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SRF at ANL: Progress and Plans

February 2, 2009

Speaker: Mike Kelly

ANL SRF Activities

■ *ATLAS Upgrade*

- 7-cavity upgrade cryomodule nearing completion
- Goal to increase ATLAS voltage by 30% in a single 5-meter module
- Demonstration of technology for next generation linacs for protons and heavy-ions

■ *ILC*

- Considerable progress on cavity processing since ~Nov. 08
- All essential steps for cavity processing/assembly are operational

■ *HINS/Project X*

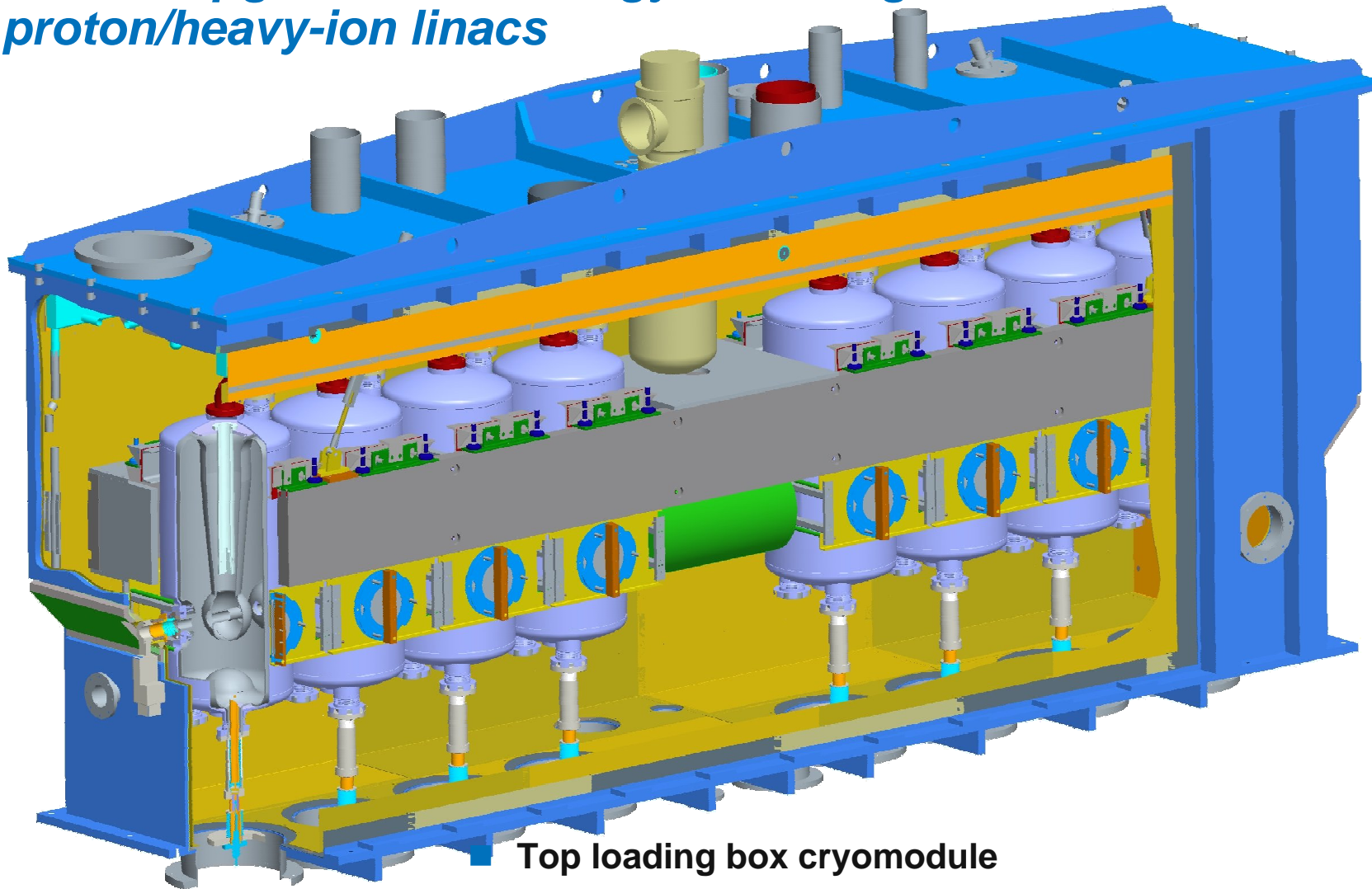
- ANL participation in ongoing R&D (single spokes SSR1-01,02)
- ANL has strong interest in working with FNAL on the front end for Project X

■ *FRIB*

- MSU selected as site in Dec. 08
- Level of ANL participation in SRF for FRIB unclear



ATLAS Upgrade: Technology for next generation SRF proton/heavy-ion linacs



Top loading box cryomodule

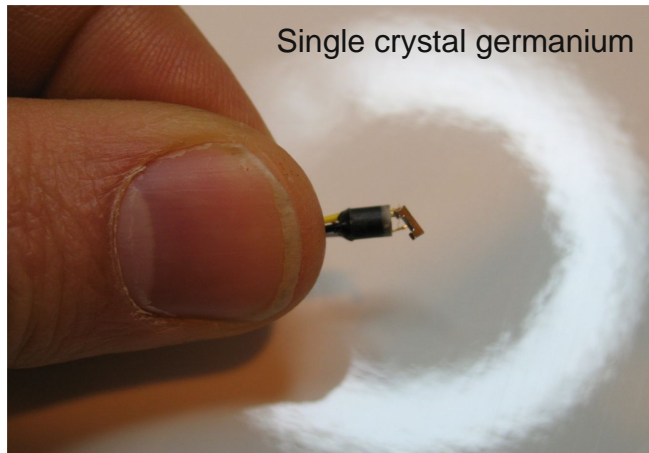
- Facilitates simplified assembly
- Equally suitable for spokes, half-waves, quarter-waves

HINS: A pair of single spoke cavities processed at ANL

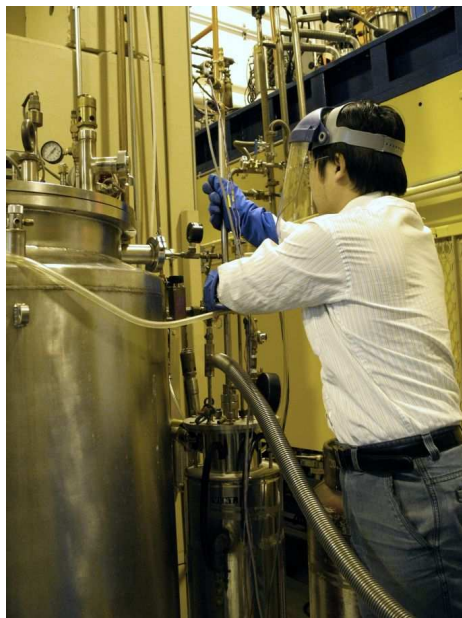


- *Performed chemical polishing, high-pressure rinsing in G150 (good results for SSR1-01)*
- *Basis for a more formal and broad based collaboration to include design, fabrication, assembly and testing*

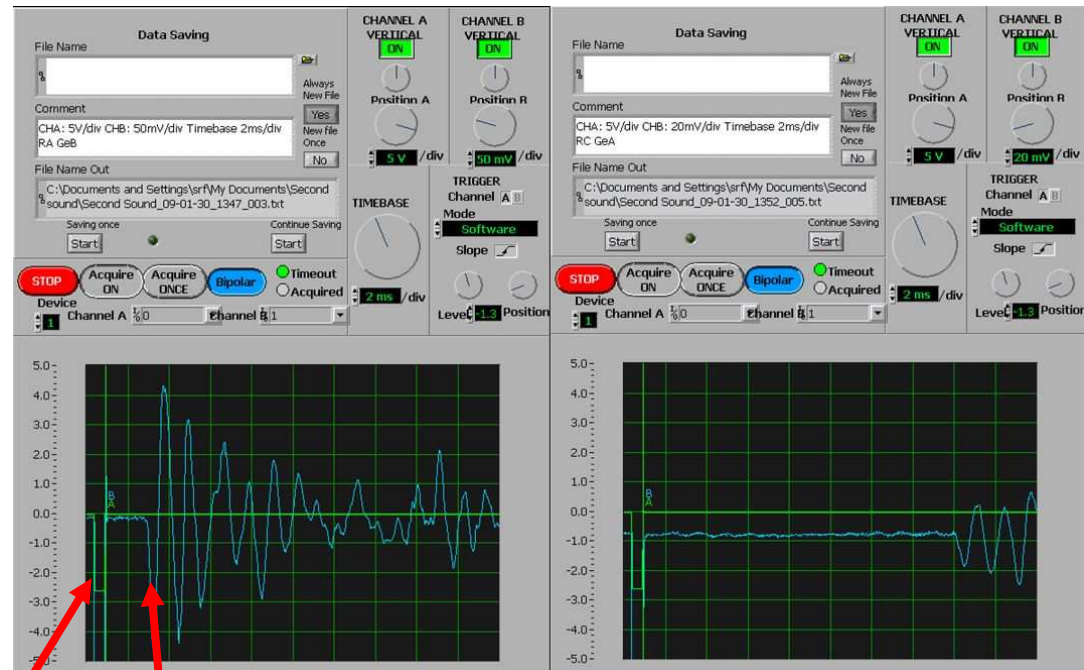
Common need in SRF community for cavity diagnostics: Second sound measurements



Single crystal germanium



Germanium detector mounted on a 6 ft dewar insert (Z. Liu)

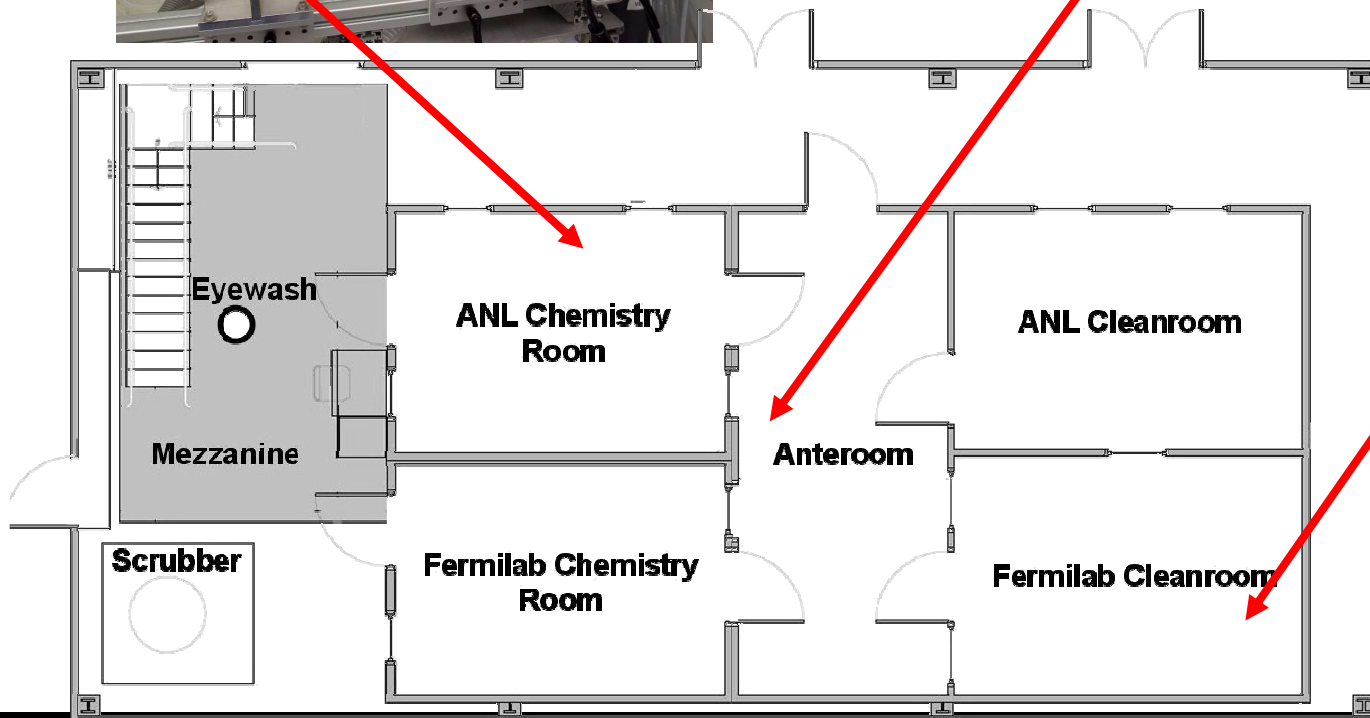
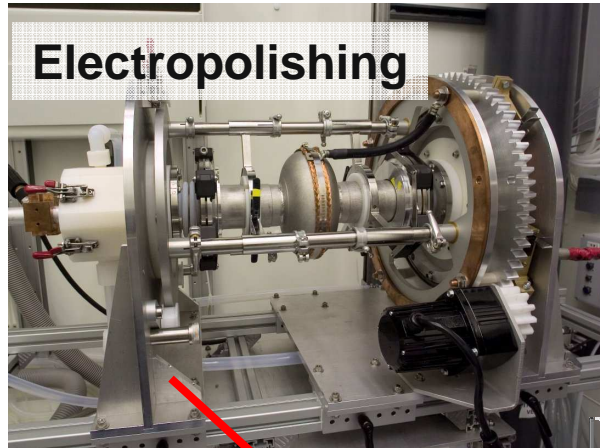


Heat pulse

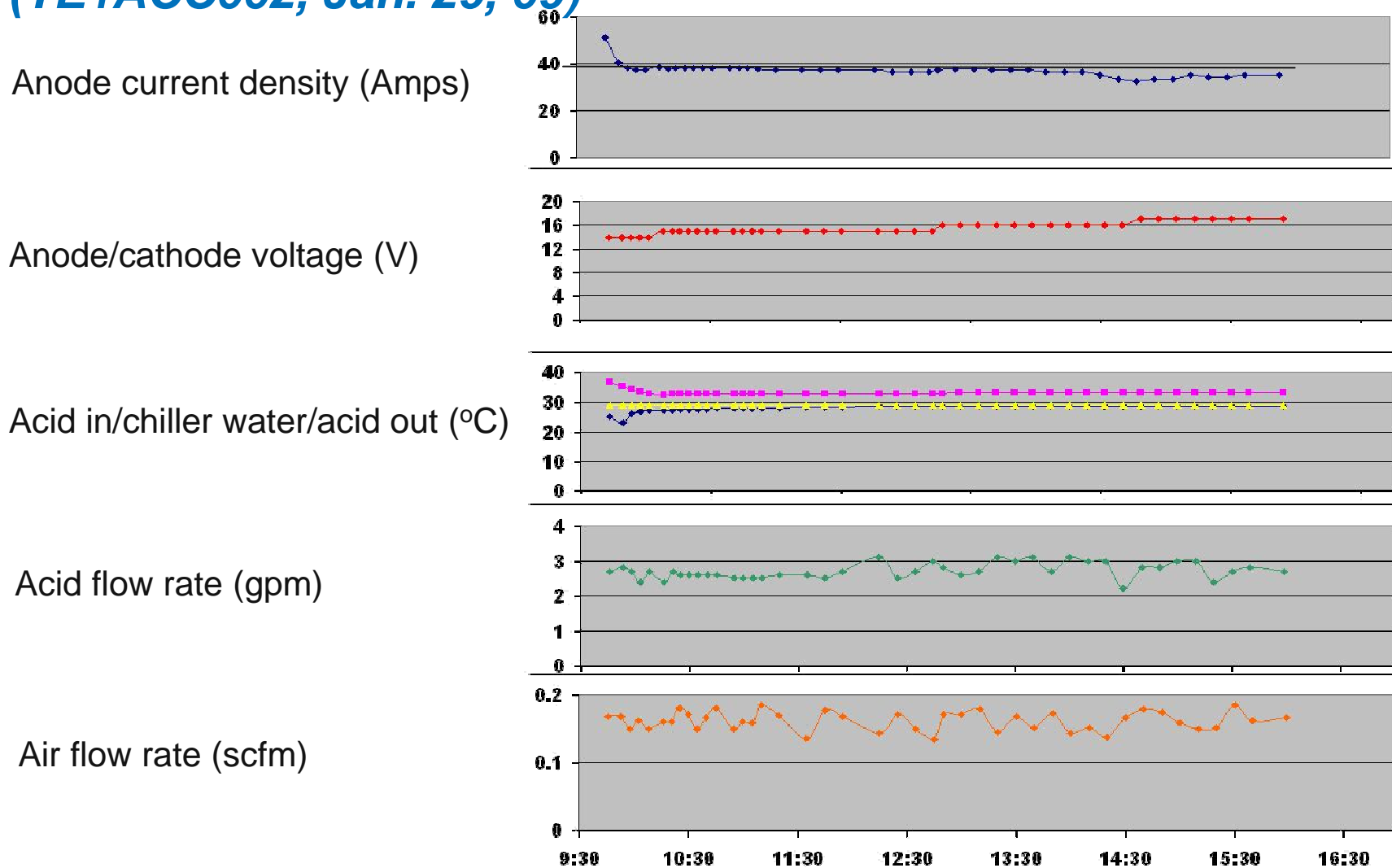
2nd sound signal

- **Good signal-to-noise, time resolution in 6" test dewar**
- **Ready for test with cavities**

ILC: Cavity processing at Argonne

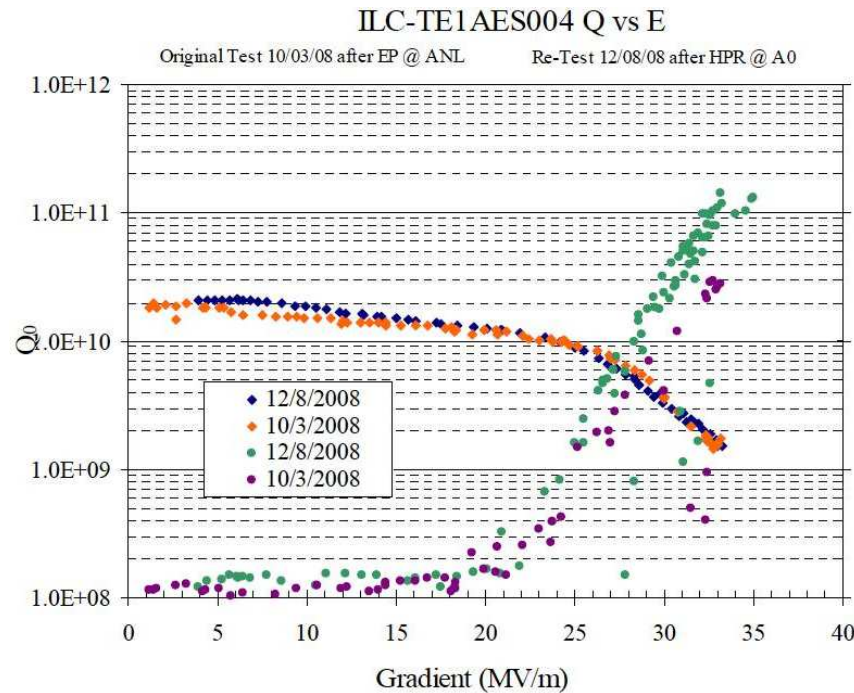


Electropolishing parameters for single cell cavity (TE1ACC002, Jan. 29, 09)

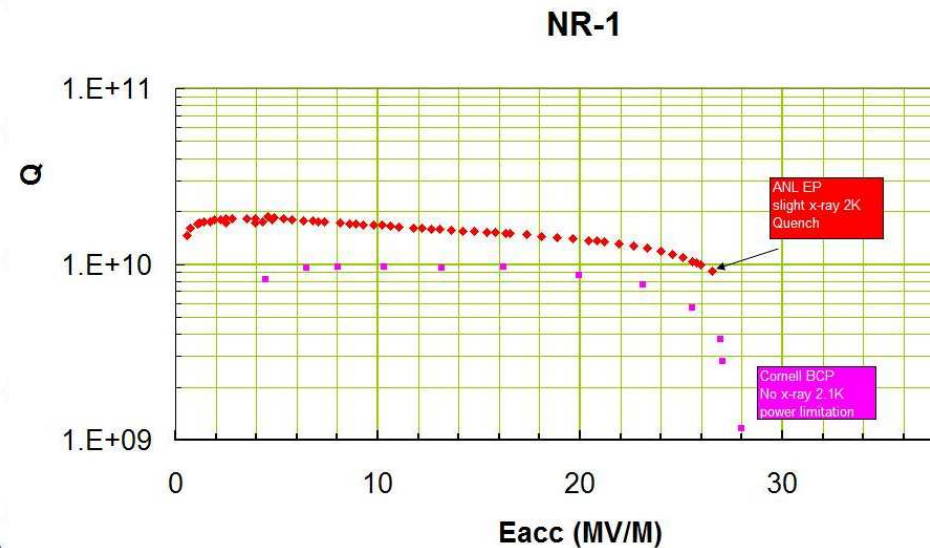


■ *We are getting a good handle on precise parameters with this system on single cells*

Recent single-cell results (fabricated at AES and Niowave)



Limited by available rf power at 33 MV/m



Limited by quench at 27 MV/m

- ***ANL/FNAL should demonstrate at least a few good single cell results before proceeding with nine cell cavities***

Data provided by J. Ozelis, G. Wu

Present FY09 manpower for ILC at joint ANL/FNAL Facility

■ *Present ANL Manpower*

- 1.25 FTE total (S. Gerbick, M. Kelly @ 50% for remainder FY09)**
 - 4 electropolishing procedures so far this year (2 last week)**
 - 2 procedures end of Feb/beginning of March**
 - 2-3 EP/month through April 09 - Sept. 09**
 - ~17 total EP procedures for FY09**

■ *Present FNAL Manpower*

- 1.5 FTE**
 - FNAL leading the clean room work**
 - FNAL personnel are being trained on electropolishing**

Manpower is ample for the next couple months

I believe the effort should be expanded to ~2 FTE each at ANL and FNAL by the end of FY09

Summary/Plan

- **ANL will install a SC cavity upgrade cryomodule into ATLAS this March**
 - Technological basis for the next generation of proton and heavy ion linacs
- **Joint ANL/FNAL processing facility in reasonably good shape to deliver cavities for ILC cold test program**
 - *No Accidents*
 - Should ramp up manpower (2 FTE each lab ~full time)
 - Spares, reserve components should be obtained ASAP in order to sustain full time operations
- **HINS/Project X collaboration in single spoke cavities**
 - ANL participation should be broad based and go beyond processing
 - ANL has strong interest in the 420 MeV front end; requires a quick start to triple-spoke prototyping
- **Work together on cavity diagnostics?**