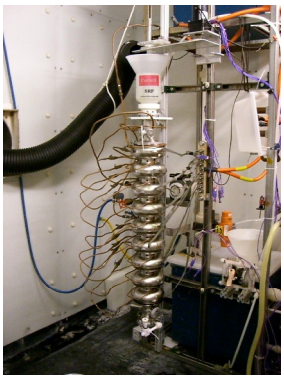
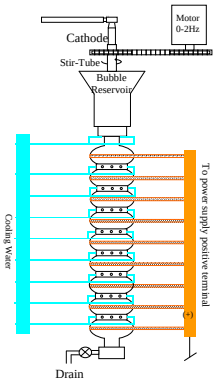
Cornell University
Laboratory for Elementary-Particle Physics

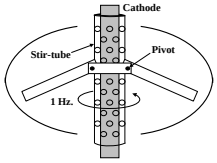
W.J. Ashmanskas, *FNAL*
H.S. Padamsee, *Cornell*

Status of 9-cell ILC cavity processing/testing at Cornell

Vertical EP





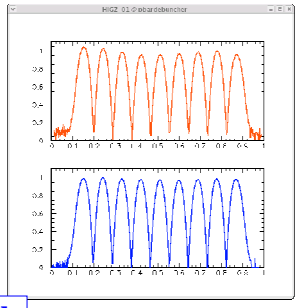


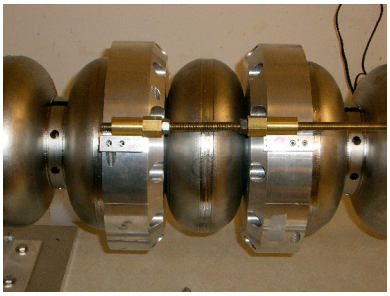
Electrolyte formula
91% (vol) H_2SO_4(96%)
9% (vol) HF(48%)
+ 2.5cc/liter HNO_3(70%)

EP parameters

cathode	Al > 99.5%
stir tube, paddles	PVDF
seals	viton
end groups	PTFE, HDPE
electrolyte	24 liters
maximum use	9 g/l dissolved Nb
EP rate at equator	≈ 0.5 μm / minute
EP rate ratio iris/equator	< 1.5
voltage	14.5 volts
current	250–400 A
temperature	30–32°C
stir rate	1 Hz

Tuning





HPR

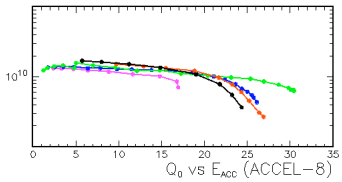
Assembly

Variable coupler

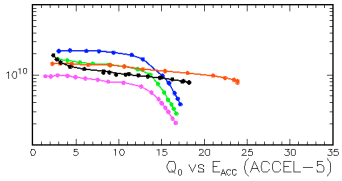
105°C bake

RF test at 2K

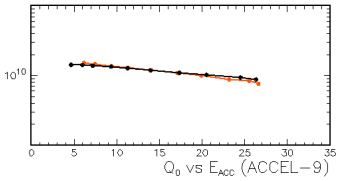
ACCEL 8	Processing	Max E_{acc}	Limitation
2006-04-21	60μm BCP	17 MV/m	quench
2006-05-24	60μm BCP	26 MV/m	Q drop
2007-02-15	25μm EP (0.5Hz 32°C)	30 MV/m	quench
2007-05-09	100μm EP, degas, 30μm EP (2Hz, 35°C)	26 MV/m	Q drop
2007-07-20	7μm EP (2Hz, 35°C)	24 MV/m	Q drop



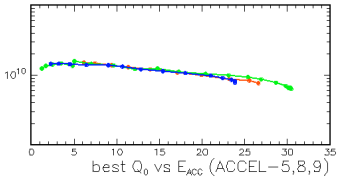
ACCEL 5	Processing	Max E_{acc}	Limitation
2006-09-06	144μm EP (0.5Hz 30°C)	16 MV/m	Q drop
2006-11-14	degas	17 MV/m	Q drop, FE
2006-12-19	3μm BCP	15 MV/m	Q drop
2007-03-02	25μm EP (0.5Hz 36°C)	24 MV/m	quench
2007-06-15	70μm EP, degas, 30μm EP (2Hz, 35°C)	18 MV/m	quench, FE



ACCEL 9	Processing	Max E_{acc}	Limitation
2007-08-15	160μm EP, degas, 40+30μm EP (1Hz 31°C)	26 MV/m	quench, FE
2007-09-15	30μm EP (1Hz, 32°C)	26 MV/m	quench



Best vertical RF tests of ACCEL5, ACCEL8, ACCEL9, with vertical electropolishing: all quench-limited



Vertical EP + 105°C bake flattens Q in Eacc ~ 25 MV/m region

Most tests limited by quench, but thus far at lower Eacc than best horizontal EP cavities

Our HPR and assembly procedures seem capable of reaching high gradient

25 um VEP (or more) seems not to induce Q disease

Our having varied EP parameters hints that some combination of overly vigorous acid stirring and too high a temperature may degrade EP quality

VEP and RF tests of AES 9-cell reentrant cavity are underway

As U.S. ILC program gains momentum, Cornell assists in SRF development & training with about one/month 9-cell cavity process/test

We gratefully acknowledge the numerous contributions to this work by A.C. Crawford of JLAB.

Cornell University's Laboratory for Elementary-Particle Physics is supported by the U.S. National Science Foundation and Department of Energy.