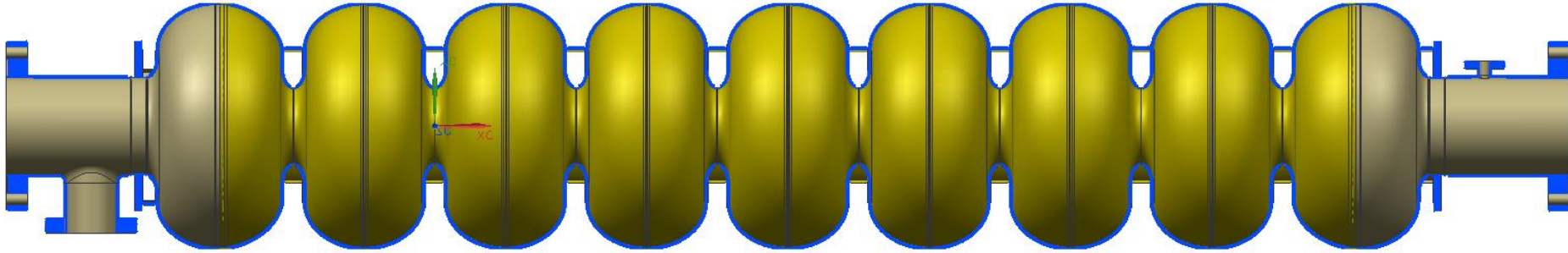

JLab Update

Rongli Geng

January 22, 2014

3rd LCC ILC Cavity Group Meeting

JLab Status: 9-cell Cavities



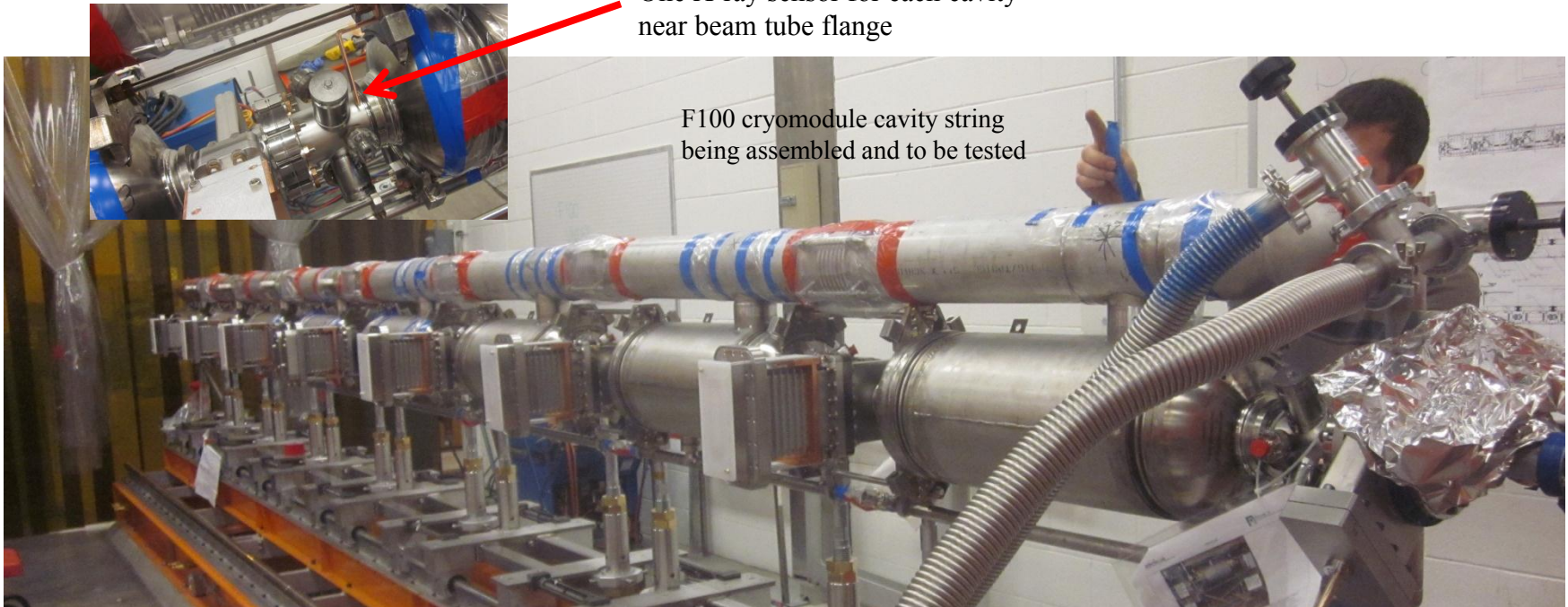
- New 9-cell Low-Surface-Field shape (SLAC design) cavity.
 - Nb half cell frequency measurement completed, excellent repeatability.
 - Stiffening weld prep machining completed.
 - New EBW fixture design and testing
- Two large-grain ICHIRO shape cavities
 - Both baseline tested
 - Cavity #1 limited by quench at 20 MV/m
 - Cavity #2 completed post-CBP processing, discovered large leak during initial pump down.



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**

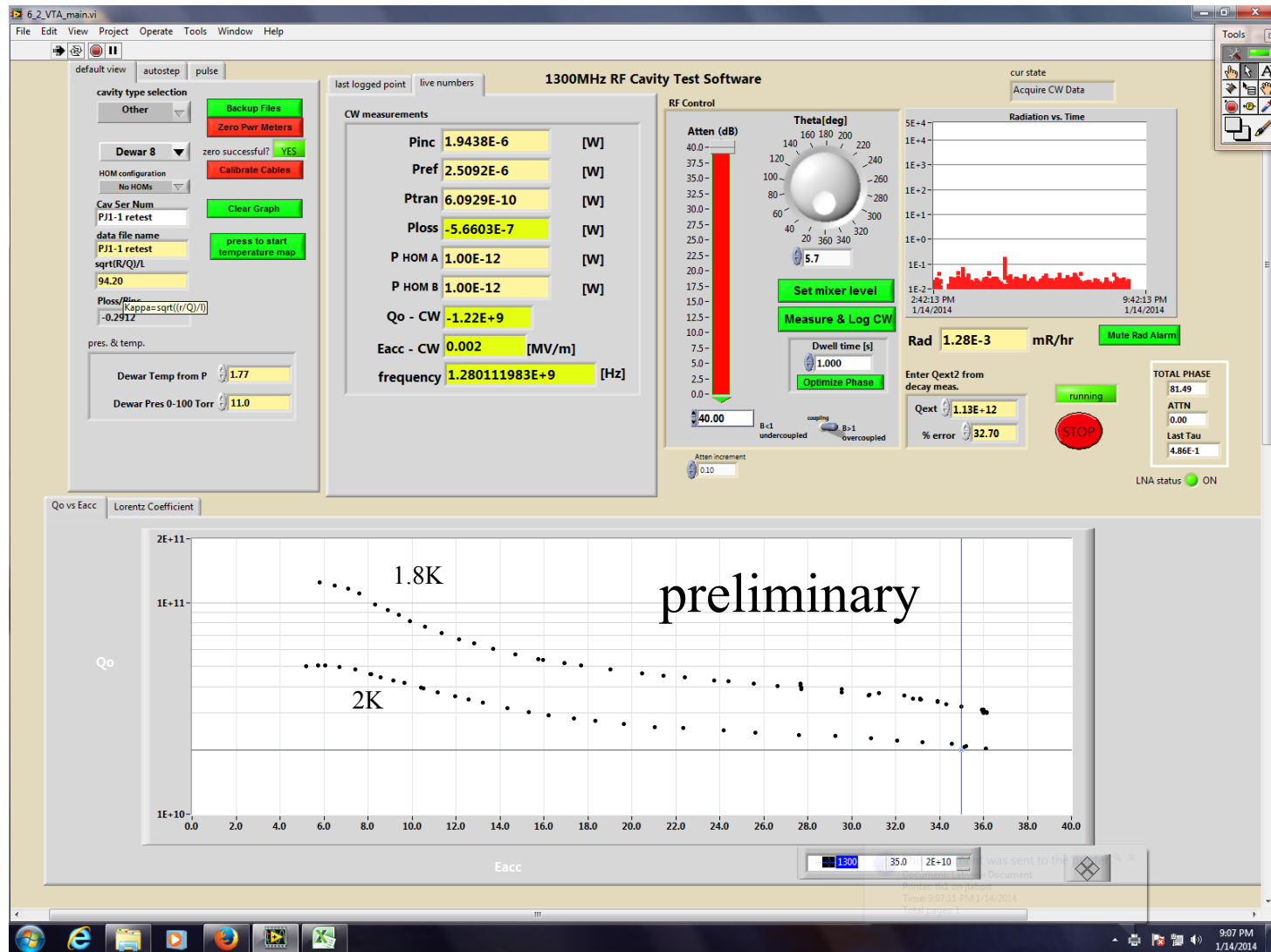
One X-ray sensor for each cavity near beam tube flange



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**
 - **Cavity PJ1-1**
 - In collaboration with Peking University, Ningxia Large grain material, half cell fab by PKU, EBW at JLab.
 - Processing procedure: Mirror-Finish (Mf) CBP + BCP10um + 800Cx2hr + EP30um + 120C48hr.
 - 3rd test after 120Cx20hr bake completed.
 - Max. Eacc 36 MV/m with Q0=2.3E10 at 2K, limited by quench, no FE.
 - Max. Eacc 36 MV/m with Q0=3.1E10 at 1.8K, limited by quench, no FE.
 - High Q0 over wide range of gradient – re-test is next for improved accuracy in Q0.
 - **Cavity G2**
 - Processing procedure: MfCBP + 800Cx2hr + EP30um + 120Cx48hr.
 - Max. Eacc 35.2 MV/m with Q0=1.5E10 at 2K, limited by quench, no FE.
 - Max. Eacc 35.8 MV/m with Q0=2.2E10 at 1.8K, limited by quench.
 - Cryogenic thermal cycling tests to be continued.
- **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.

1-Cell 1.3 GHz TESLA Mid-Cell PJ1-1



1-Cell 1.5 GHz Low-Loss Shape PJ1-2 (CEBAF Upgrade End Cell)

