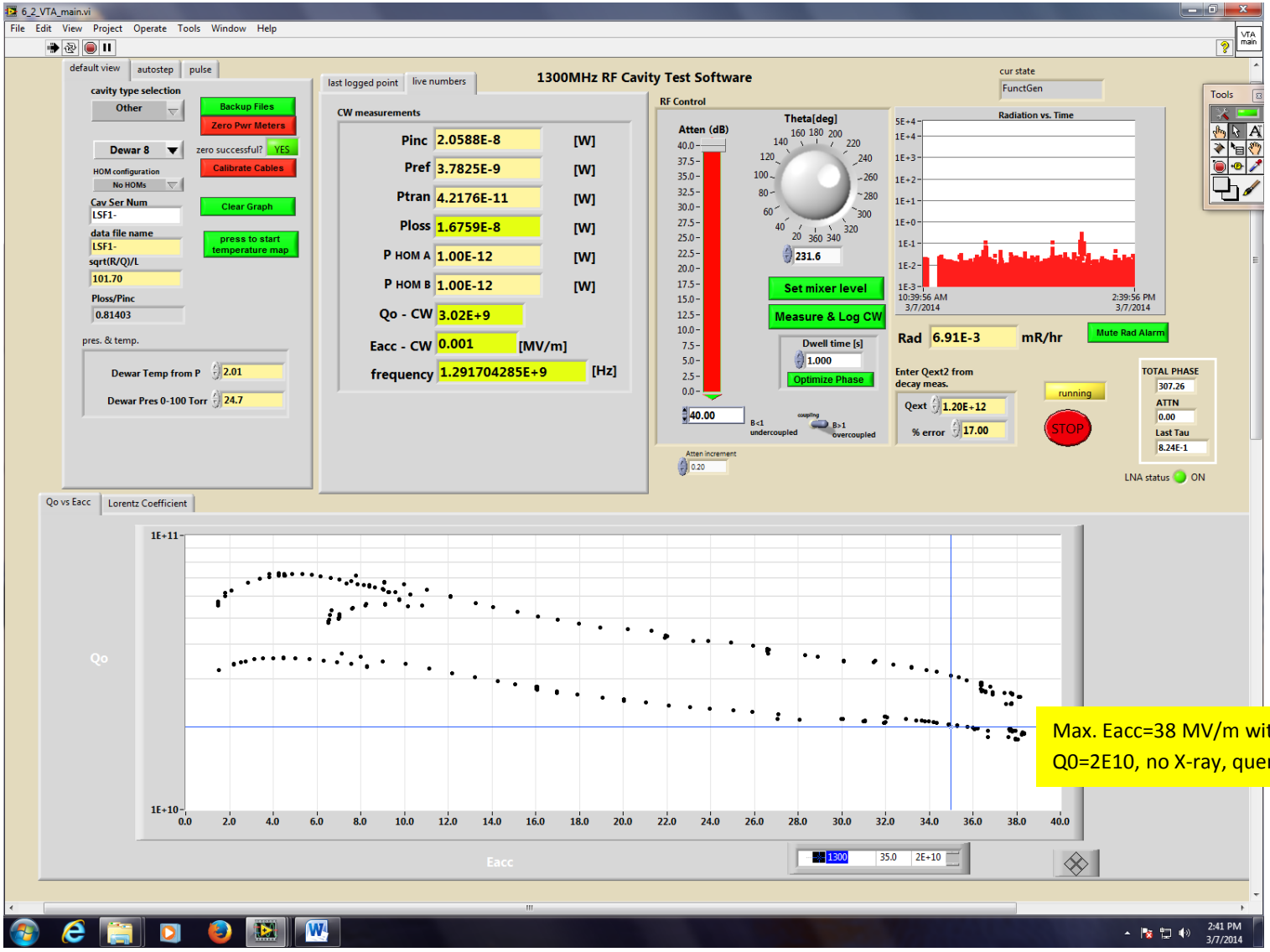
- **Installation X-ray sensors (Hamamatsu S1223-01) at all cavities in full FEL cryomodule**
  - **Compare field emission data at VTA testing with cryomodule testing**
  - **Establish correlation between FE induced X-ray and FE induced Q0 loss and dark current at end of cryomodule**
  - **Cryomoudle in test cave. Test to be started soon.**



JLab Status: High Q0 at 45 MV/m

- **Two single-cell large-grain niobium cavities under processing and testing for high Q0 at ultra high gradient regime of > 45 MV/m**
  - **New LSF shape 1-cell large-grain cavities (Two each)**
    - **In collaboration with Peking University, Ningxia Large grain material.**
    - **Processing procedure: BCP + 800CX2hr + BCP + 120C bake.**
    - **Test data later slide.**
- **One new single-cell large-grain niobium cavity under processing and testing**
  - **Cavity PJ1-2**
    - **In collaboration with Peking University and OTIC, Ningxia large-grain Nb material and fabrication.**
    - **CEBAF upgrade cavity Low-loss shape, 1.5 GHz.**
    - **Processing procedure: BCP60um+800Cx2hr+BCP60um+HPR+120Cx48hr.**
    - **Max. Eacc 34 MV/m with Q0=1.6E10 at 2K, limited by quench, no FE.**
    - **Max. Eacc 34 MV/m with Q0=2.5E10 at 1.8K, limited by quench, no FE.**
    - **Next is EP and re-test.**
    - **Test data later slide.**

LSF1-2 Cold Test Result



Max. Eacc=38 MV/m with Q0=2E10, no X-ray, quench limit

1-Cell Niobium Cavity PJ1-2 RF Performance