



ACD Cavity Shapes

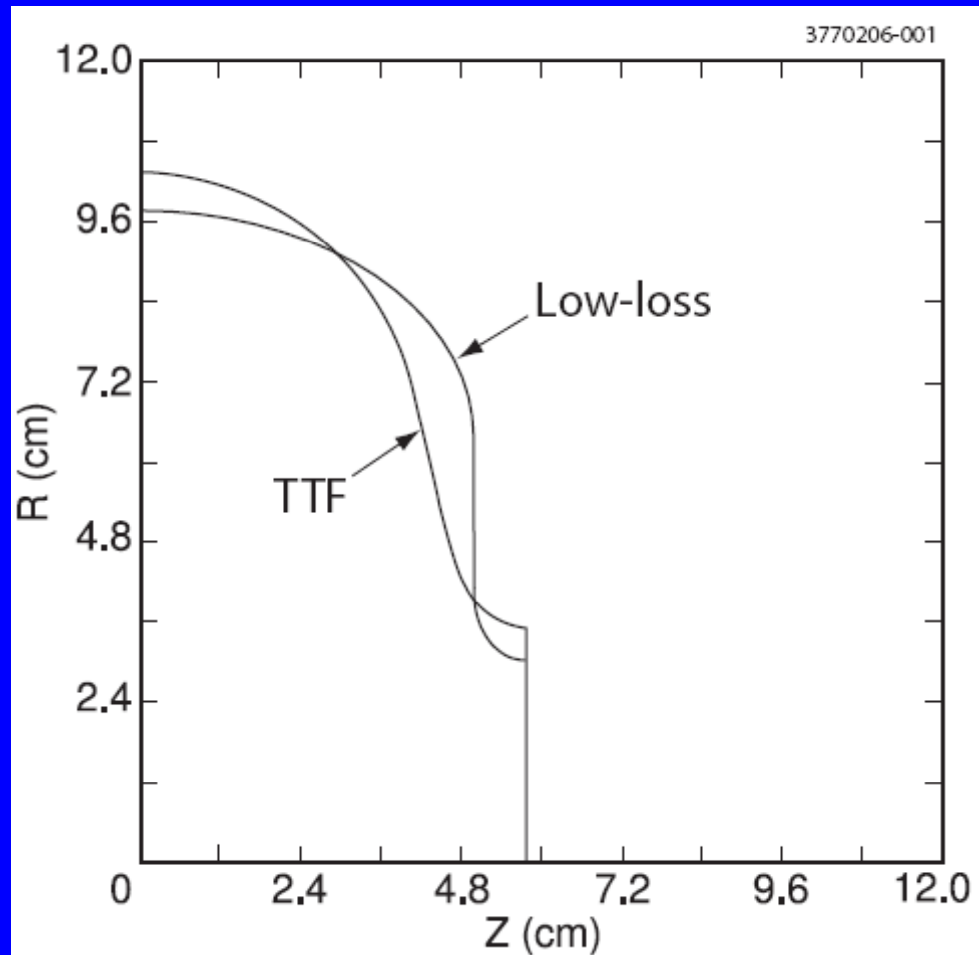
Rong-Li Geng

Jefferson Lab

ILC08, November 16-20, 2008, UIC

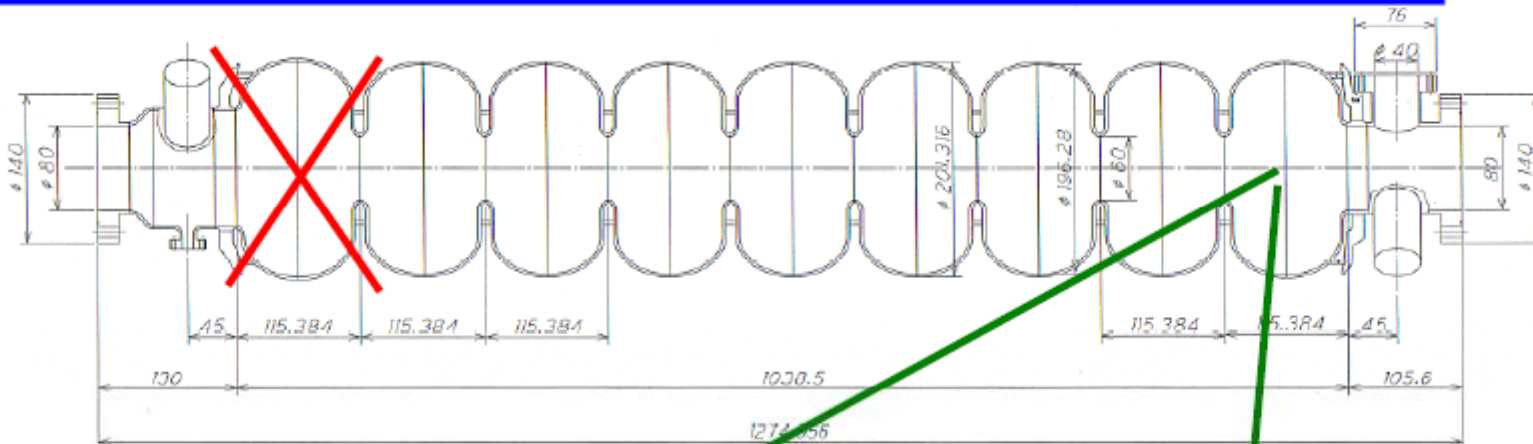


Low-loss (Ichiro) Shape

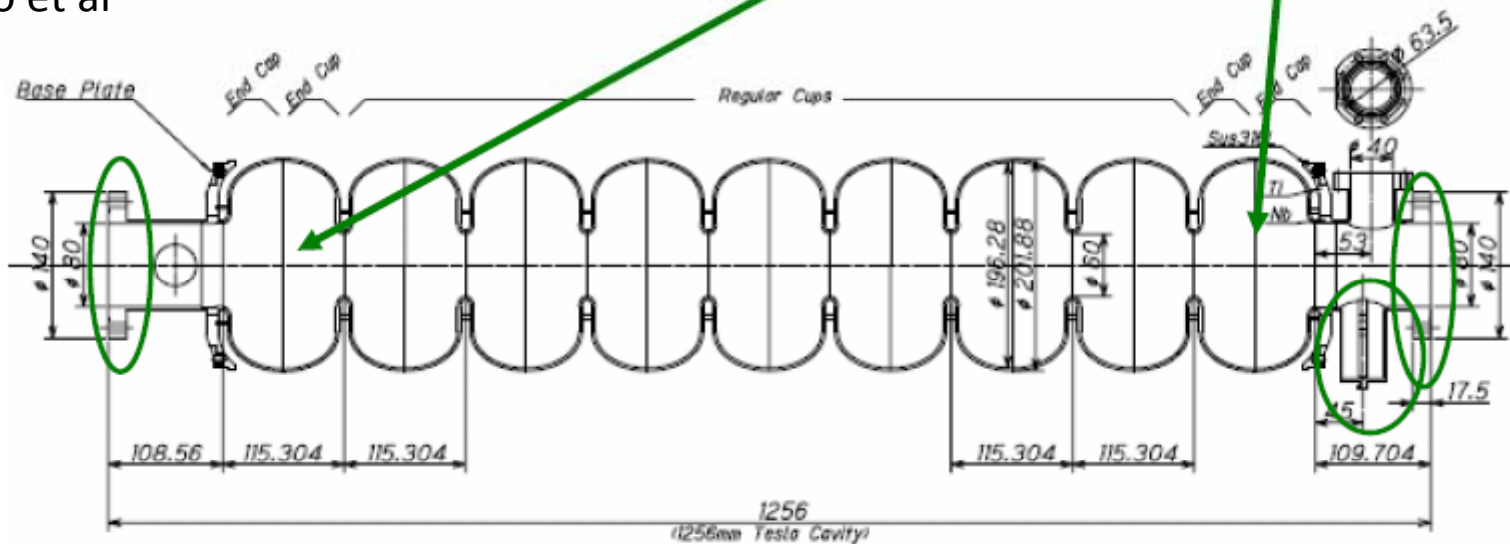


- Many 1-cell cavities reached excellent > 45 MV/m results.
- ICHIRO5 (no HOM coupler) reached 36 MV/m in 2008 under KEK/JLab collaboration
- New 9-cell cavities w/ improved end group design fabricated and being processed and tested at KEK

Redesigned Cavity Shape: Ichiro/New Ichiro



K. Saito et al

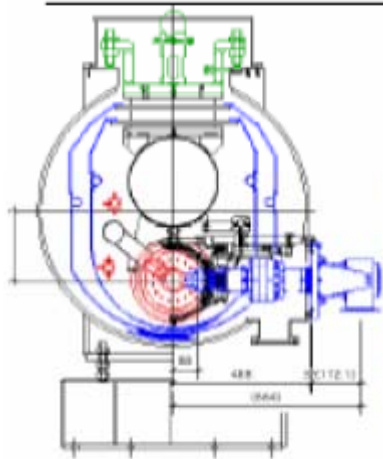


New Design:

- 1) Smaller BP, 2) Simpler END cell shape, 3) Redesigned HOM Coupler, 4) Use MO Sealing

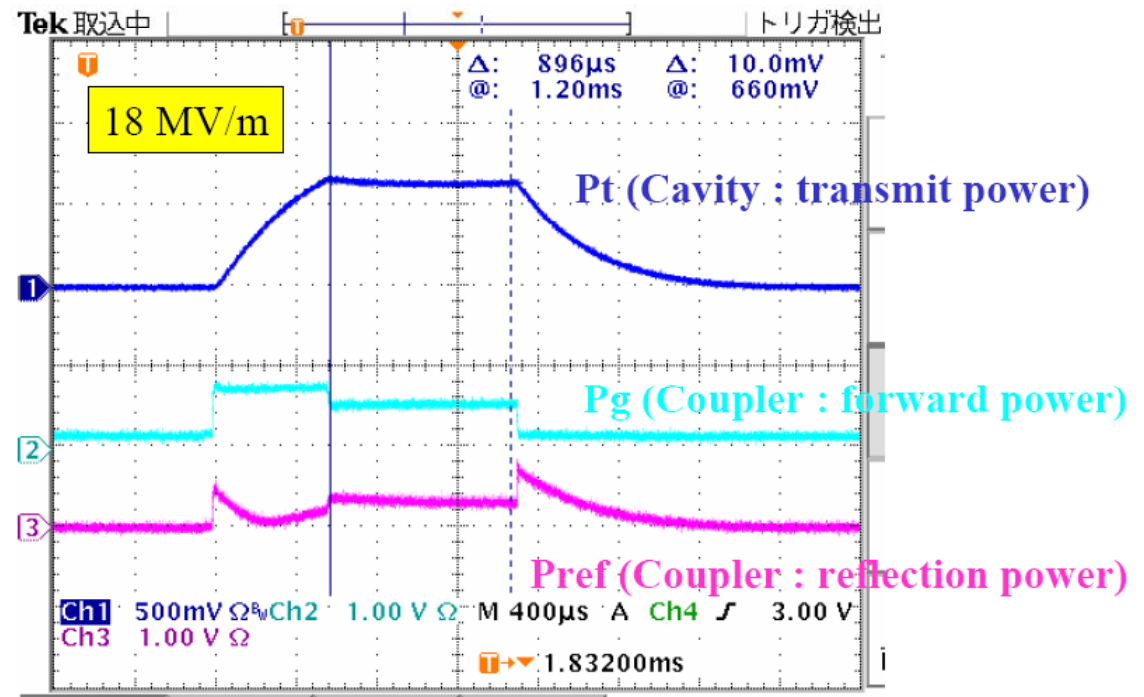
First Ichiro 9-cell test in a cryo-module

T. Saeki et al., EPAC08

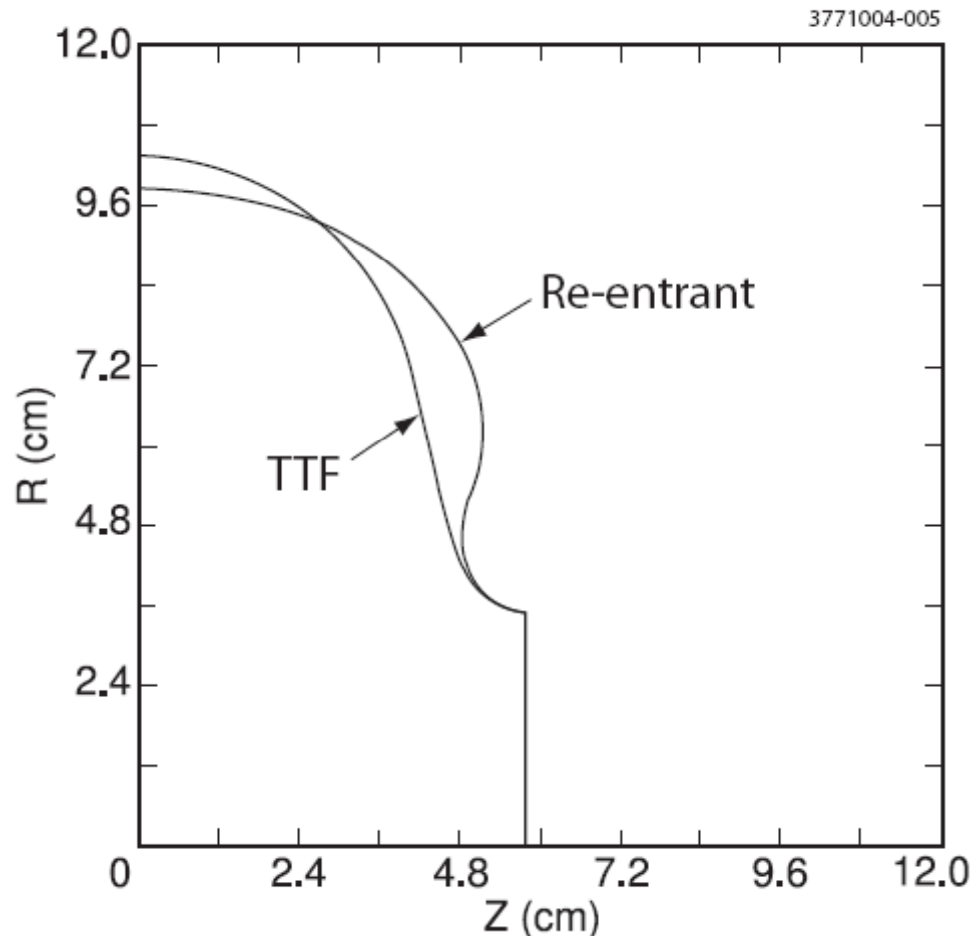


LL shape Cavity

High-power tests

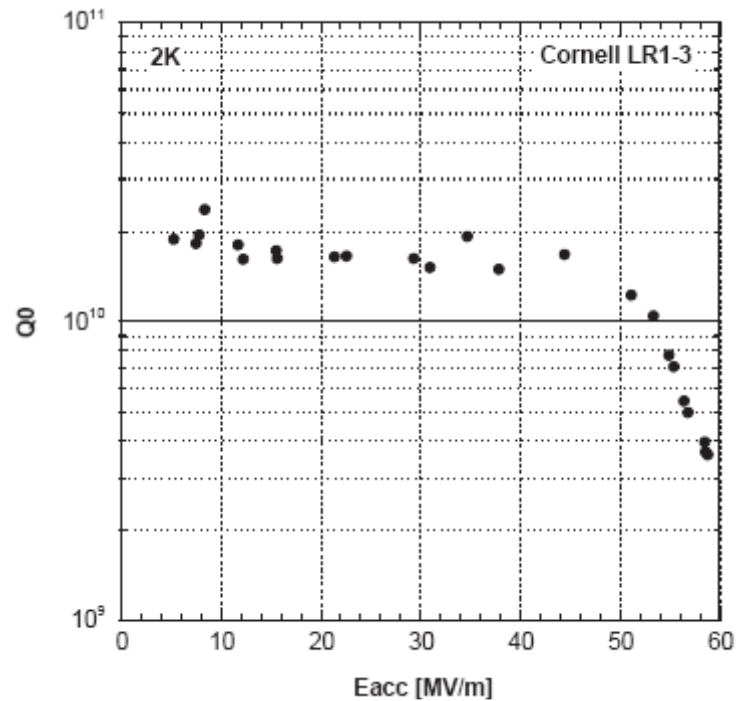


Re-entrant Shape



- Single-cell 60 mm aperture Re-entrant cavity reached record gradient 59 MV/m in 2007 under Cornell/KEK collaboration
- First 9-cell re-entrant cavity 15 MV/m quench limited due to pit. Further processing and testing under way at Cornell

59 MV/m single-cell Re-entrant

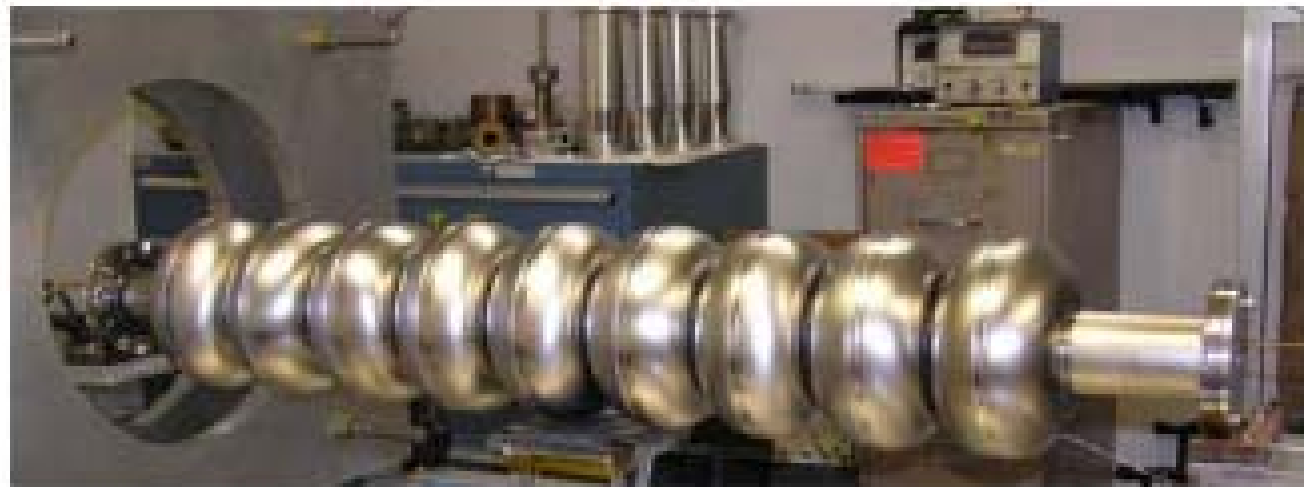


R.L. Geng et al., PAC07

First 9-cell Re-entrant cavity by Cornell/AES

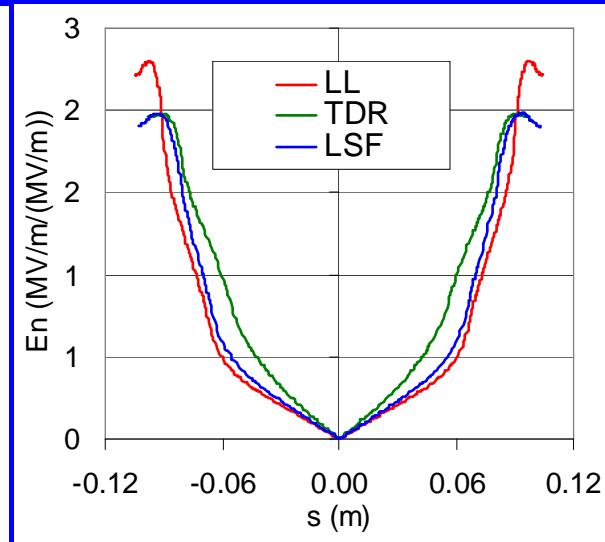
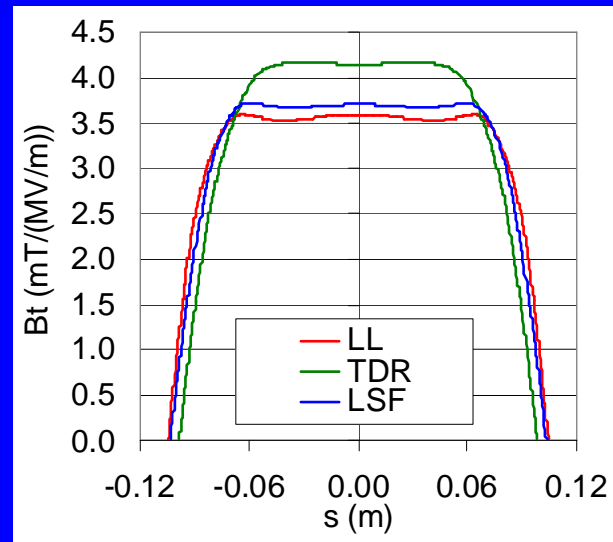
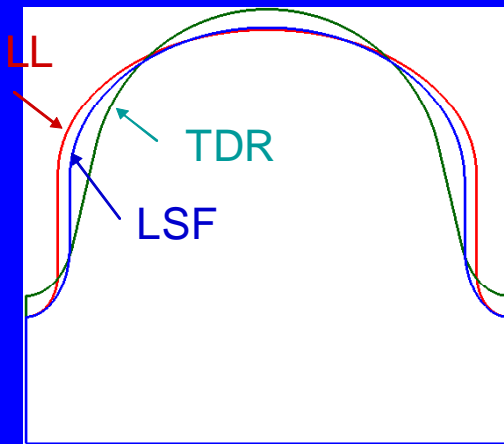
H. Padamsee et al., PAC07

Rongli Geng



A New ACD Shape

Low-Surface-Field (LSF) proposed by SLAC



The Low Surface Field (LSF) Design

- 15% higher R/Q than TDR
- 11% lower $B_s/E_a \rightarrow$ 20% lower cryogenic heating
- 15% lower E_s/E_a than LL design, same as TDR
- Field flatness 20% more sensitive to cell error than LL

Z. Li and C. Adolphsen, LINAC08

Opportunities and Challenges

- Potential of higher gradients for shorter linac length.
- Excellent single-cell results demonstrated for both low-loss/Ichiro and re-entrant shapes.
- LSF shape has further improved surface field ratios.
- Increased detuning challenge due to reduced mechanical strength.
- Increased field flatness preservation challenge due to reduced cell-to-cell coupling.
- Simulation results show acceptable emittance dilution for 60 mm aperture. Beam test is still yet to happen to fully justify.