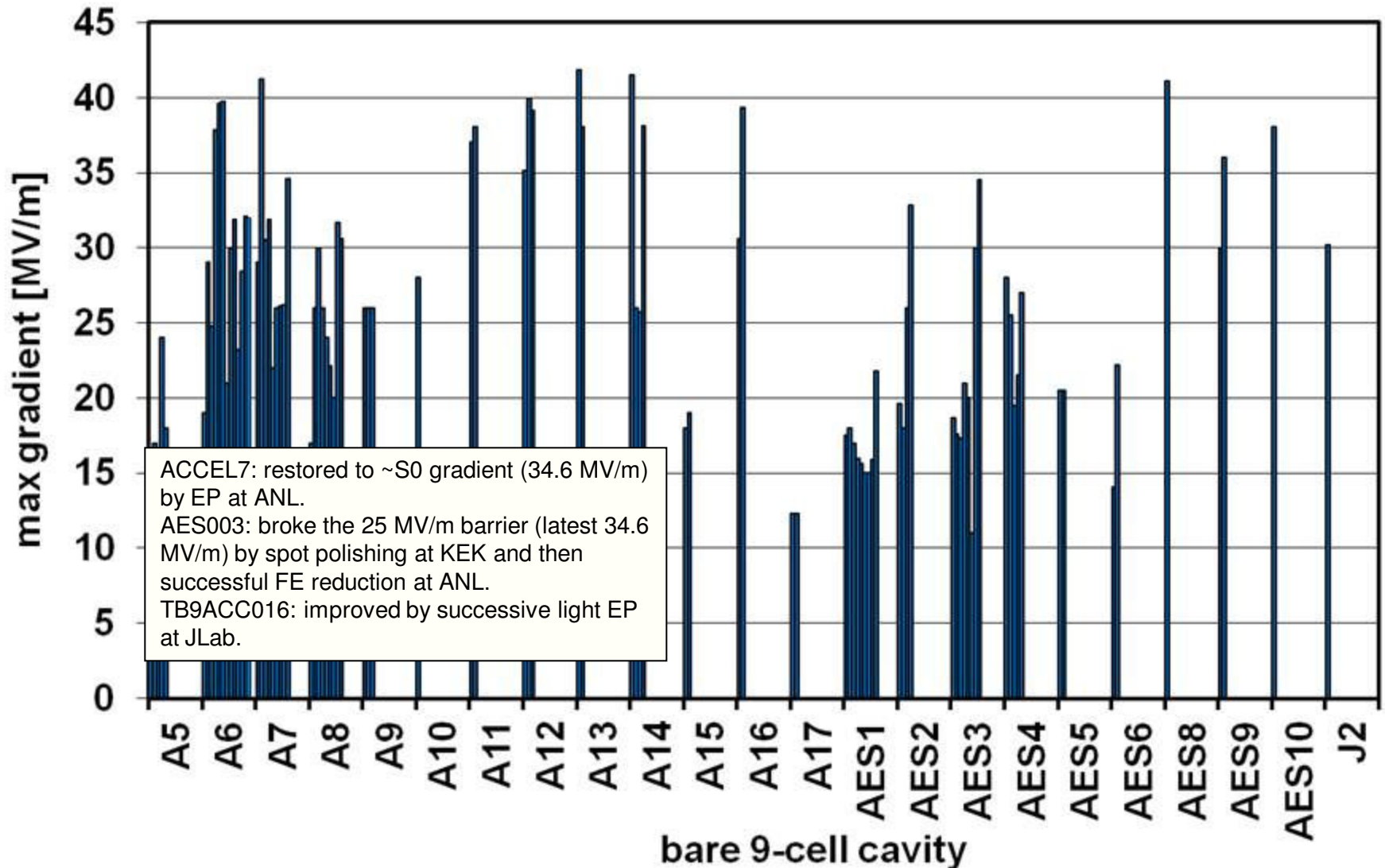


Update on S0 Work in the Americas Region

Mark Champion
16 February 2010

Americas 9-cell Cavities



Americas 9-cell Cavities

Qualification tests since Nov. 1, 2009

Serial Number	Field [MV/m]	Date of Test	Location	Test limitation
ACCEL7	26.0	11/6/2009	FNAL	quench/FE
TB9AES010	38.0	11/7/2009	JLAB	quench
TB9ACC016	30.6	11/25/2009	JLAB	quench
TB9ACC017	12.3	12/7/2009	FNAL	quench
ACCEL7	26.1	12/16/2009	FNAL	quench/FE
TB9ACC016	31.3	12/16/2009	JLAB	quench
ACCEL6	32.0	12/21/2009	FNAL	quench/FE
ACCEL7	26.2	12/28/2009	FNAL	quench/FE
TB9ACC010	28	1/6/2010	Cornell	quench/FE
AES003	30.0	1/12/2010	FNAL	quench/FE
AES003	34.5	1/26/2010	FNAL	FE

And a few more since then...



Vertically tested, bare (un-dressed) cavities
Two dressed cavities also vertically tested at Fermilab

Americas 9-cell Cavities

Status/Plans

Serial Number	Gradient [MV/m]	Test Location	Cavity Status/Plan
Qualification Tests for Dressing are Complete			
AES001	21.8	KEK	dressed; R&D path
AES002	32.8	JLAB	dressed; R&D path
AES004	27.0	JLAB	dressed; S1-Global@KEK
TB9ACC011	38.0	JLAB	dressed; S1-Global@KEK
TB9ACC013	38.0	FNAL	dressed; CM2@Fermilab
TB9AES009	36.0	JLAB	dressing in progress; CM2@Fermilab
ACCEL8	30.6	JLAB	dressing in progress; CM2@Fermilab
TB9AES008	41.1	JLAB	bare; CM2@Fermilab
TB9AES010	38.0	JLAB	bare; CM2@Fermilab

R&D Bare Cavities (if improved, go to cryomodules)

ACCEL6	32.0	FNAL	R&D path (facility studies)
ACCEL7	26.2	FNAL	R&D path (facility studies)
ACCEL9	26	Cornell	R&D path (vertical EP@Cornell)
AES003	34.5	FNAL	R&D path (VTS after local grinding at KEK)
JLAB-2	30.2	JLAB	R&D path (tuning machine commissioning)
TB9ACC010	28	Cornell	R&D path (vertical EP at Cornell); bare
TB9ACC012	39.1	FNAL	R&D path (EBW damage; planning repair)
TB9ACC014	38.1	FNAL	R&D path (handling damage; repair underway)
TB9ACC015	19.0	JLAB	R&D path (tumbling/VEP@Cornell)
TB9ACC017	12.3	FNAL	R&D path (pit studies)
TB9AES005	20.5	JLAB	R&D path (tumbling/VEP@Cornell)
TB9AES006	22.2	JLAB	R&D path (tumbling/VEP@Cornell)

New Cavities Intended for Cryomodules

TB9AES007 in processing at JLab
 12 new RI cavities received, in inspection, and starting processing
 6 new AES cavities expected Feb-Mar
 6 new Niowave-Roark cavities expected Feb-Jun

S1-Global Cryomodule
 4-cavity string completed at KEK



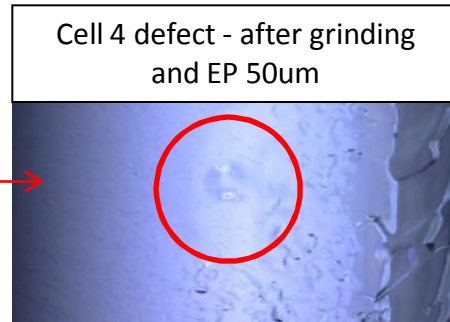
AES004

TB9ACC011

In addition, 1-cell cavities are used to qualify new vendors and techniques before progressing to 9-cells

AES003 Repair

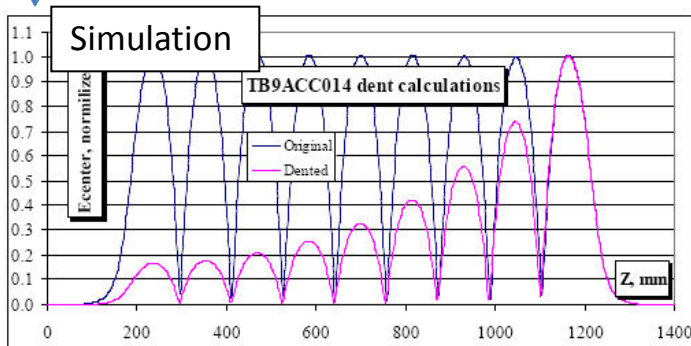
- Initially moderate performance ~ 20 MV/m with isolated quench location at cell 4 verified with thermometry; performance not substantially improved by repeated EP
- Used for commissioning of variable coupler (FNAL); field-emission limited
- Used for commissioning of optical inspection system and thermometry (LANL)
- Sent to KEK for optical inspection (Kyoto/KEK system) , local grinding of equator and iris defects, and EP



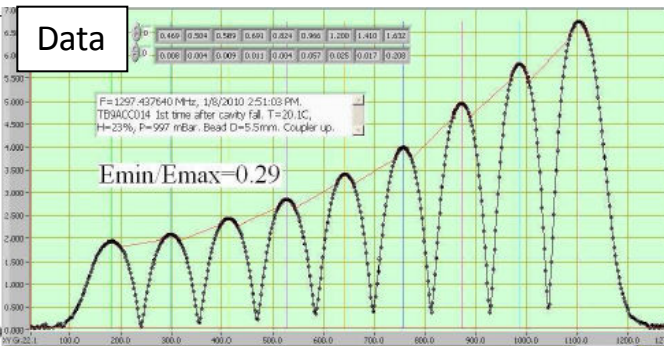
- FNAL/ANL first test after partial HPR 30 MV/m; field-emission limited; no heating at previous quench site
- FNAL/ANL full HPR cycle, cavity performance improved to 34 MV/m; currently field-emission limited; additional improvement anticipated

TB9ACC014 Recovery Attempt

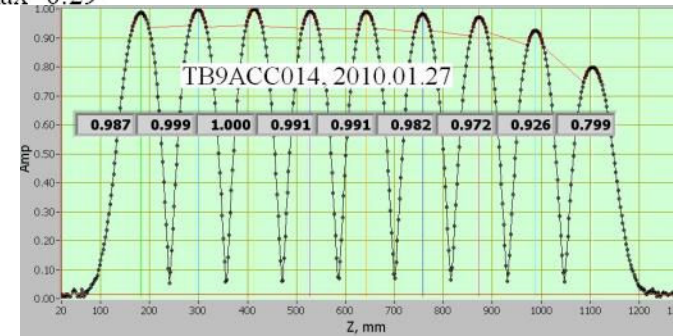
- Well performing cavity: last test 38 MV/m
- Cell 9 damaged in handling incident
- Dented cell was tuned to lower field based on simulation
 - Simulated dent: 5.3 mm flat cut plus 3 mm dent depth
 - Cavity tune well simulated – dent is slightly overestimated
 - Surface magnetic enhancement factor 1.35; to compensate must reduce field in cell #9 to 74% of that in other cells
 - Cavity estimated tune for improved performance was achieved
 - Expect <3% loss of overall cavity gradient
- Plan HPR and vertical test in the next couple of weeks



Frequency shift +544 kHz. Emin/Emax=0.17

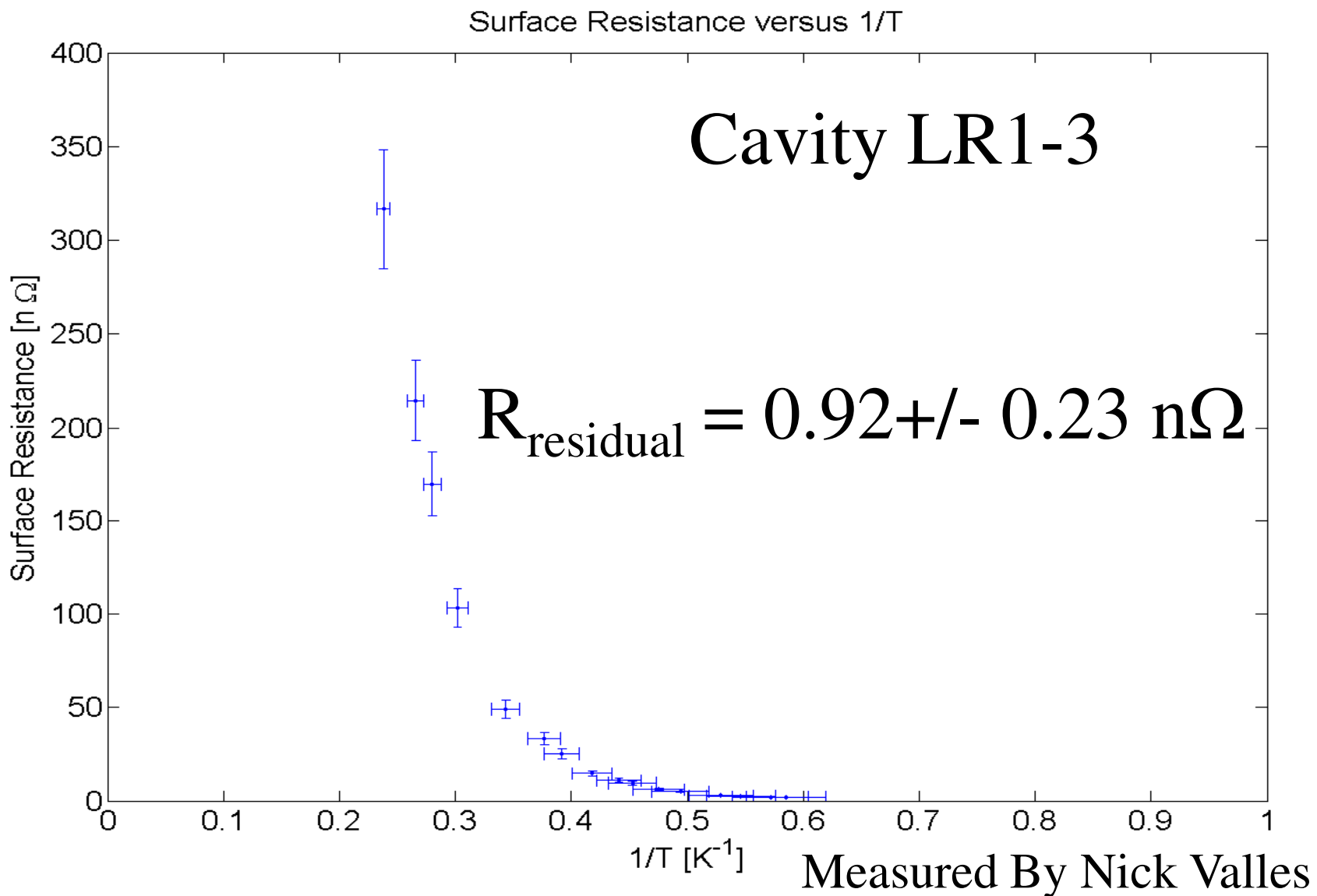


Frequency shift +210 kHz. Emin/Emax=0.29





- Recently we have:
 - Lowered the temperature at which we performed the vertical electropolishing of a single cell reentrant cavity and found a very good residual resistance, $\sim 0.92 \text{ n}\Omega$ please refer to later slide.
 - Tested the reentrant 9-cell cavity after additional H-degassing at JLAB.
- In the next month we are planning:
 - Finish tumbling, bulk VEP, and ship to JLAB for H-degassing AES5
 - Start tumbling ACCEL9
 - μ -VEP TB9ACC010 and test, again
 - μ -VEP TB9ACC015 and get into the works for testing





AES Reentrant 9-Cell Cavity Repair

