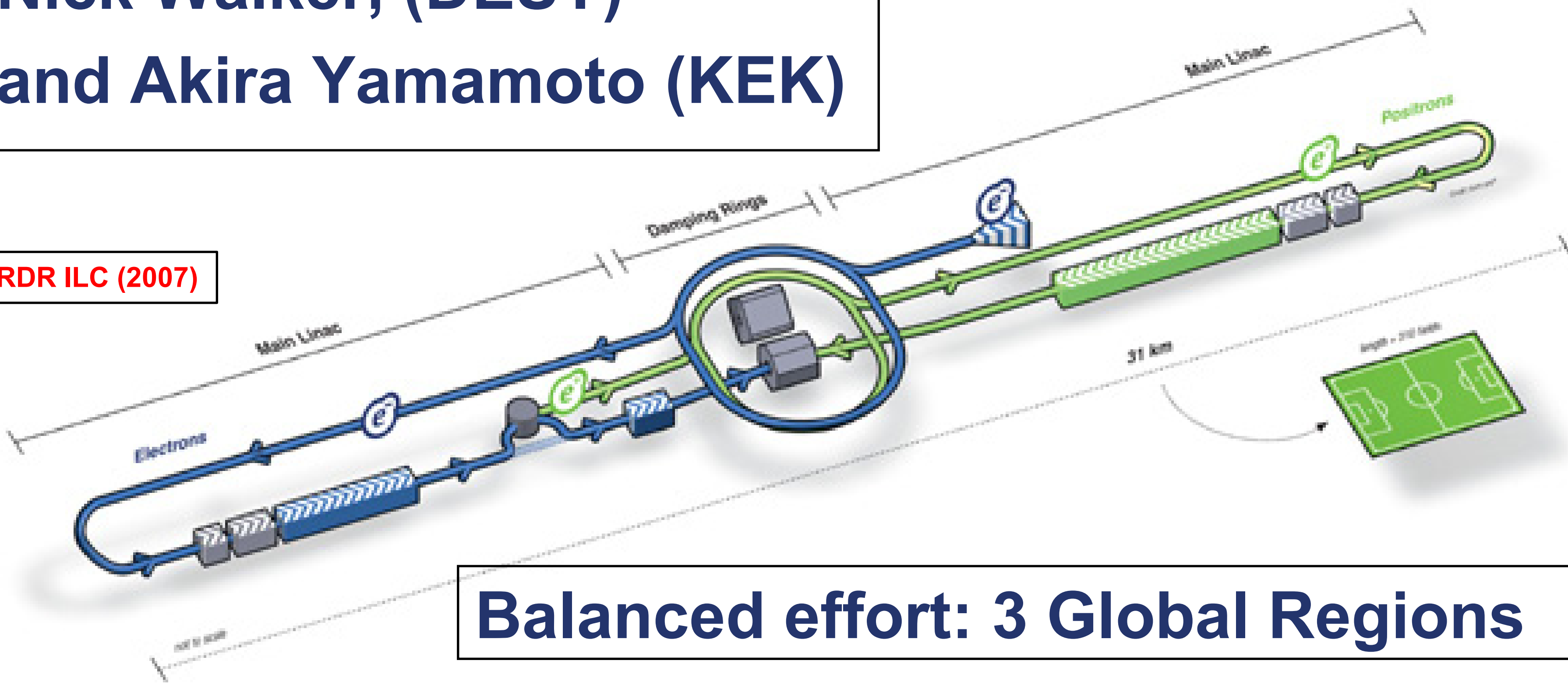
Present Status of the ILC Project and Developments

Marc Ross, (Fermilab)

Nick Walker, (DESY)

and Akira Yamamoto (KEK)

RDR ILC (2007)



Balanced effort: 3 Global Regions

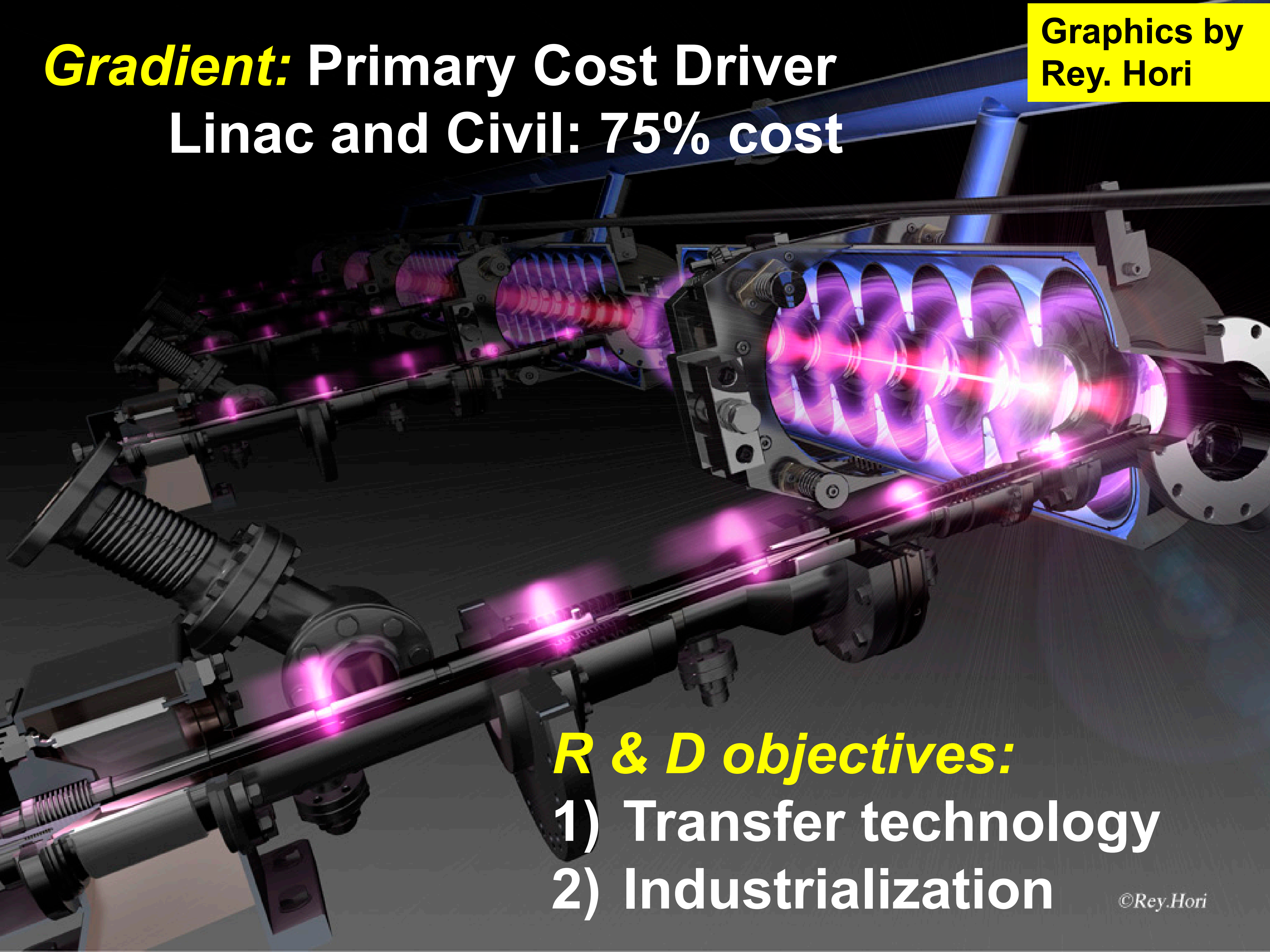
International Particle Accelerator Conference 2011, San Sebastian, España

Outline: ***SCRF***

- **High Gradient Superconducting RF R & D:**
  - Cavities
  - Cryomodules
  - Industrialization
  - System Test
- **Siting**
- **Design Optimization**
- **Beam Test Facilities**
- **Next Steps**

Graphics by Rey. Hori

Gradient: Primary Cost Driver
Linac and Civil: 75% cost



R & D objectives:

1) Transfer technology
2) Industrialization

Graphics by Rey. Hori

Gradient: Primary Cost Driver
Linac and Civil: 75% cost

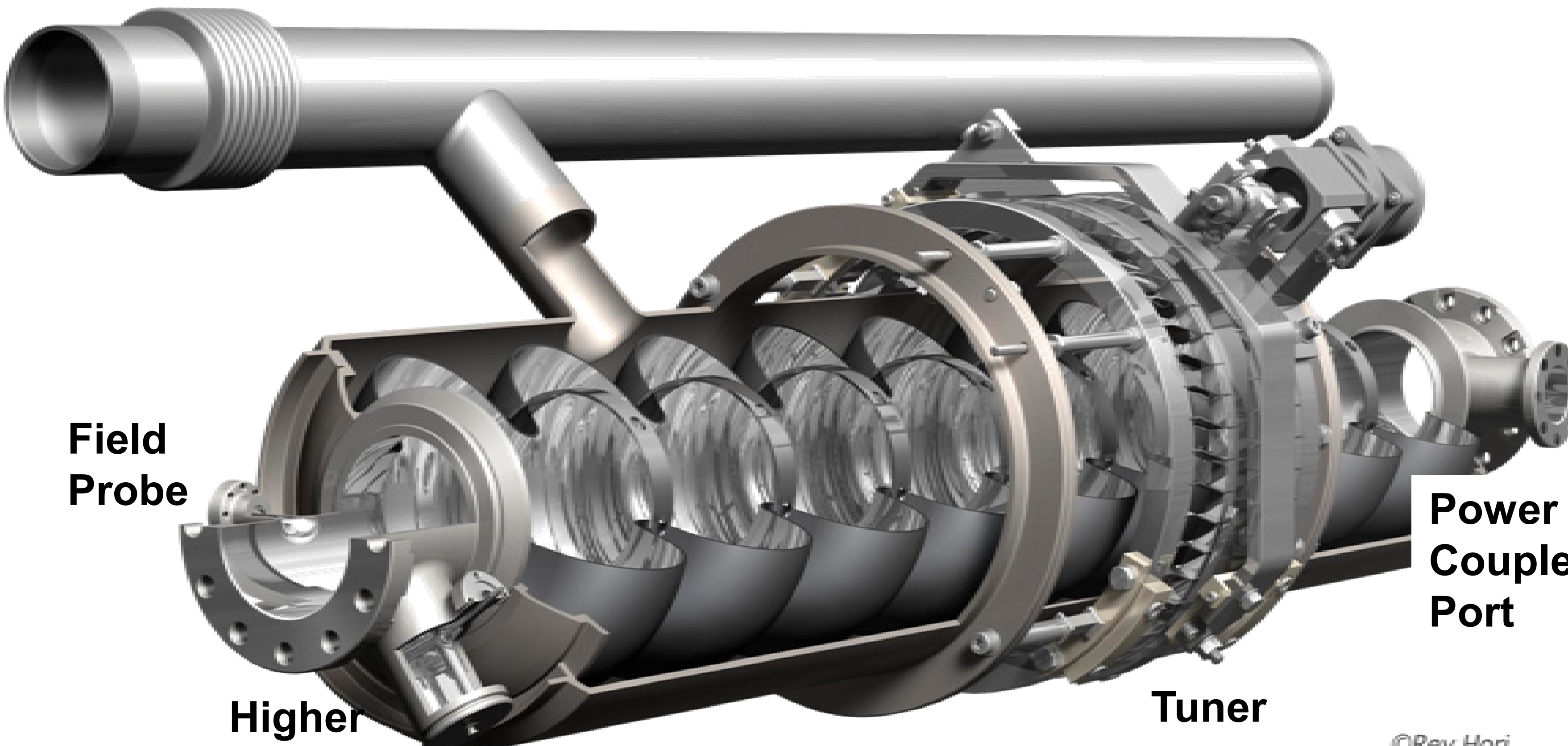
- **Feasibility DEMONSTRATED (2000 – 2005)**
- **Challenge: deploy and industrialize technology *in each region***
- **Realistic *in-kind cost models* independently developed *in each region***
- **Prepare for *project approval* process *in each region***

R & D objectives:

1) **Transfer technology**
2) **Industrialization**

The ILC SCRF Cavity:

- 9 cell 1300 MHz SW cavity
- Formed, welded niobium sheet
- 2.4 mm thick
- 1 m long; 30 kg

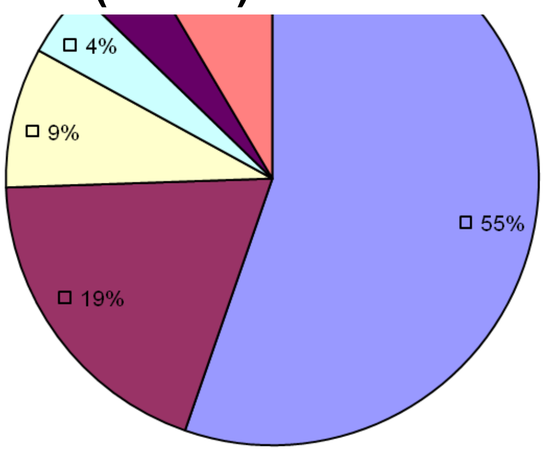


Graphics by Rey. Hori

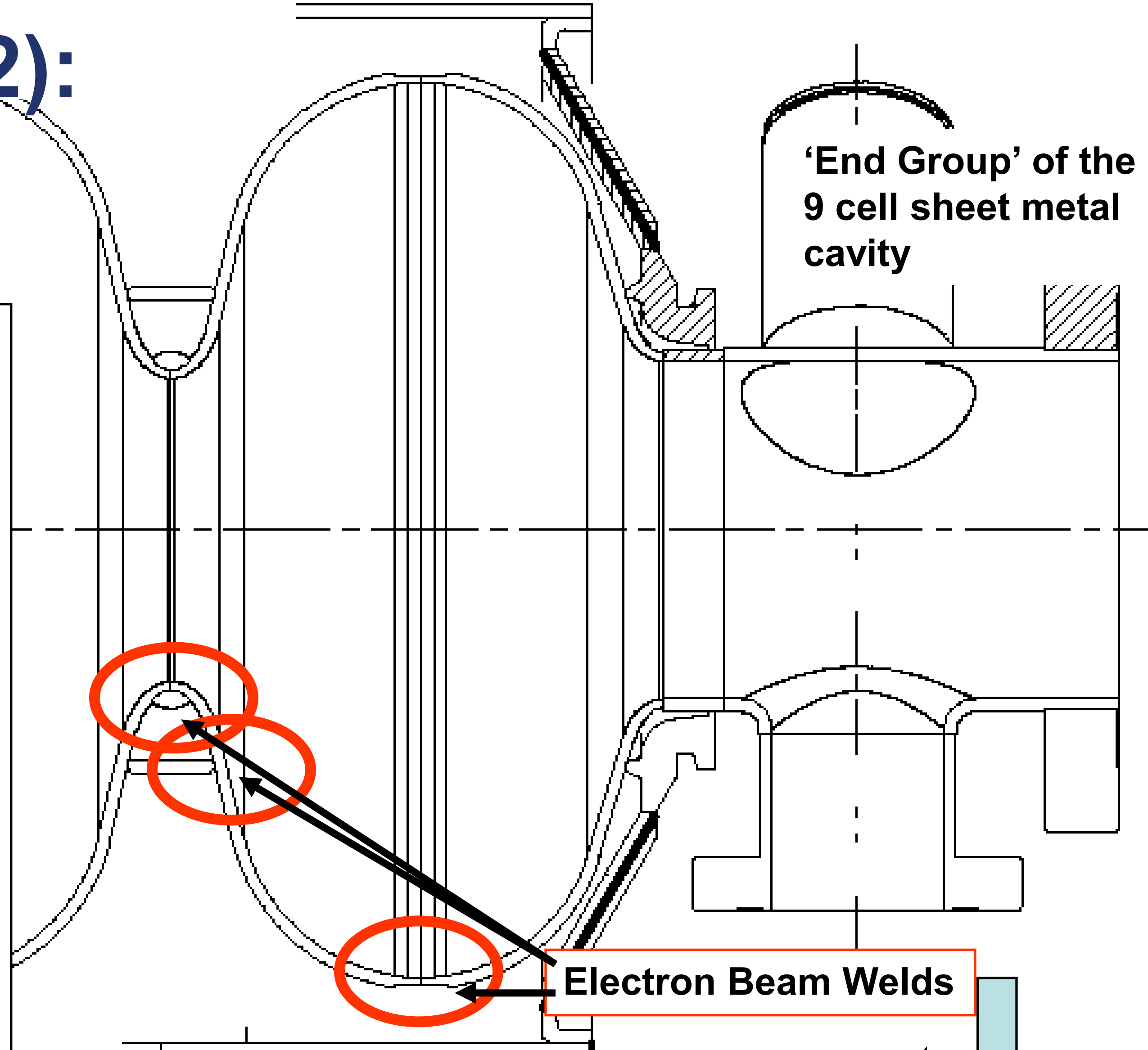
The ILC SCRF Cavity (2):

Gradient Limits in Vertical test:

- Quench (55%)
- Field Emission (19%)
- Q-slope (4%)
- (Other)



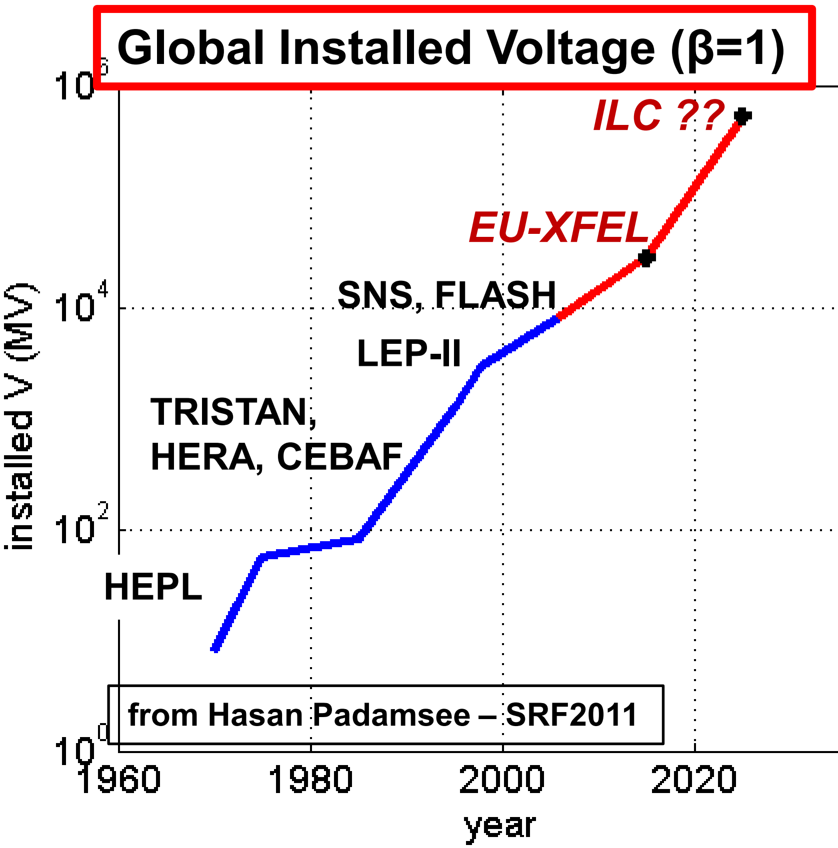
Rongli Geng, Jefferson Lab



Kenji Saito, KEK

SRF: 1970 - 2011:

- **Gradient progress:**
  - Standardized recipe
  - Electron beam welding
  - Purification (thermal conductivity)
  - Chemical polishing
  - High pressure, high purity rinsing
  - Diagnostics
  - Mechanical grinding /tumbling: surface repair



SRF for ILC Main Linac	Value
C.M. Energy	500 GeV
Beam Rep. rate	5 Hz
Pulse duration	1 ms
beam current	9 mA
Av. field gradient	31.5 MV/m +/- 20%
# 9-cell cavities	14,560
# cryomodules	1,680
# RF units (10 MW Kly)	560

Standard Procedure Established for Surface Processing

	Standard Fabrication/Process
Fabrication	Nb-sheet purchasing
	Component Fabrication
	Cavity assembly with EBW
Process	EP-1 (~150um)
	Ultrasonic degreasing with detergent, or ethanol rinse
	High-pressure pure-water rinsing
	Hydrogen degassing at > 600 C
	Field flatness tuning
	EP-2 (~20um)
	Ultrasonic degreasing or ethanol (or EP 5 um with fresh acid)
	High-pressure pure-water rinsing
	Antenna Assembly
	Baking at 120 C
Cold Test (vertical test)	Performance Test with temperature and mode measurement

allow twice

Key Process

Fabrication

- **Material**
- **EBW**
- **Shape**

Process

- **Electro-Polishing**
- **Ethanol Rinsing or**
- **Ultra sonic. + Detergent Rins.**
- **High Pr. Pure Water cleaning**

Standard Procedure Established for Surface Processing

	Standard Fabrication/Process
	Baking at 120 C
Cold Test (vertical test)	Performance Test with temperature and mode measurement

allo

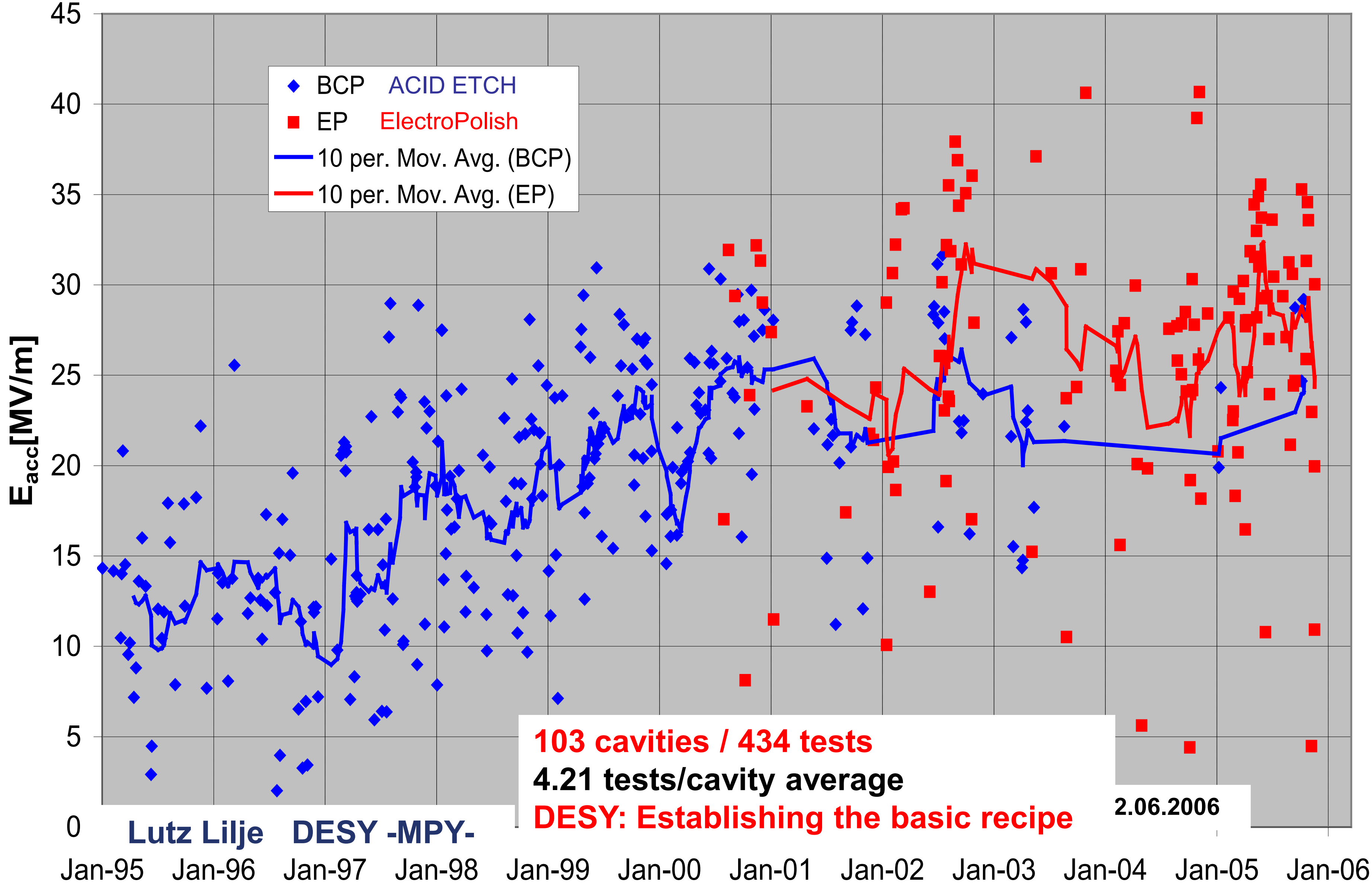
Key Process

- **High Pr. Pure Water cleaning**

Niobium:

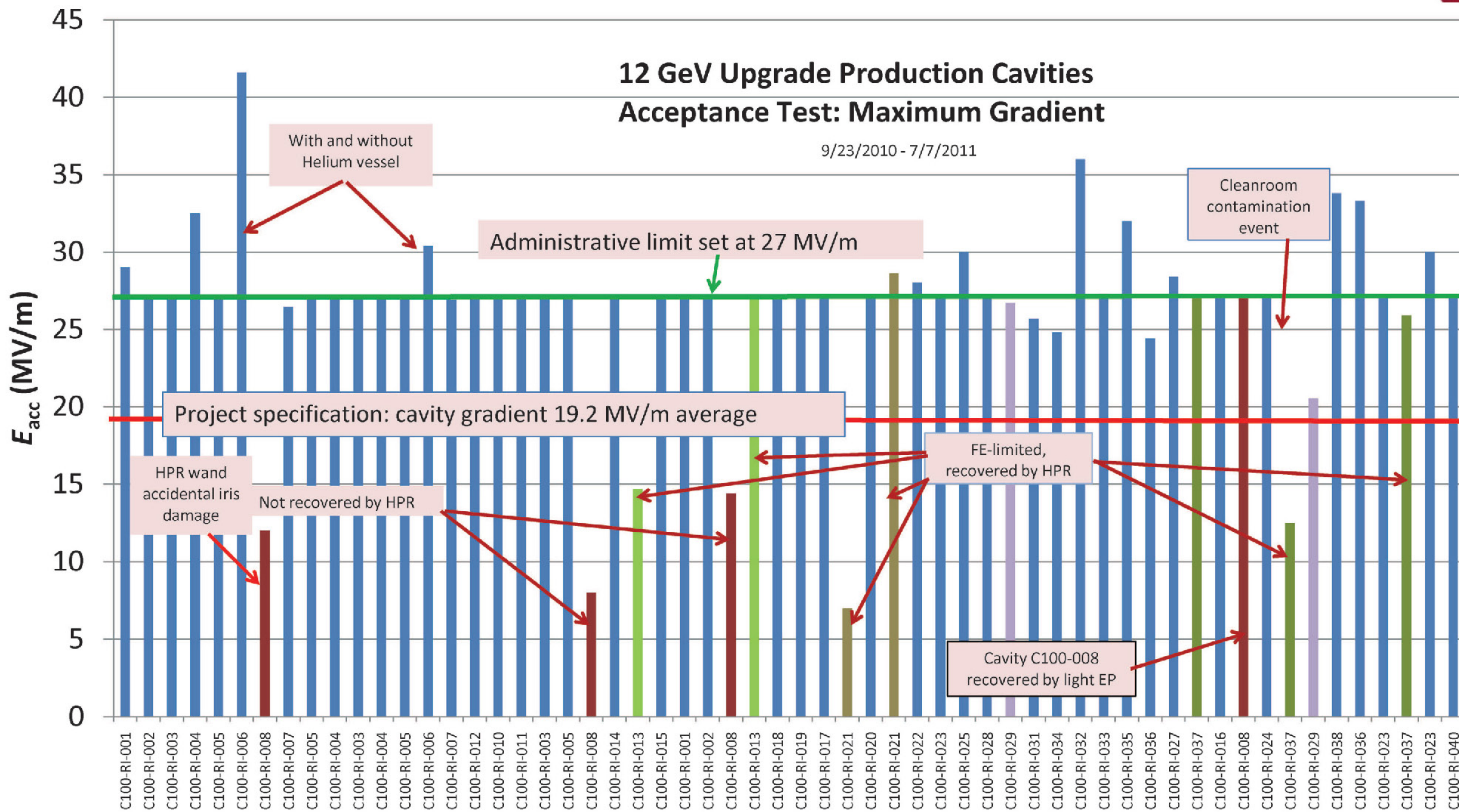
- **Refractory metal**
  - Extraordinary resistance to heat and wear
  - Chemically inert
- **Extremely ductile and soft (esp. pure Nb)**
- **Oxygen getter - contaminant**
  - Tempering process introduces impurity
- **Prone to 'cold weld' with many metals**

Vertical Cavity Test Results: 1995-2006



12 GeV project cavities – to date

Vertical Test; 1500 MHz 7 cell
Processed using ILC recipe



MOOCA01 Production and Testing Experience with the SRF Cavities for the CEBAF 12 GeV Upgrade, C. Reese et al

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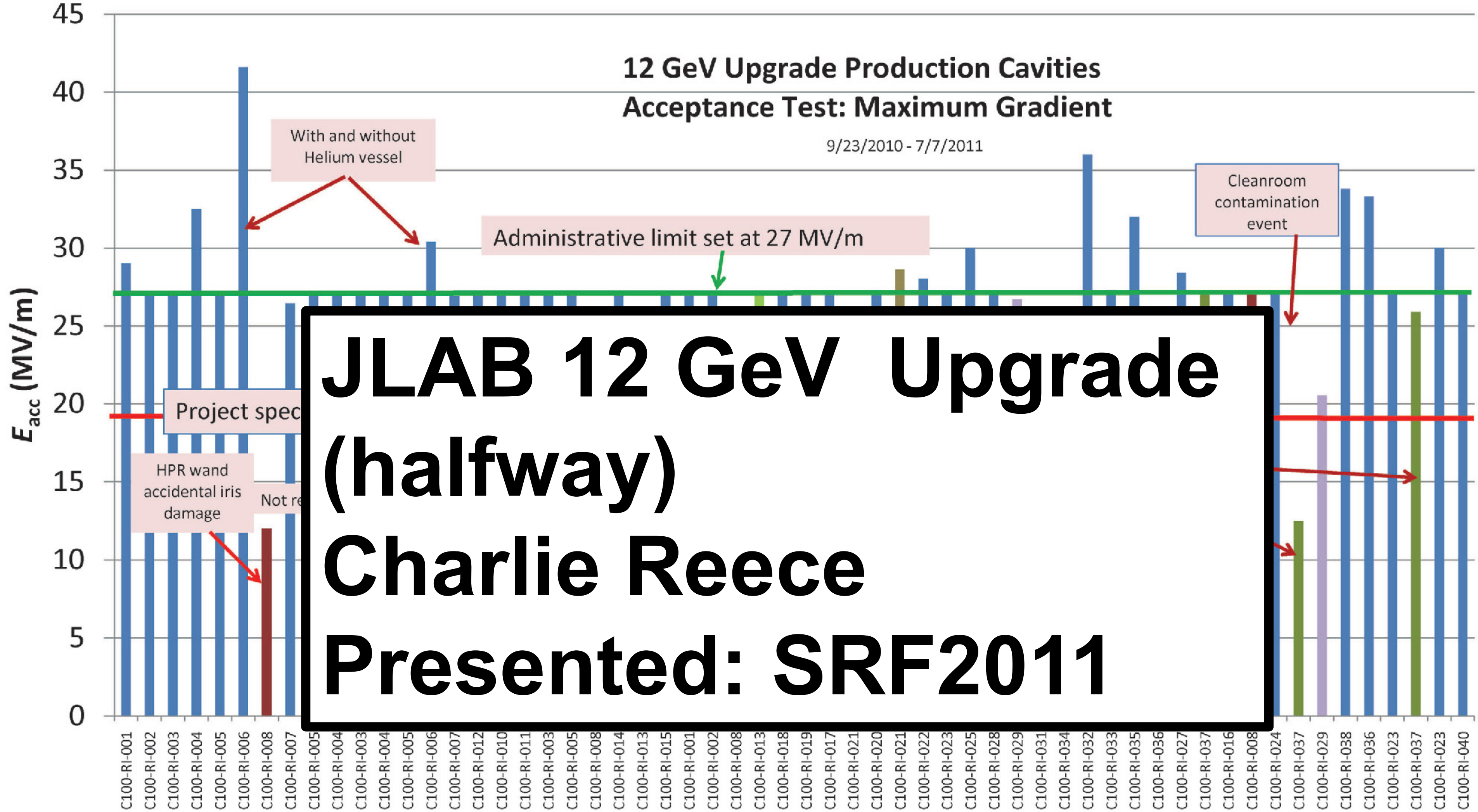

JLAB 12 GeV Upgrade (halfway)
Charlie Reece
Presented: SRF2011

MOOCA01 Production and Testing Experience with the SRF Cavities for the CEBAF 12 GeV Upgrade, C. Reese et al

Production model: ***estimated yield***

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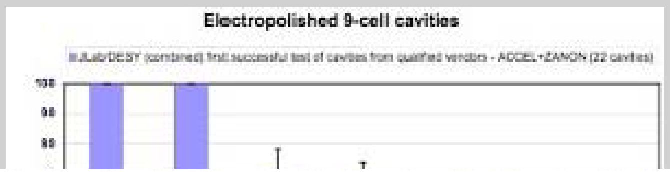
One sheet to plot them all
DESY database becomes standard tool for cavity research

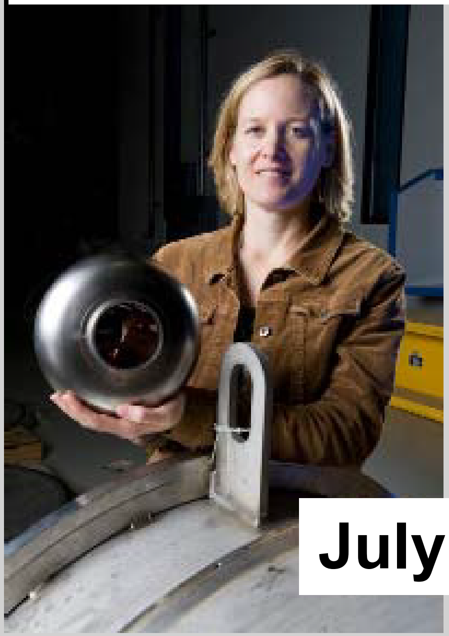
The idea sounds simple enough: collect all the data that exist in the world on cavities – nine-cell TESLA-style cavities, to be precise – including all tests, manufacturers and achieved gradients and merge it into a common format so that all cavity professionals around the world can extract the data they need to compare cavity performance and learn. Anyone who has ever set up a database and tried to merge existing data sets into one knows: it's not that easy. However, the ILC's accelerator experts have just decided that they will all use a database system developed by DESY to set up the world's first global cavity database.

The main driver behind this is a key ILC challenge called 'yield' — an efficient word for a concept that means something like 'the probability that cavities will reach the required gradient'. 'Gradient' in turn means the energy imparted by a cavity to electrons or positrons over the distance of one metre — a challenge at the heart of the ILC, because a high gradient means efficient acceleration, which means short accelerators, which in turn means lower cost. Only good statistics give a good picture of the yield. "That's why we are really after statistics, we need this standardisation to be able to compare data from around the world and provide reliable estimates of expected cavity performance," says Camille Ginsburg from Fermilab, who is in charge of the ILC cavity database project.



The ILC cavity-treating labs (Fermilab, JLab, Cornell, DESY and KEK) agreed in July that they would use the DESY database system

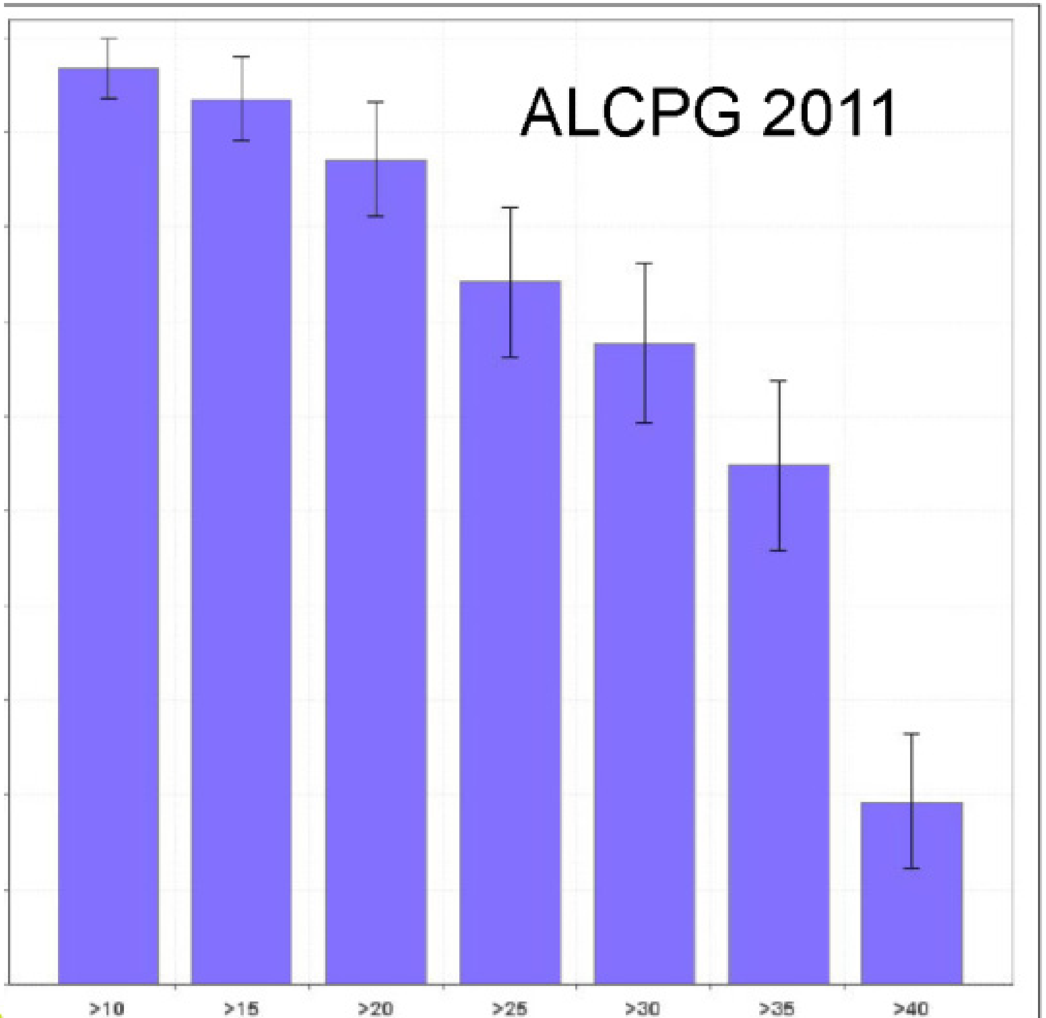
Global Cavity Vertical Test Result Database – led by Camille Ginsburg (Fermilab)



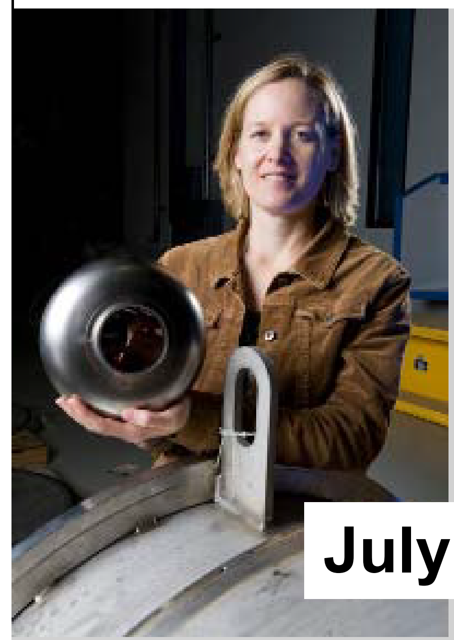
July 2009

The new worldwide ILC cavity database features only nine-cell, no single-cell cavities like the one held by Camille Ginsburg in this picture.

Production model: *estimated yield*



Global Cavity Vertical Test Result Database – led by Camille Ginsburg (Fermilab)



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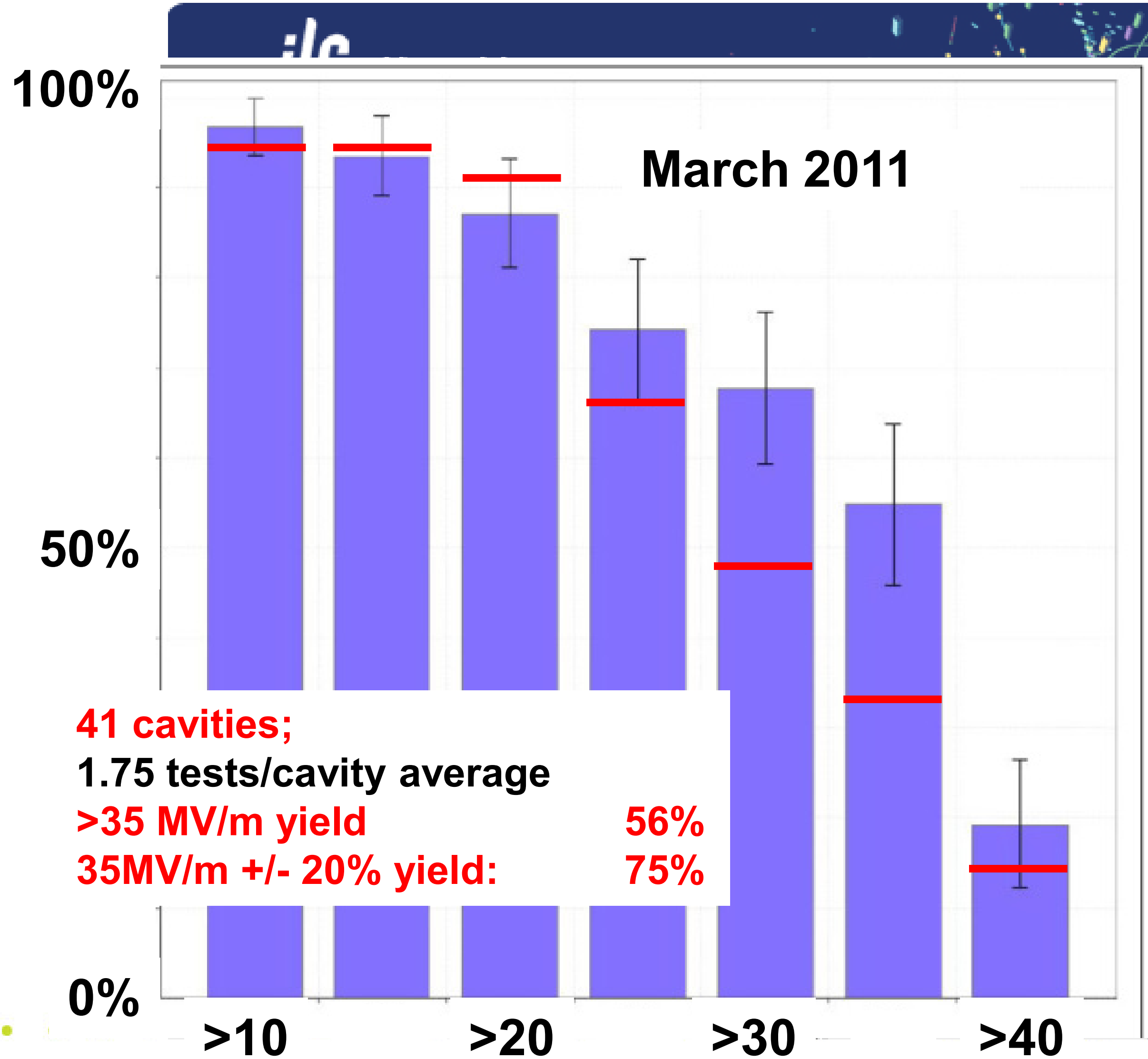

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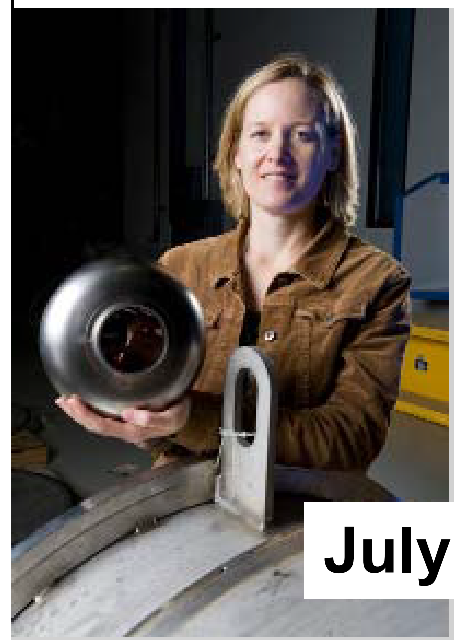

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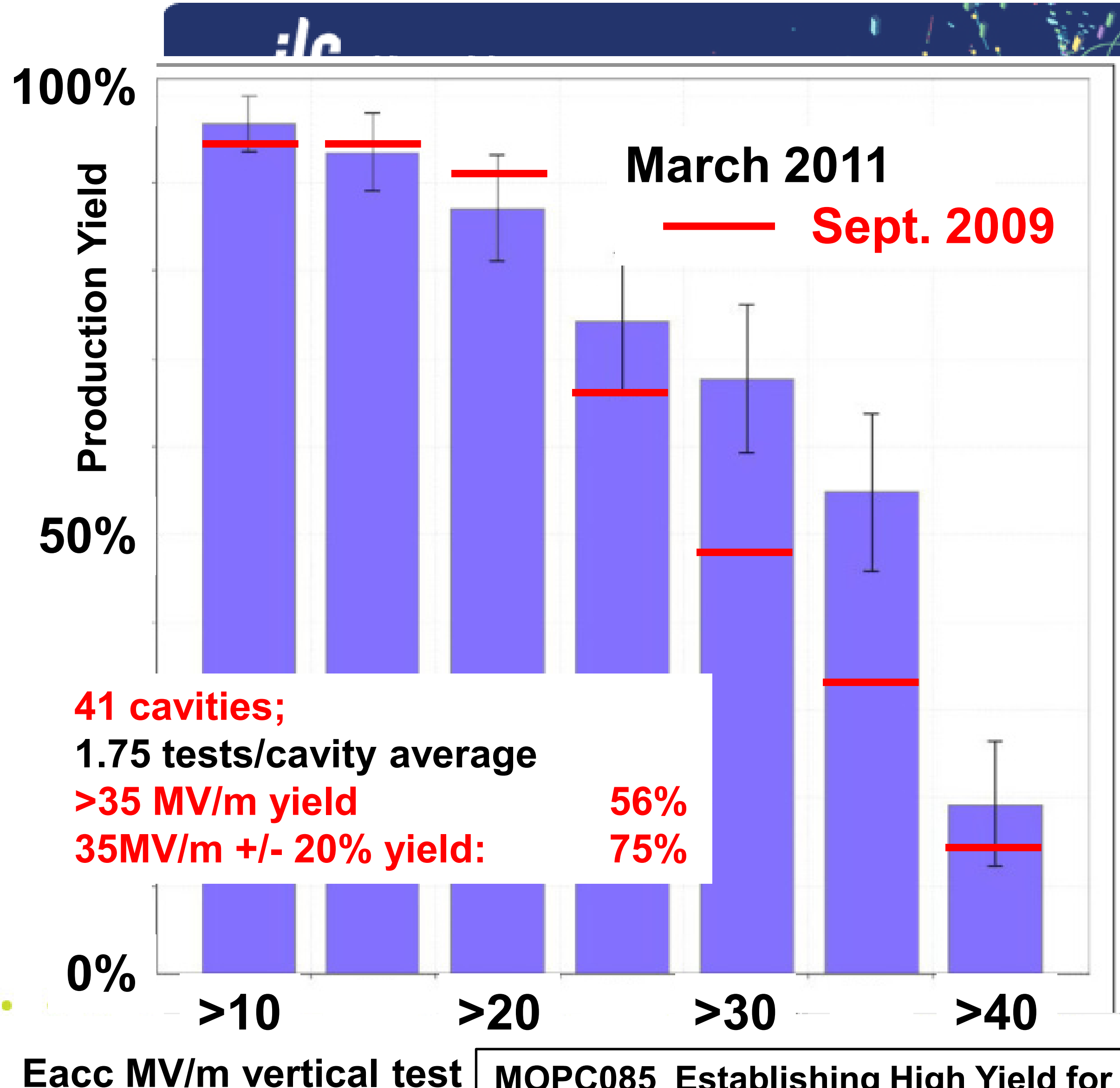
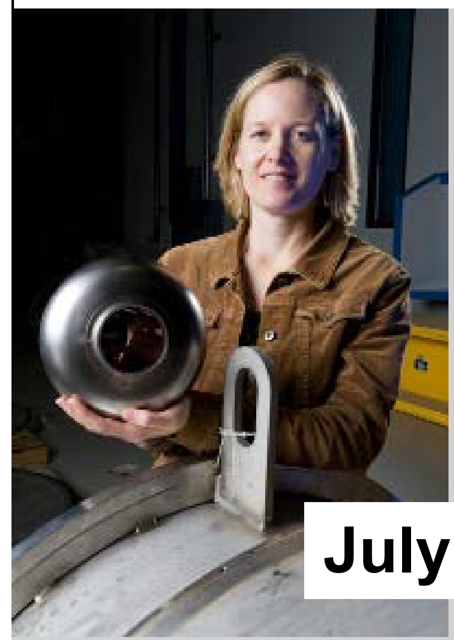


41 cavities;
1.75 tests/cavity average
>35 MV/m yield 56%
35MV/m +/- 20% yield: 75%

Global Cavity Vertical Test Result Database – led by Camille Ginsburg (Fermilab)



The new worldwide ILC cavity database features only nine-cell, no single-cell cavities like the one held by Camille Ginsburg in this picture.

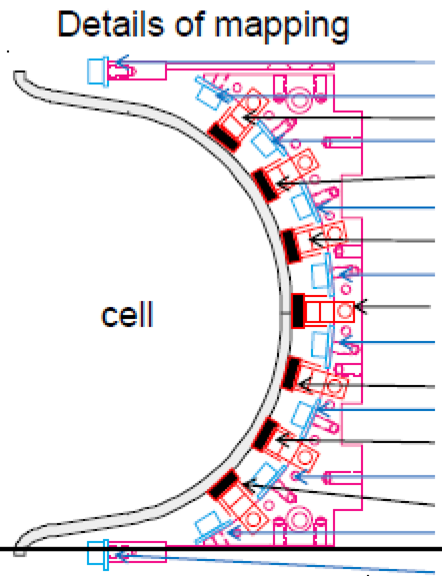
MOPC085 Establishing High Yield for High-gradient Cavities Felix Schlander

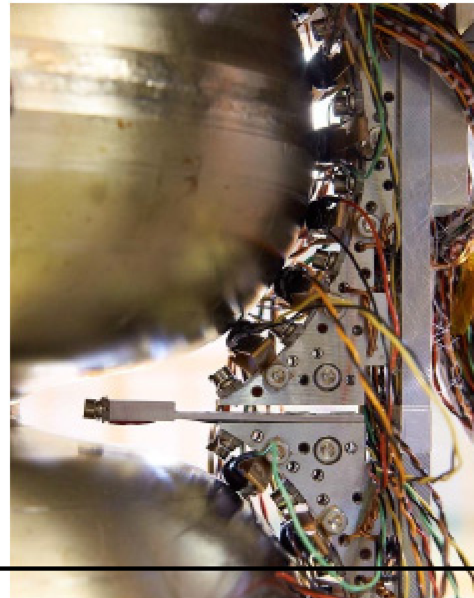
Quench limit:

(55% in vertical test)

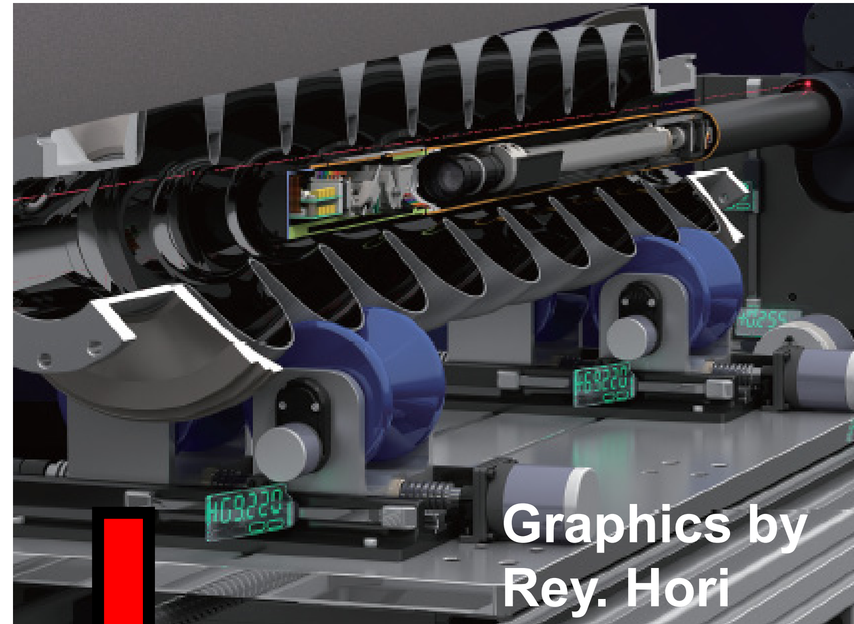
- **Typically one cell limits the entire cavity**
  - (other cells near nominal ~28-44 MV/m)
- **Limiting defects:**
  - *Fabrication-caused* geometric irregularities *15-25 MV/m* (0.2-1 mm Ø) at or near the equator weld:
    - Observed and uniquely identified: *Can be repaired*
  - *> 25 MV/m:* *not* correlated with observable features
- **Diagnostic tools →**

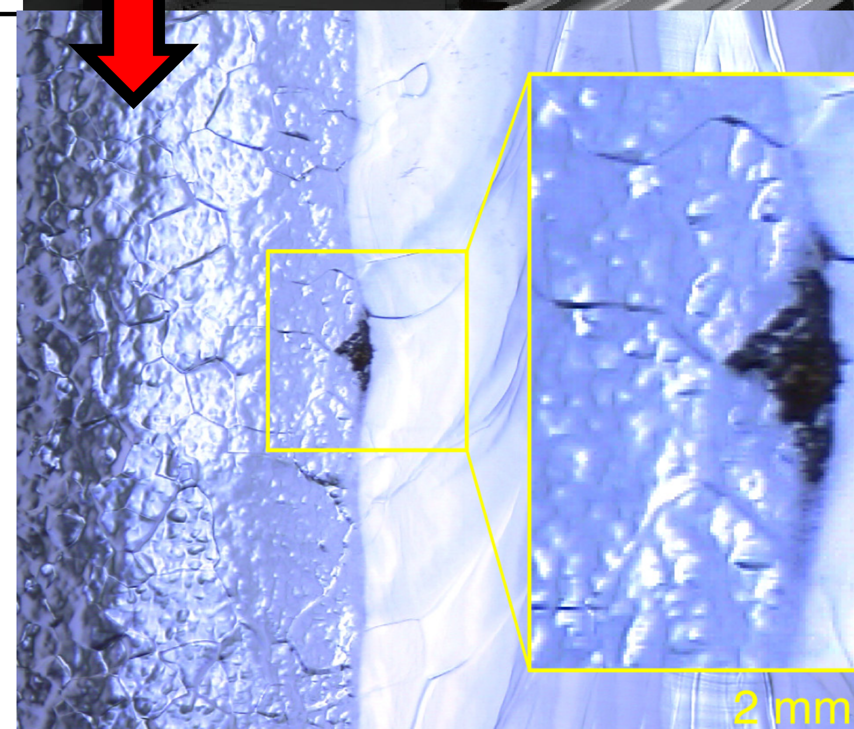
- **Thermal/radiation mapping**
  - Carbon resistors and PIN diodes



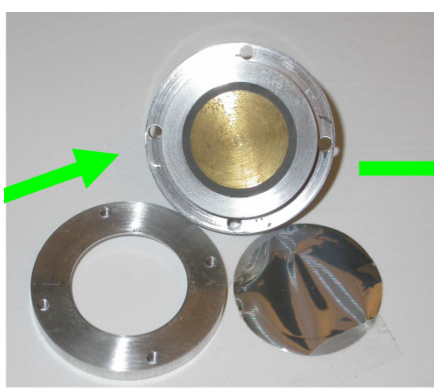


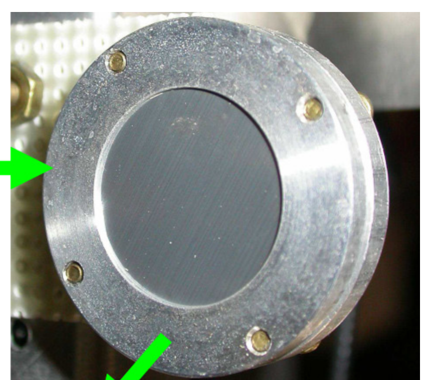
- **Camera:**



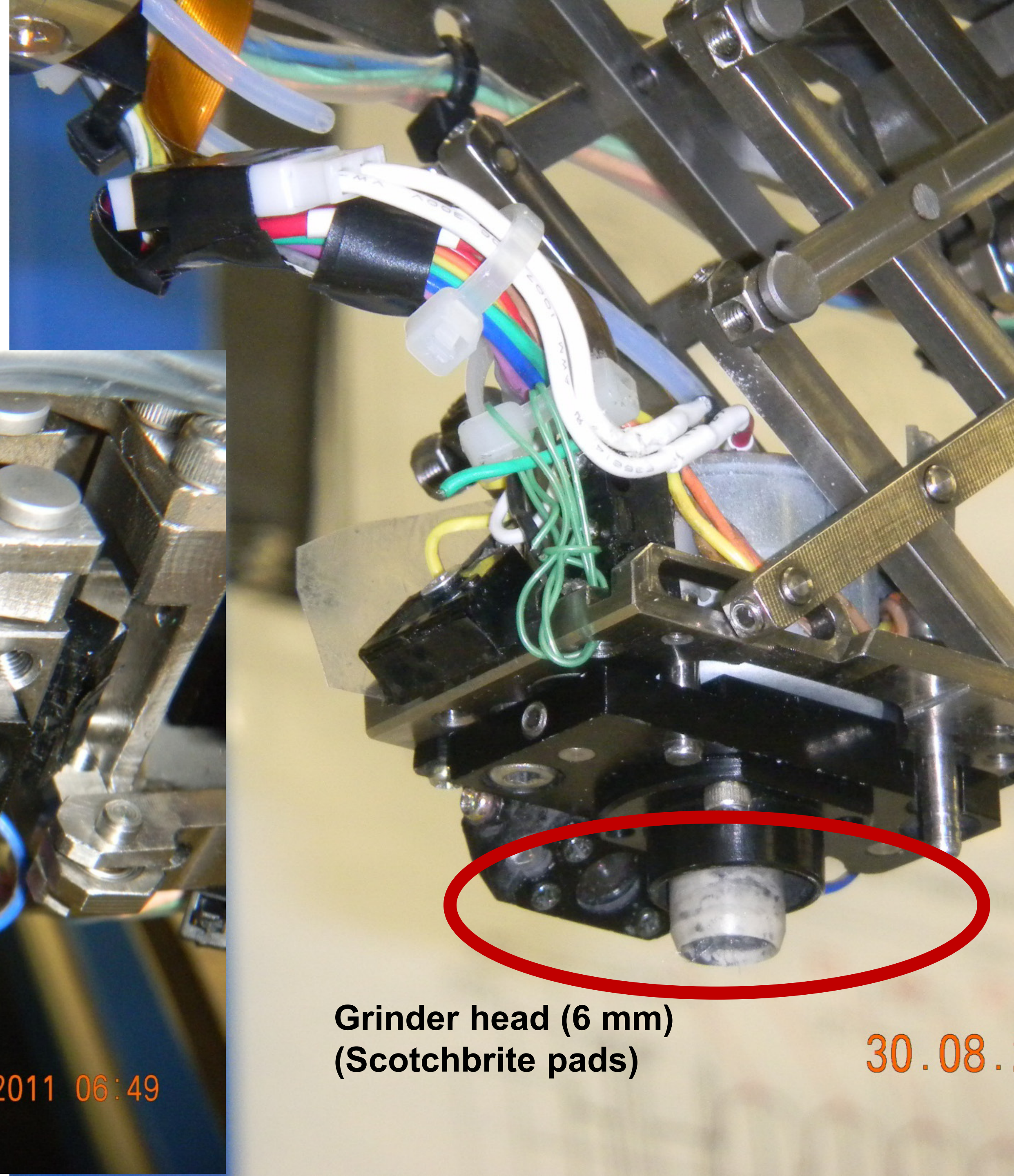


- **Second-Sound**
  - Quench location





Local Grinding:



Local Grinding:

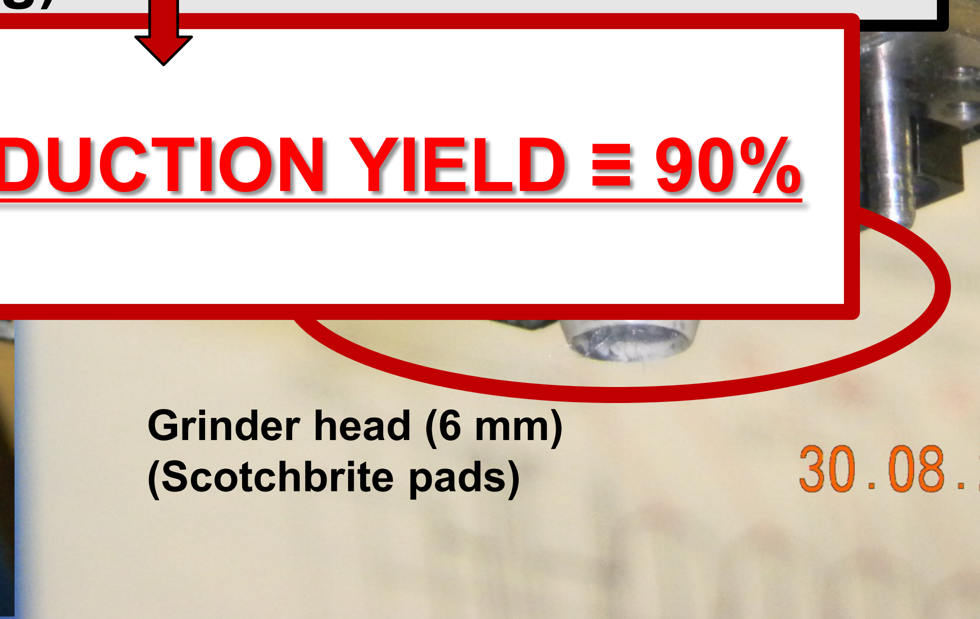
Standard recipe yield (2010):

- 35MV/m +/- 20%: 75%

Including repair of identified cell weld *fabrication defects*:

- 35MV/m +/- 20%: 90%
- (local grinding or tumbling)

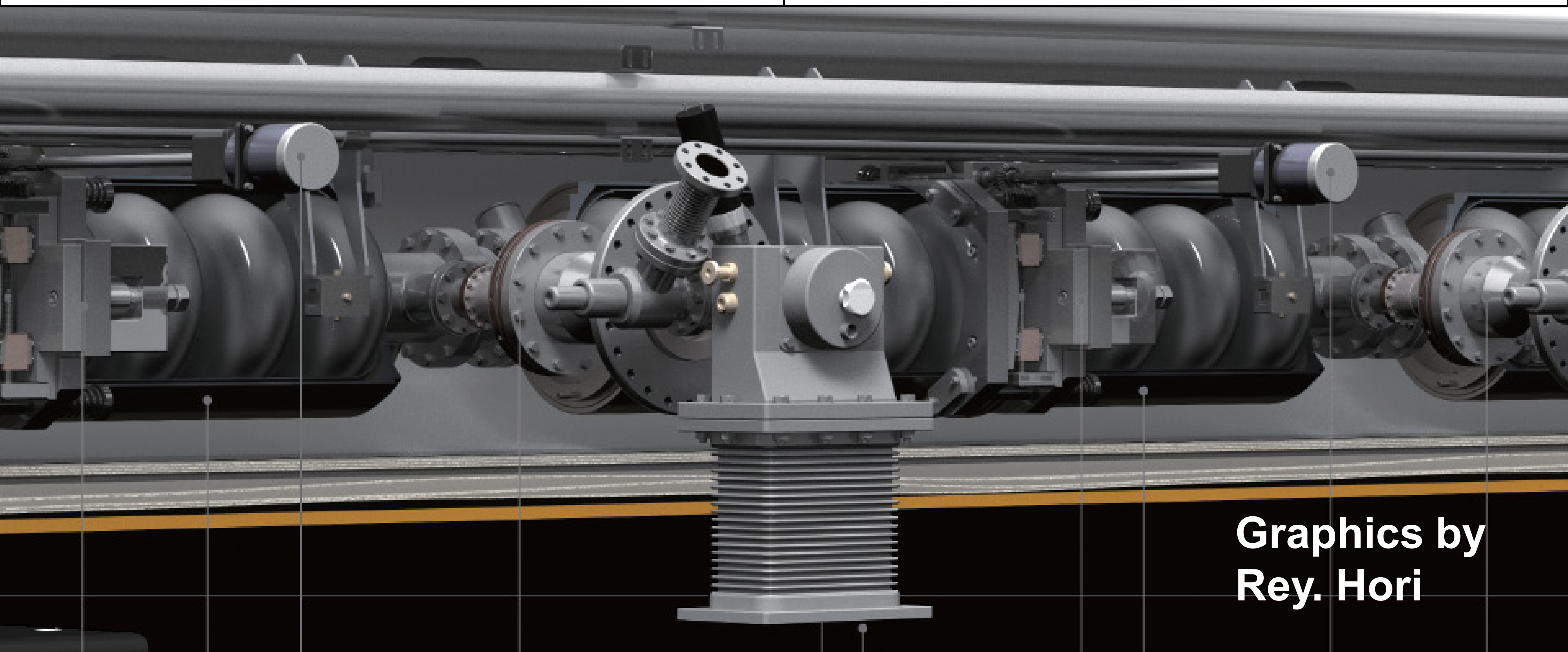
2012 GOAL PRODUCTION YIELD ≡ 90%



Grinder head (6 mm)
(Scotchbrite pads)

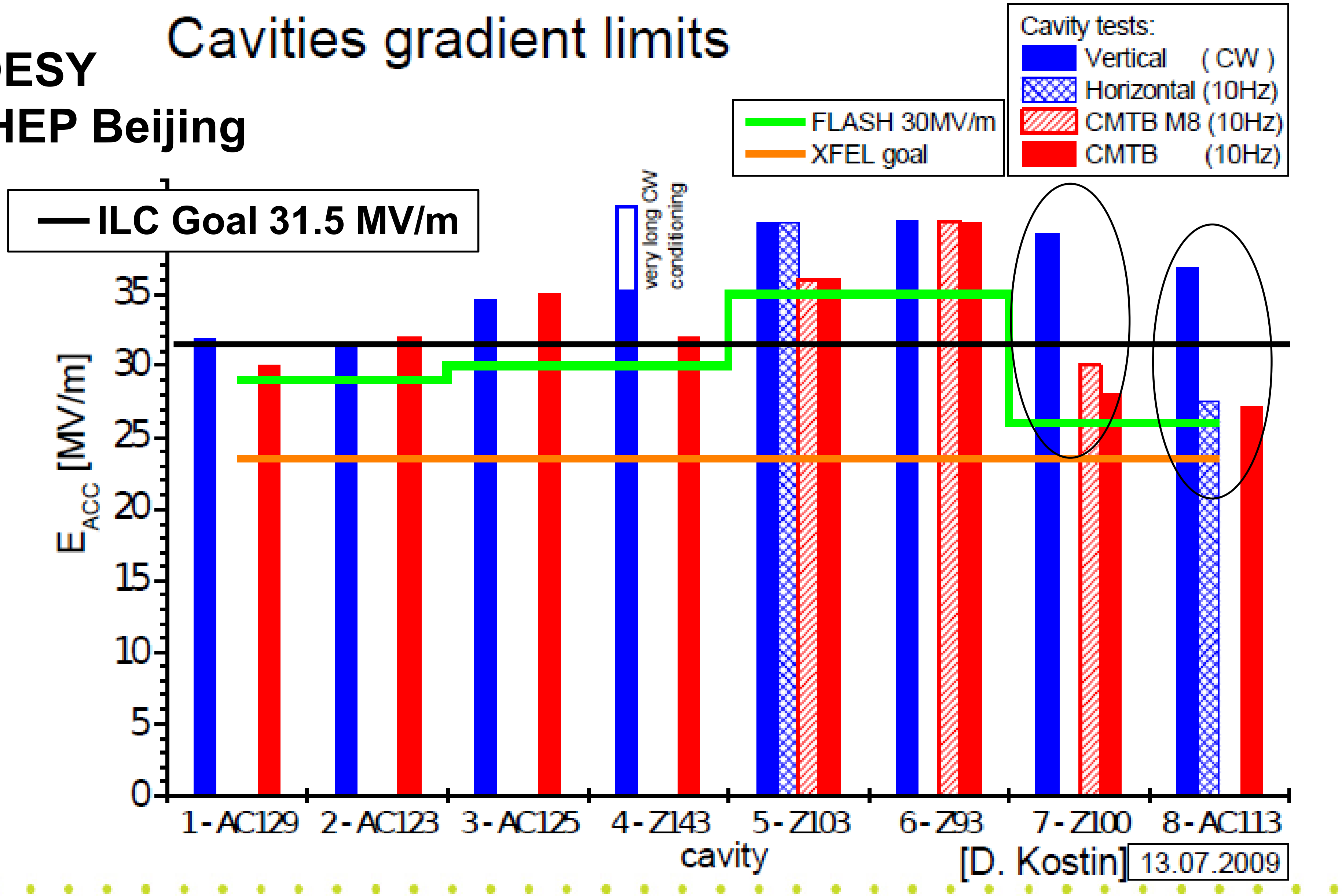
Cryomodule

2006-2011:	DESY CM prototype:
• KEK *S1 Global* • Fermilab CM-1 • Desy 9 each (XFEL prototypes)	*PXFEL1: <V> ~ 32 MV/m* →exceeds ILC target 31.5 MV/m←

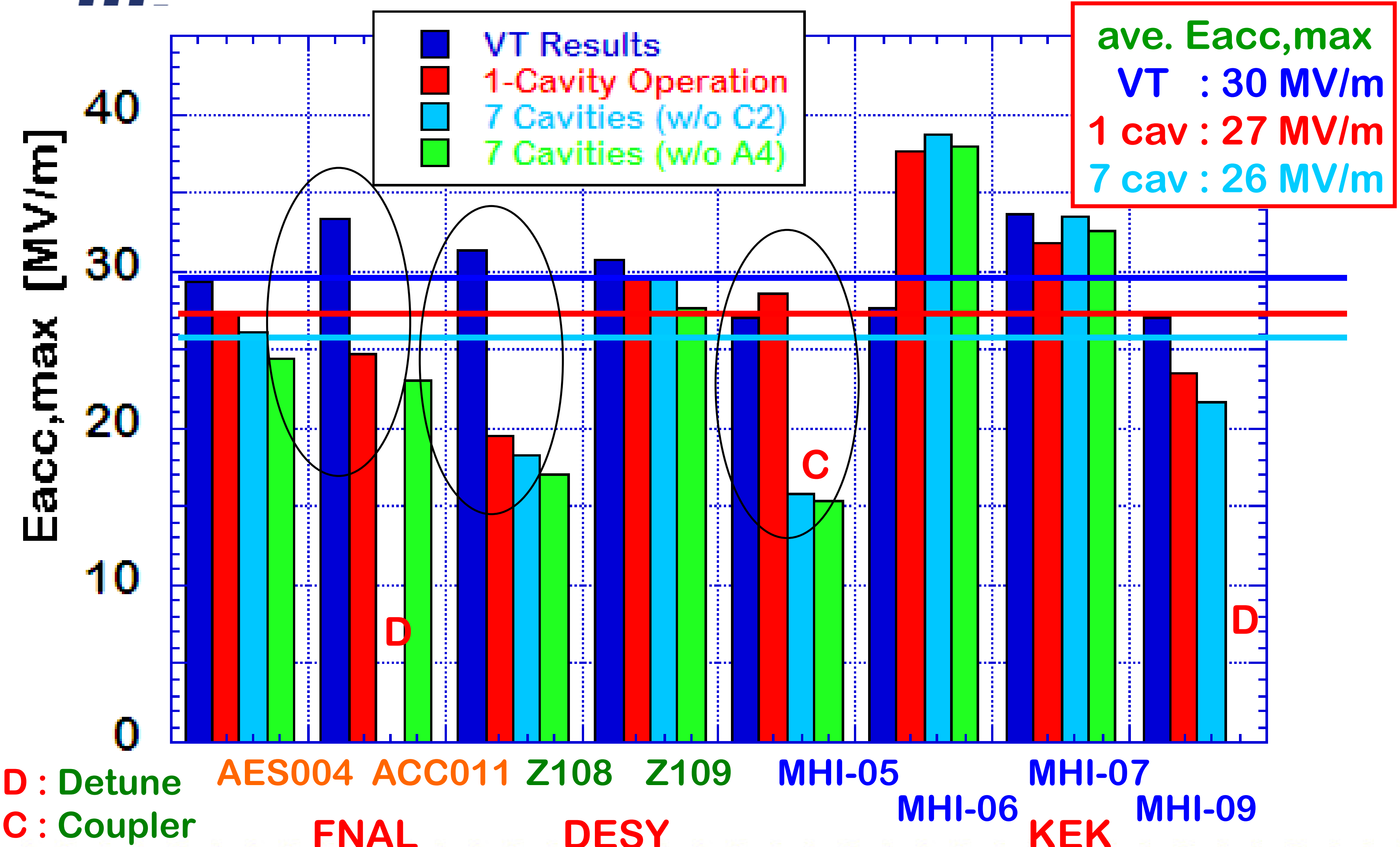


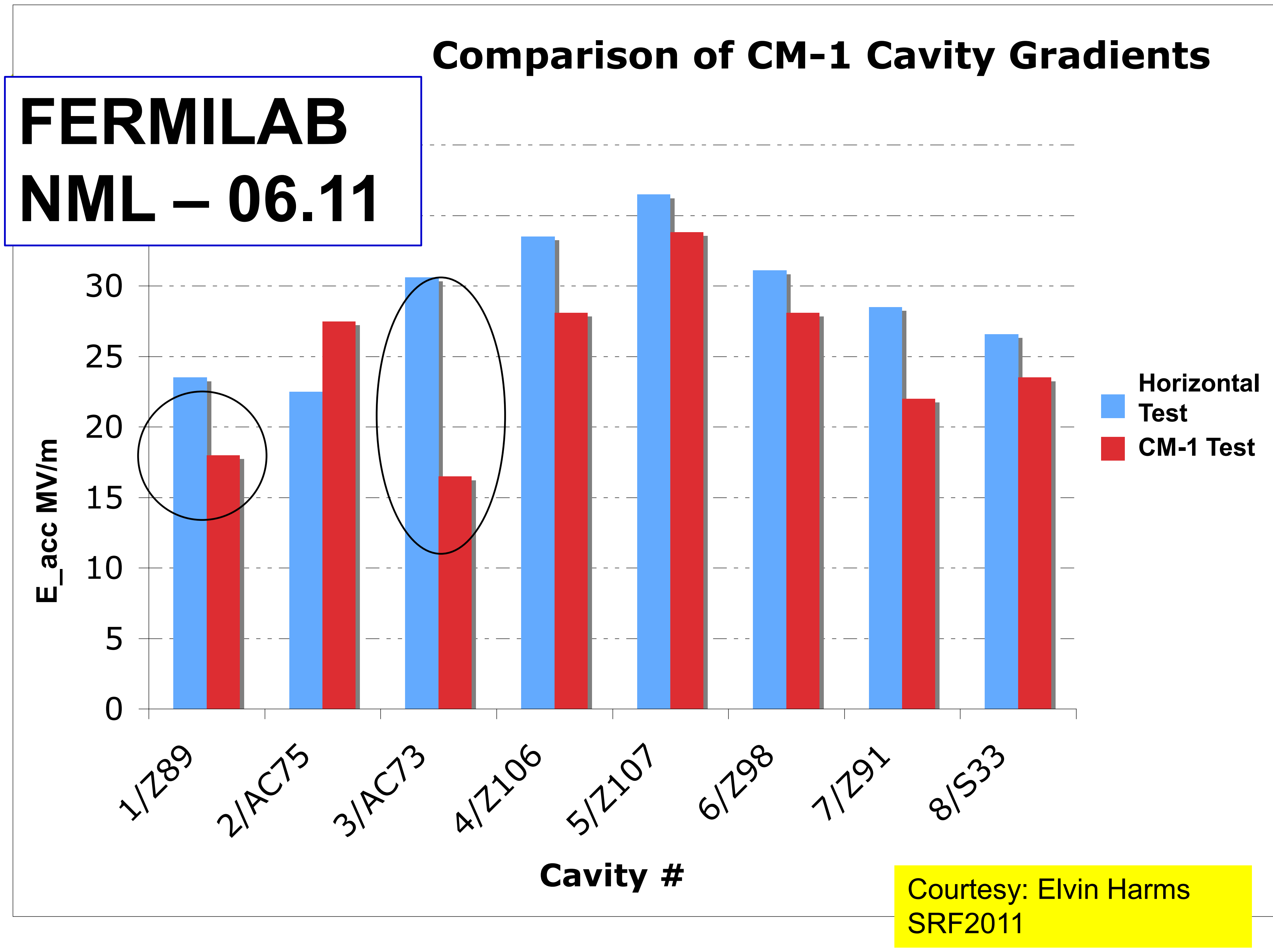
Module performance PXFEL1

DESY
IHEP Beijing

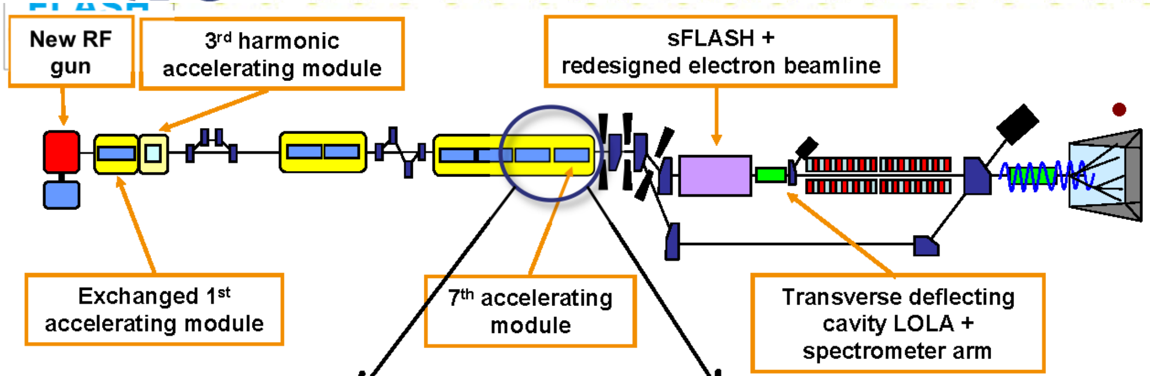


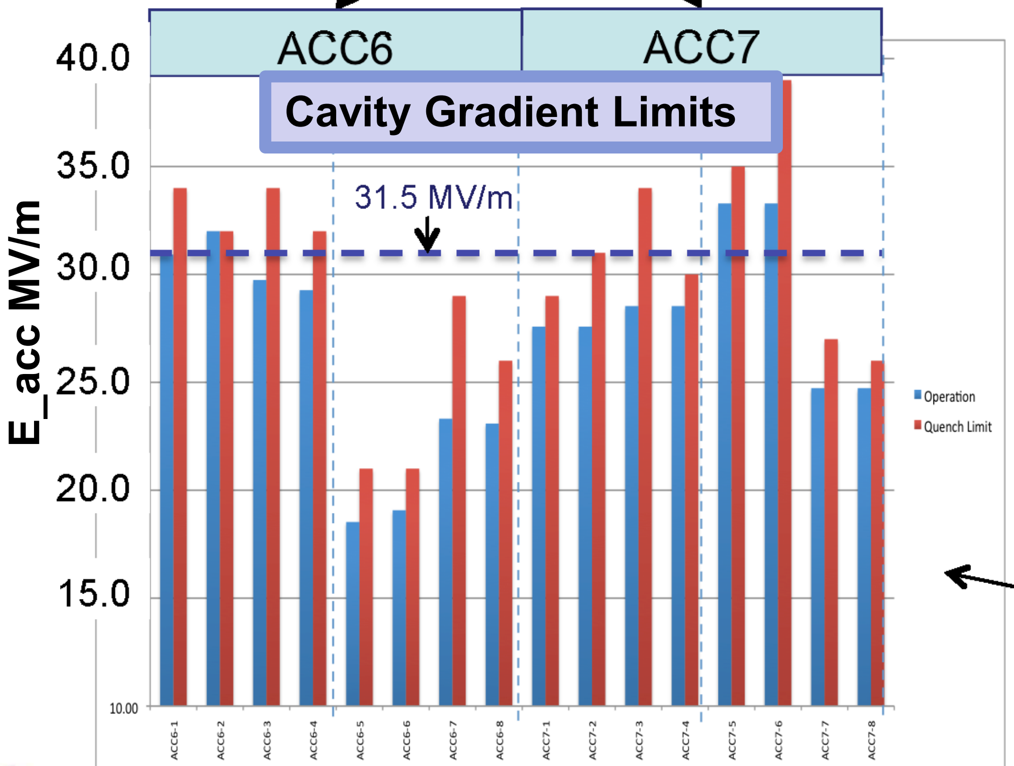
S1 Global Cryomodule (STF – KEK)




Comparison of CM-1 Cavity Gradients
FERMILAB
NML – 06.11
E_acc MV/m
0
5
10
15
20
25
30
1/Z89
2/AC75
3/AC73
4/Z106
5/Z107
6/Z98
7/Z91
8/S33
Cavity #
Horizontal Test
CM-1 Test
Courtesy: Elvin Harms
SRF2011

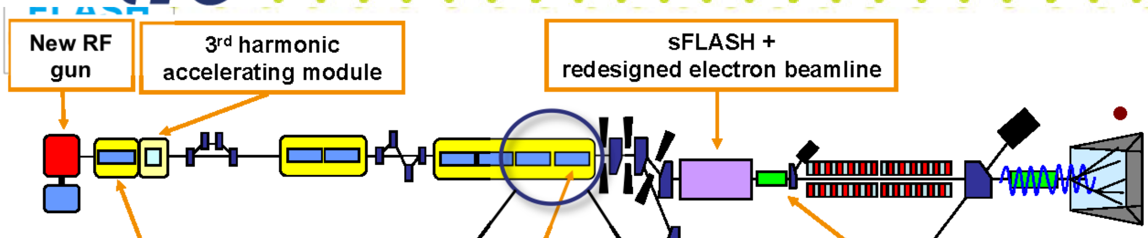
System Test: FLASH (DESY)





- **Operation with <u>Gradient Spread</u>**
  - From single RF source
- **Specifically: achieving constant gradients <u>for each individual cavity</u> during beam pulse**
  - to within few percent
  - close to gradient limits
  - 'Effective usable gradient'
- **ACC67 modules at FLASH have operating gradient spread around +/-25%**

System Test: FLASH (DESY)



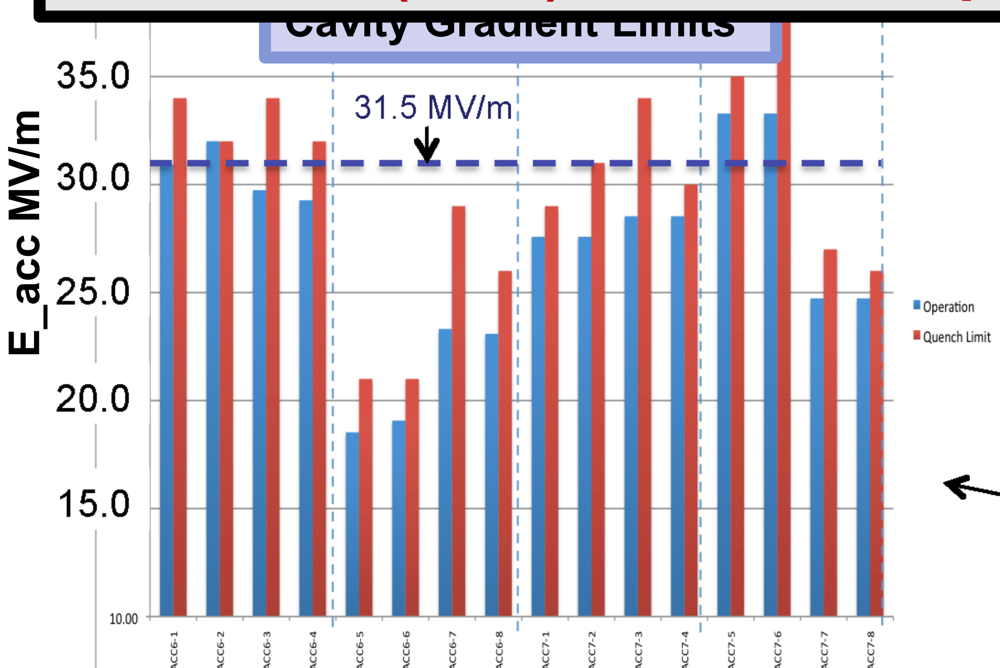
System Test Facility construction now underway:

NML (Fermilab)	**completion 2012**
STF (KEK)	**completion 2013**

- **Operation with Gradient Spread**

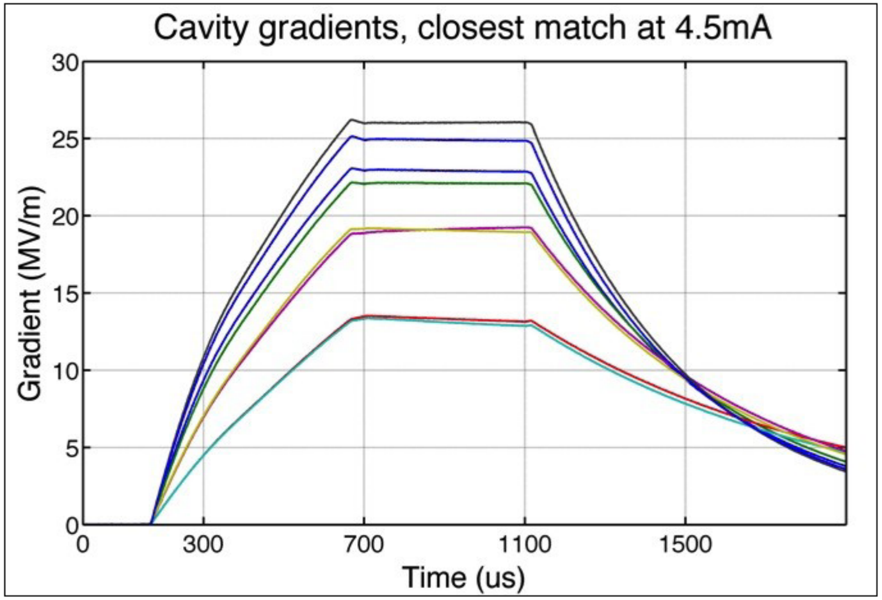
individual cavity during beam pulse

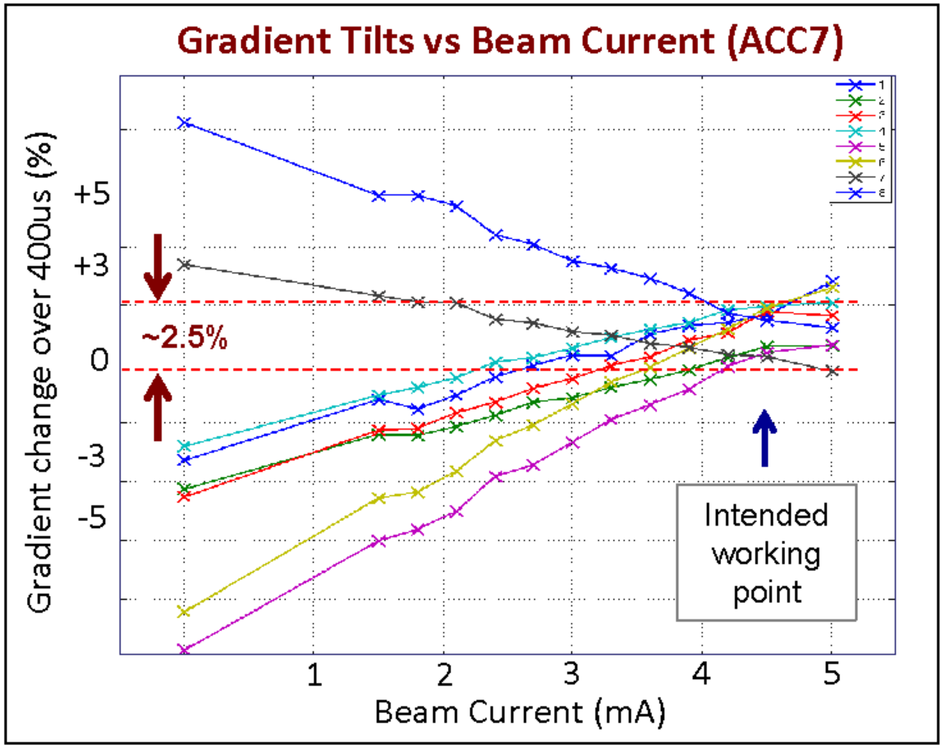
  - to within few percent
  - close to gradient limits
  - 'Effective usable gradient'



- **ACC67 modules at FLASH have operating gradient spread around +/-25%**

FLASH Beam Loading Tests – 02.2011





- Example of flat gradient solution achieved
  - 4.5 mA beam
- Scan of beam current (bunch charge) around working point

Nick Walker | DESY MAC | 12 May 2011 | Page 18

Achievements: SRF Linac – 'FLASH' (DESY) (Sept 2009)

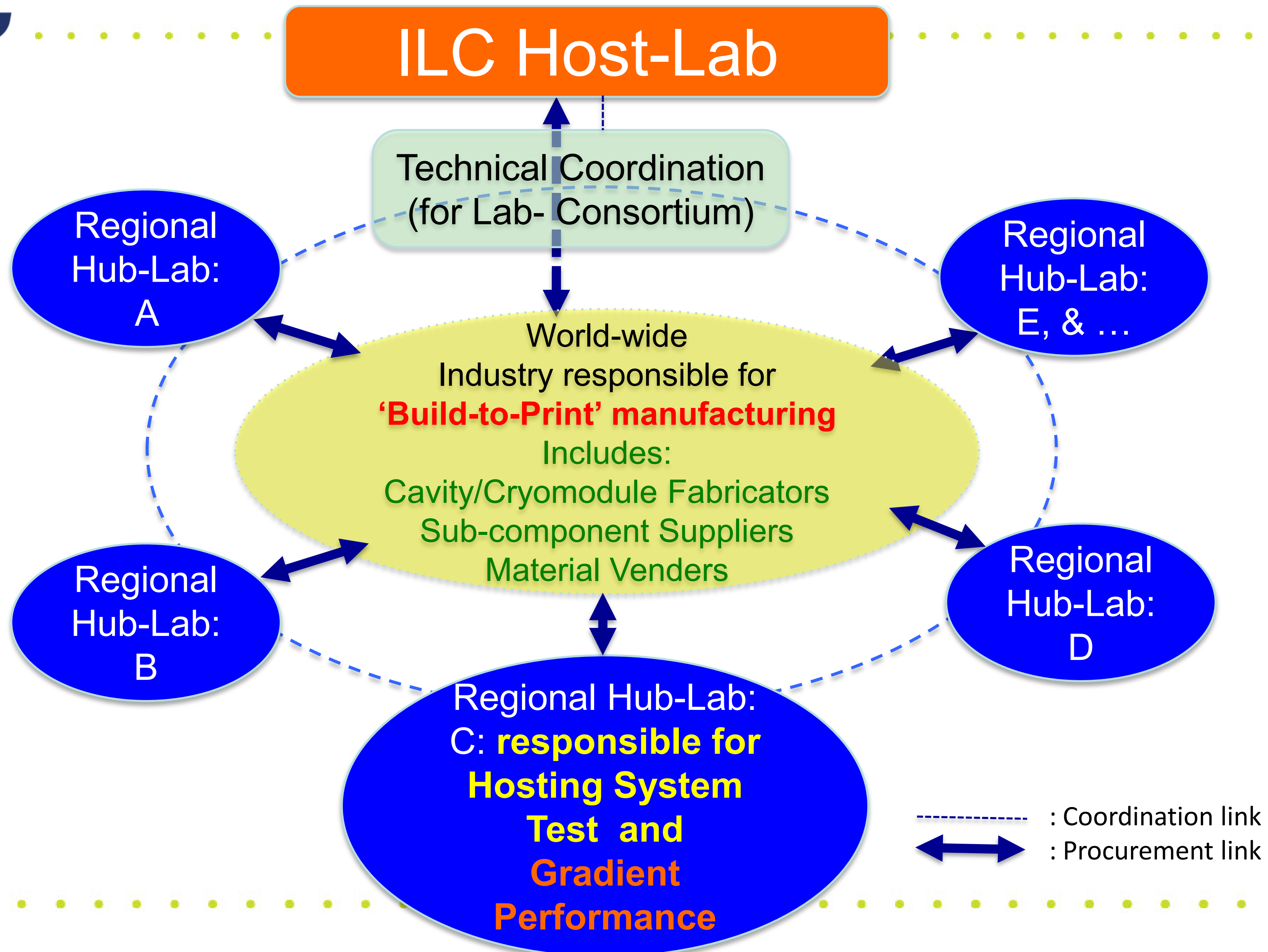
Metric	Goal for '9mA' study	Achieved (Sept 2009)
Macro-pulse current	9 mA	9 mA
Bunches per pulse	2400 x 3nC	1800 x 3nC ~2400 x 2nC
Cavities operating at high gradients, close to limit	Up to 38Mv/m	4 cavities > 30MV/m
Energy Stability	0.1% at 250 GeV (ILC)	<0.5% p-p (0.8 ms) ~0.13% rms (5 Hz)

Phase and energy stability achieved at 80% RDR baseline current

	ILC Main Linac design	TTF/FLASH (2009)
Energy / Cavities / avg. G	250GeV / 8K / 31.5MV/m	0.8 GeV / 48 / 16 MV/m

THPC081 Status of the Free Electron Laser FLASH at DESY M. Vogt

ILC-SCRF Industrialization Model



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EU-XFEL (at DESY):

- European companies to make 800 cavities in next few years
  - (600 contracted for delivery before 2014)
- 100 cryomodules to be assembled at Saclay

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Outline: ***Siting***

- **High Gradient Superconducting RF R & D**
- **Siting → Civil Engineering**
  - Tunnel configuration studies:
    - Deep twin; Deep single; shallow construction; mountain region
  - Specific site studies (2) underway in Japan
  - Interconnection between site topography and HLRF
- **Design Optimization**
- **Beam Test Facilities**
- **Next Steps**

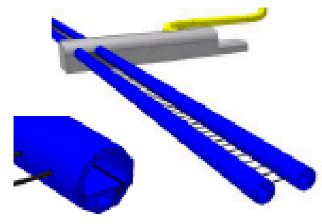
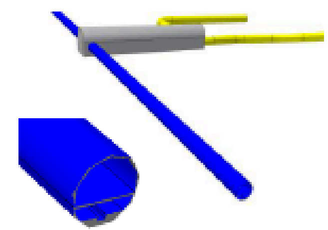
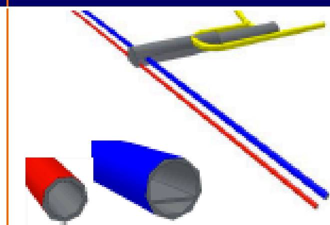
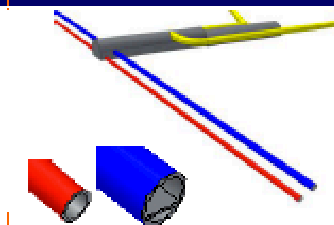
Courtesy: A. Enomoto, M. Miyahara

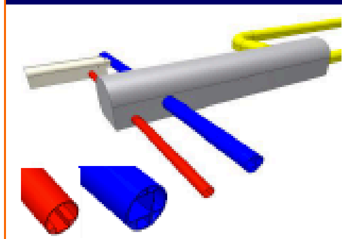
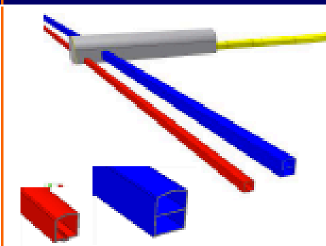
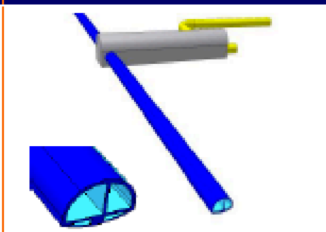
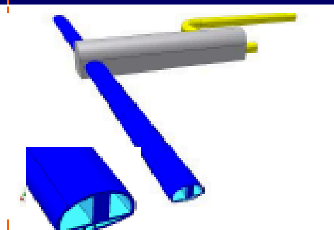
Mountain Region Tunnel Configurations

Global Design Effort - CFS

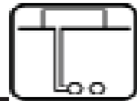
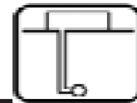
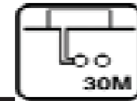
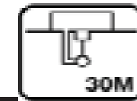
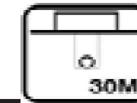
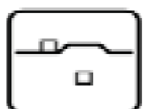
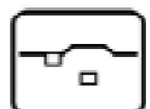
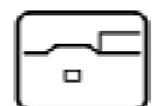
11

■比較検討案のイメージ **8 Schemes** : Case Study for MLT Cost Estimate

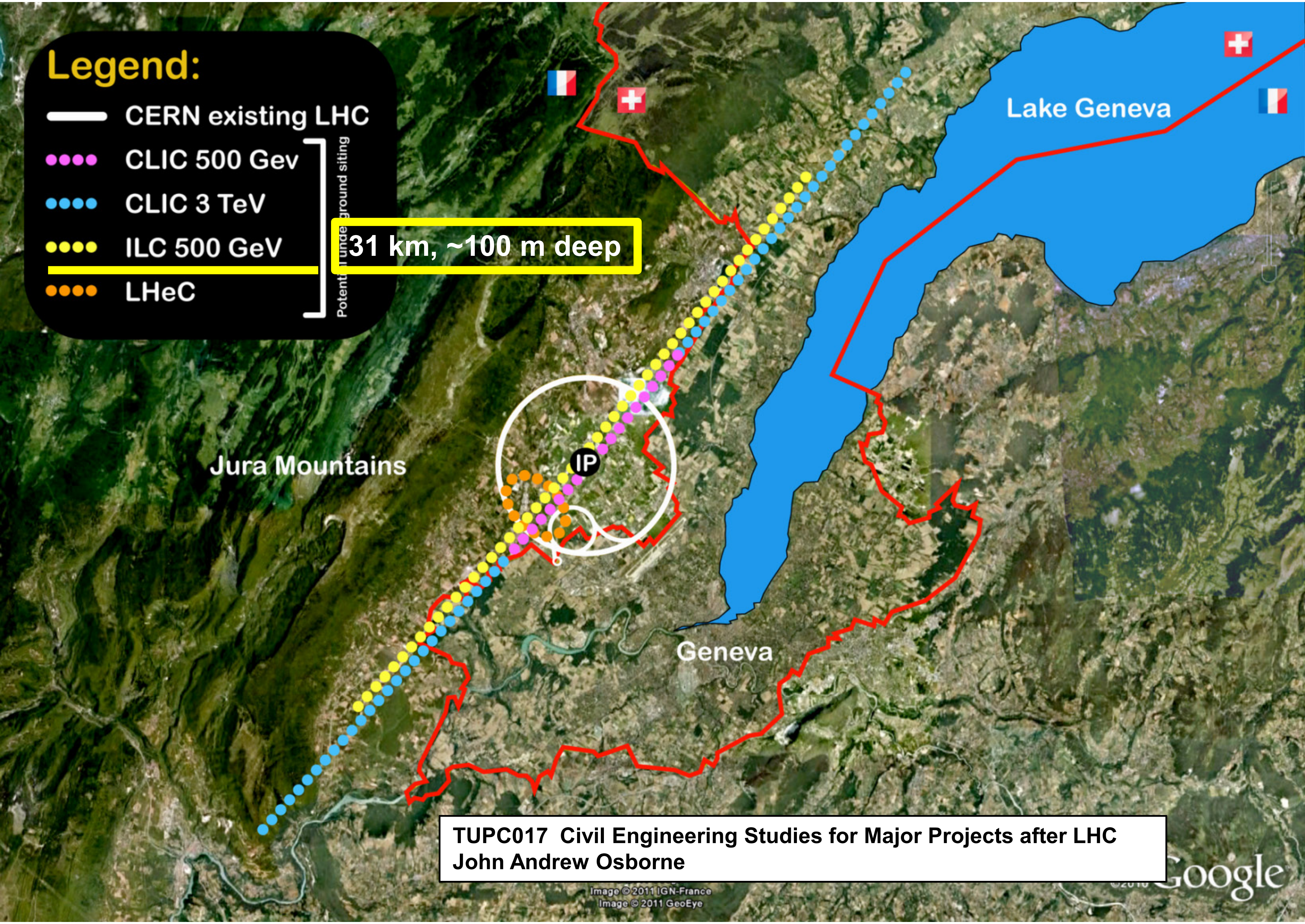
Case-1	Case-2	Case-3	Case-4
RDR D-T-R	RDR' S-T-R	XFEL JS-T-X	KCS JS-T-K
			
円形／ツインT	円形／シングルT	円形／シングルT	円形／Jシングル T

Case-5	Case-6	Case-7	Case-8
DRFS JS-T-D	DRFS JS-N-D	DRFS S-N-D	DRFS wS-N-D
			
円形／Jシングル T	幌型／Jシングル T	幌型／シングルT	幌型／シングルT

Linac Configuration Study - US

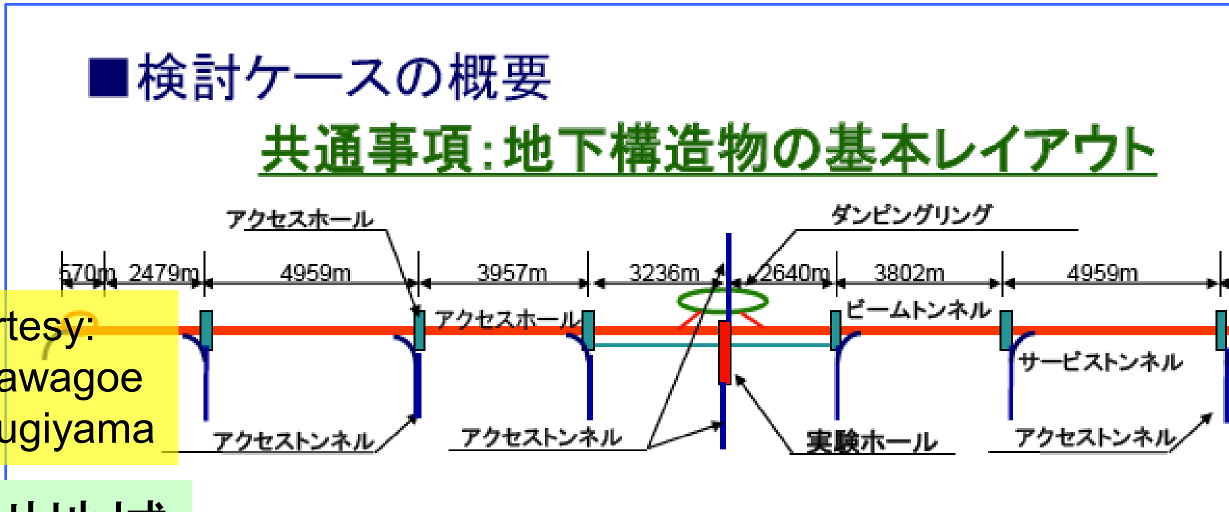
	A	B	C	D	E	F	G	H
								
	DEEP		NEAR SURFACE					
	Twin Deep Tunnels	Single Deep Tunnel	Twin Near Surfce Tunnels	Near Surface Tunnel, At Surface Gallery	Single Near Surface Tunnel	Enclosure in Open Cut, Cont. Gallery	Enclosure & Cont. Gallery in Open Cut	Enclosure in Open Cut
EXCAVATION	TBM	TBM	TMB	TBM & OPEN CUT	TBM	OPEN CUT	OPEN CUT	OPEN CUT
No. of TUNNELS	TWO-TUNNEL	ONE-TUNNEL	TWO-TUNNEL	TWO-TUNNEL	ONE-TUNNEL	ONE-TUNNEL	TWO-TUNNEL	ONE-TUNNEL
SHAFT SOIL	VARIES	VARIES	VARIES	VARIES	Soft/SURRY	NA	NA	NA
TUNNEL SOIL	ROCK	ROCK	COHESIVE SOIL OR ROCK	COHESIVE SOIL - LOW PERMEABILITY	SATURATED SAND & GRAVEL	SOILS VARIES	SOILS VARIES	SOILS VARIES
SERVICE SPACE	SECOND TUNNEL	SURFACE BUILDINGS	SECOND TUNNEL	CONTINOUS SERVICE GALLERY	AT CAMPUSES	CONTINOUS SERVICE GALLERY	CONTINOUS SERVICE GALLERY	AT CAMPUSES
ILC Technology	DISTRIBUTED RF	CLUSTERED RF	DISTRIBUTED RF	DISTRIBUTED RF	CLUSTERED RF	DISTRIBUTED RF	DISTRIBUTED RF	CLUSTERED RF
SIMILAIR TO	RDR SAMPLE SITES	RDR & CLIC	RDR	DUBNA ILC	XFEL	PROJECT X	PROJECT X	
ACCESS	VERTICAL SHAFT	VERTICAL SHAFT	VERTICAL SHAFT	VERTICAL SHAFT	VERTICAL SHAFT	HATCH	HATCH	HATCH

Courtesy: V. Kuchler, T. Lackowski, T. Lundin

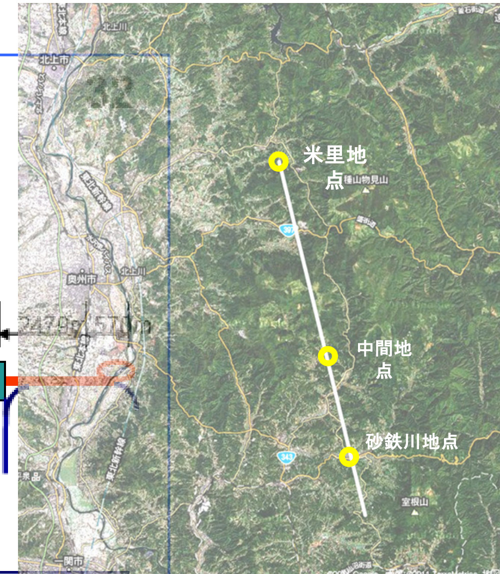

Legend:
CERN existing LHC
CLIC 500 Gev
CLIC 3 TeV
ILC 500 GeV
LHeC
31 km, ~100 m deep
Lake Geneva
Jura Mountains
IP
Geneva
TUPC017 Civil Engineering Studies for Major Projects after LHC
John Andrew Osborne
Image © 2011 IGN-France
Image © 2011 GeoEye
Google

Courtesy: A. Enomoto, M. Miyahara

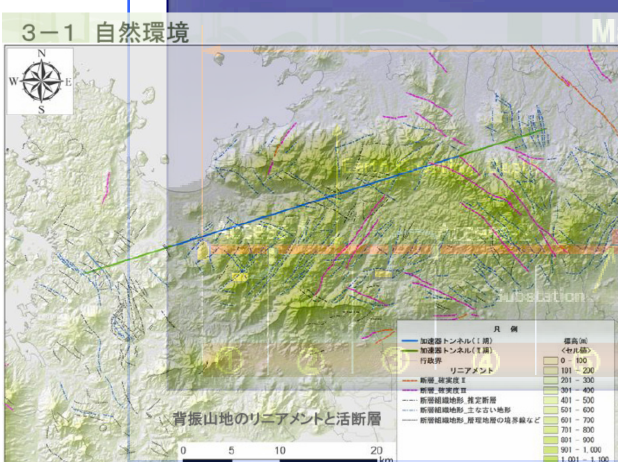
今年度の検討課題



Courtesy:
K. Kawagoe
A. Sugiyama



九州地域

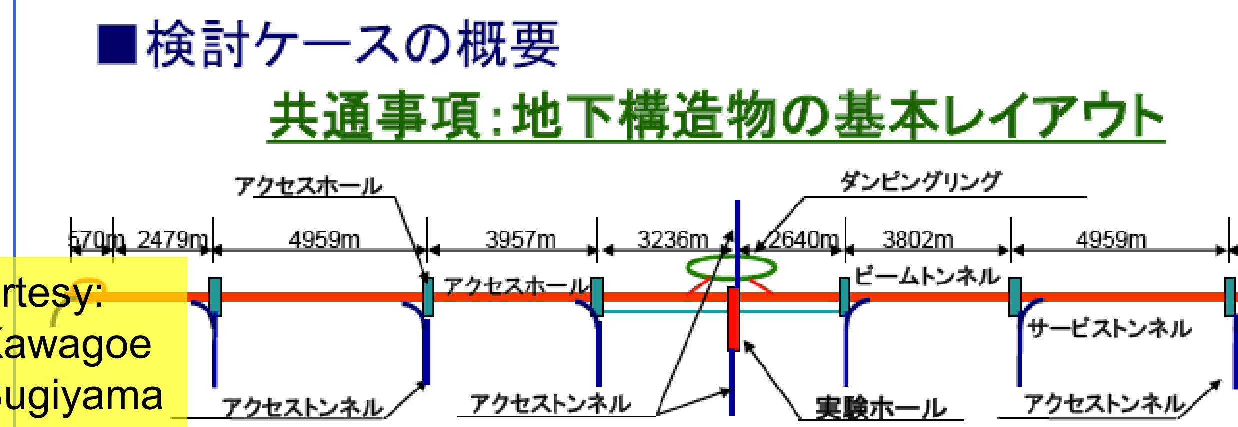


東北地域

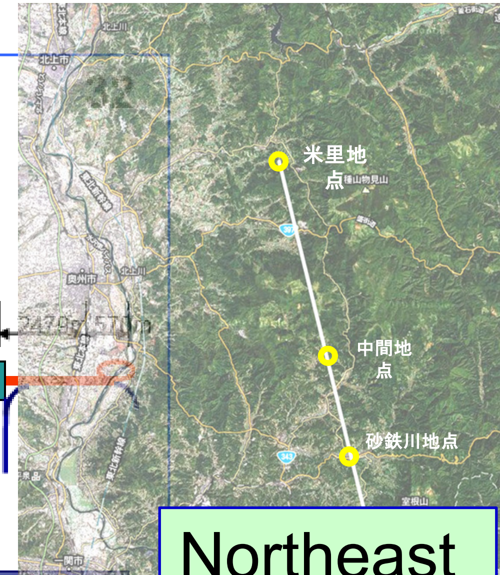
Courtesy:
H. Yamamoto
T. Sanuki

Courtesy: A. Enomoto, M. Miyahara

Site Geological studies - 2011

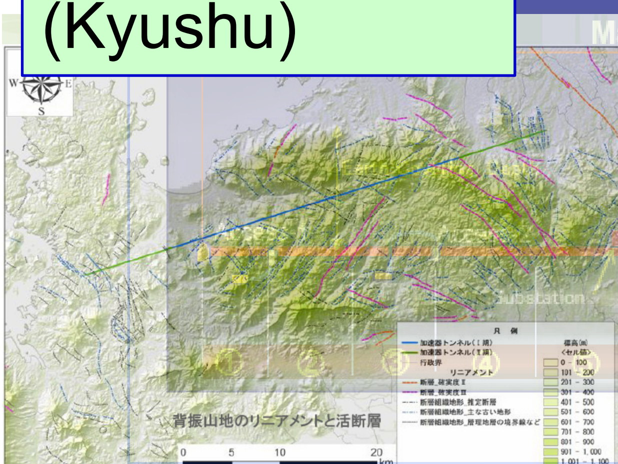


Courtesy:
K. Kawagoe
A. Sugiyama



Northeast (Tohoku)

Far west Japan (Kyushu)



加速器学会・加速器土木

Courtesy:
H. Yamamoto
T. Sanuki

Outline: ***Design Optimization***

- **High Gradient Superconducting RF R & D:**
- **Siting**
- **Design Optimization- Four 'Top-Level' Changes:**
  1) Allow gradient spread
  2) Single tunnel main linac
     - Alternate HLRF schemes
  3) Reduce beam power (number of bunches)
  4) Central region – relocate positron source
     - (from mid-linac baseline location)

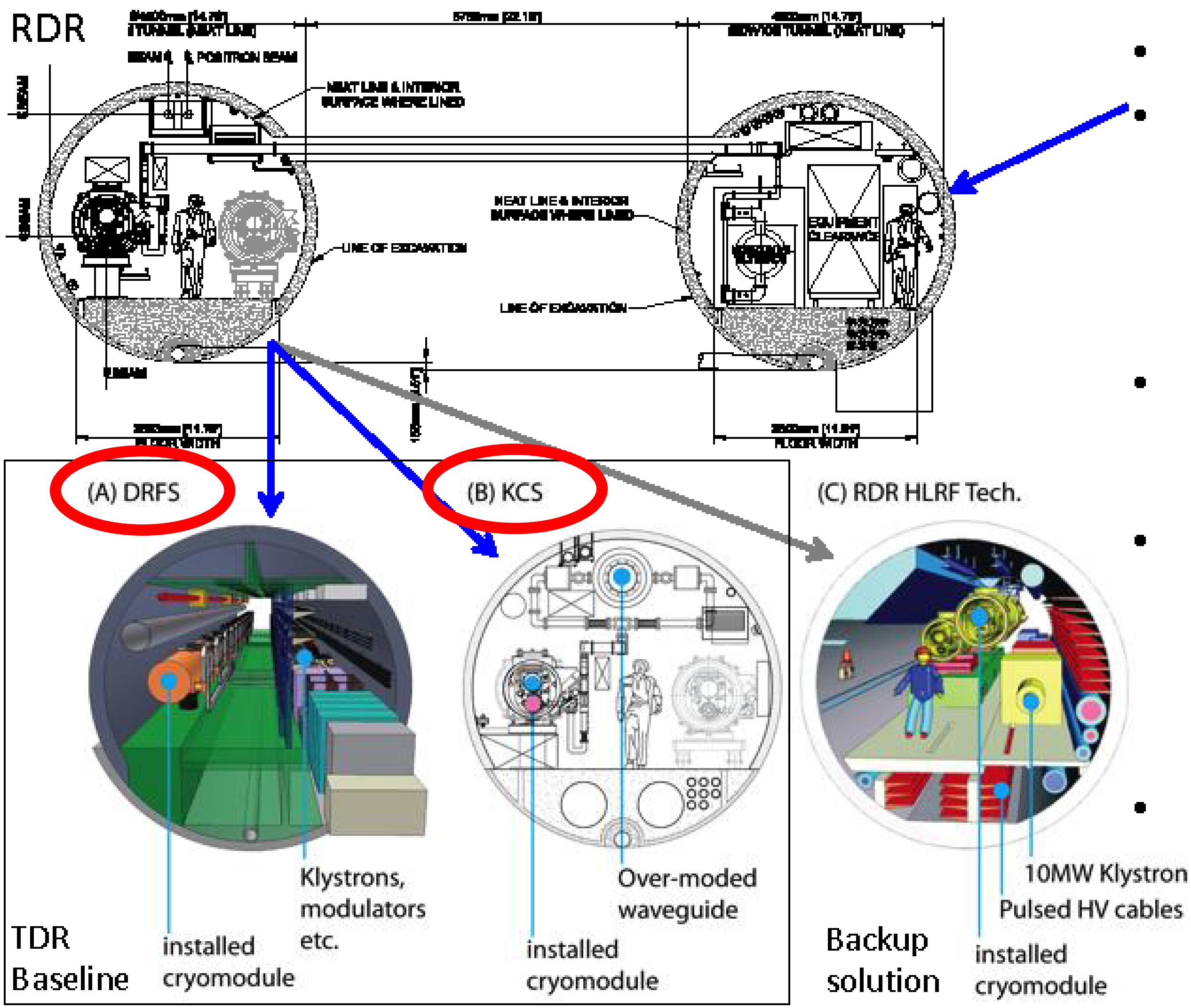
  → **Cost reduction ~ 12% total** ←
- **Beam Test Facilities**
- **Next Steps**

TLCC1: Gradient

- Accept ≤ ±20% gradient spread
  - VT accept up to 0.8×35 = 28 MV/m → higher yield
  - Operating gradient 31.5 MV/m avg. (10% margin)
  - Accept the range 25 ≤ E_{acc} ≤ 38 MV/m
- RF power capacity
  - Additional 10-15% required

	ILC main linac cavity operational specification	R&D goal for cavity gradient in vertical test
Gradient in vertical test, including the 2nd pass	35 MV/m at Q0≥ 8x109, average with spread ≤ ±20 %	35 MV/m at 90 % yield, equivalent to ≥ 38 MV/m, average
Cavity-string gradient in cryomodule test	34 MV/m, average	
Main linac operational gradient	31.5 MV/m at Q0 ≥ 1x1010 average, with spread ≤ ±20%	

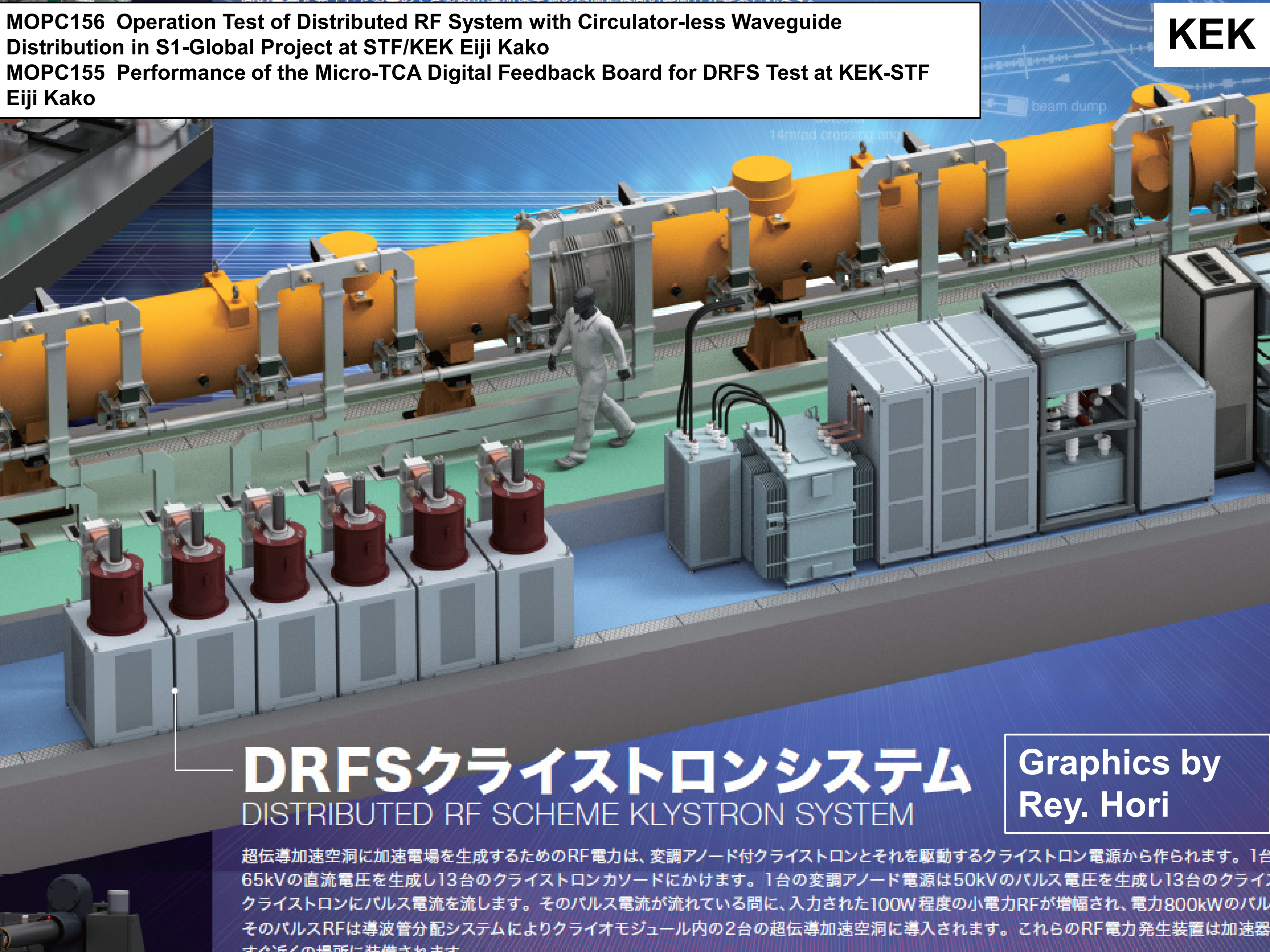
TLCC2: Single Tunnel



- トンネル長25km短縮
- HLRF solution
  - Distributed RF sources (DRFS)
  - Klystron Cluster Scheme (KCS)
  - Accept site dependence
  - **Both require R&D**
- Back-up solution
  - TESLA Tech. option in single tunnel (e.g. XFEL-like)
- Considerations of
  - Operations
  - Installation
  - Availability
  - Safety egress
- Cost saving relative small (~2% TPC)

MOPC156 Operation Test of Distributed RF System with Circulator-less Waveguide Distribution in S1-Global Project at STF/KEK Eiji Kako
MOPC155 Performance of the Micro-TCA Digital Feedback Board for DRFS Test at KEK-STF Eiji Kako

KEK

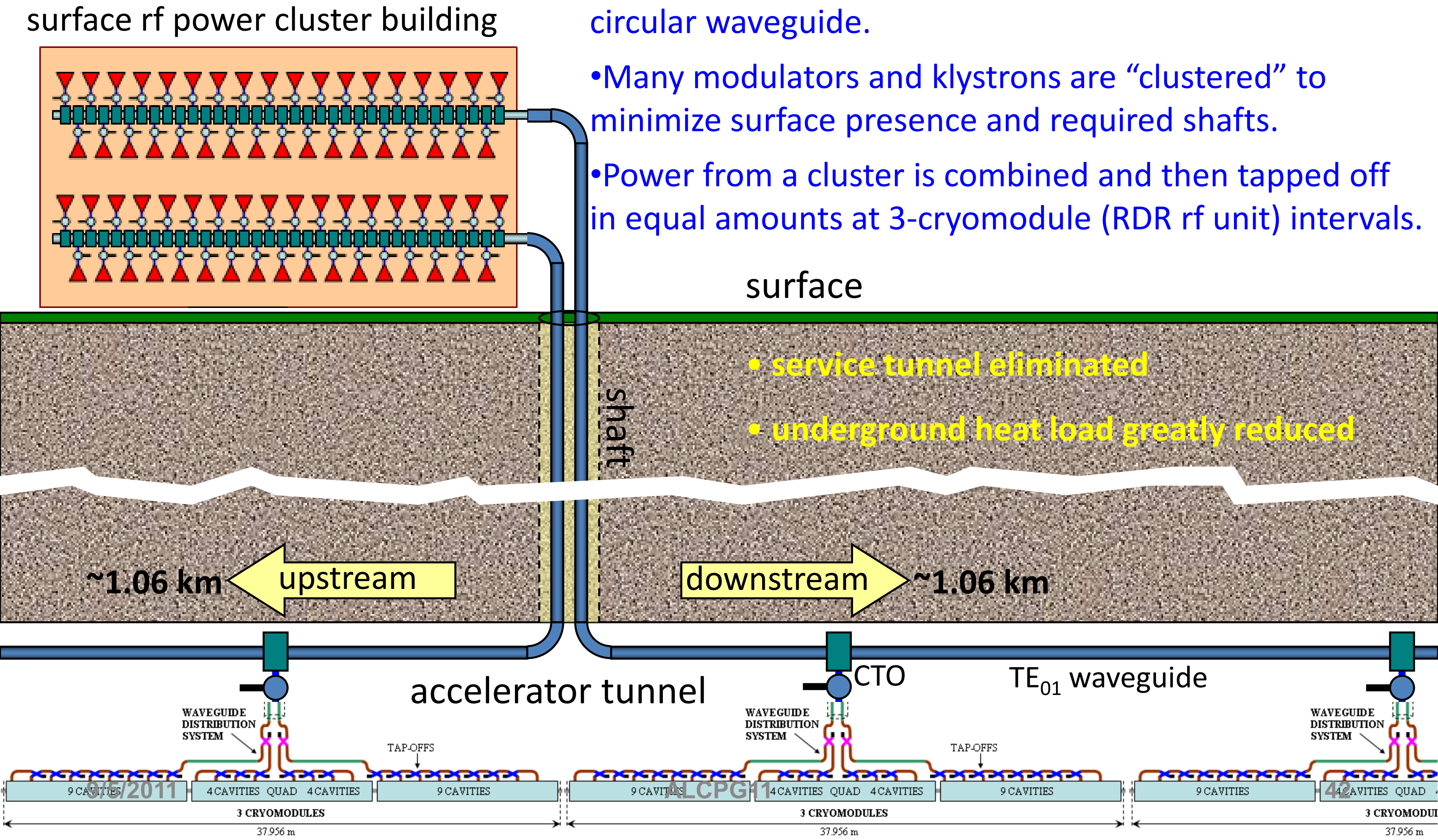


Graphics by Rey. Hori

Klystron Cluster System Basic Layout

‘KCS’

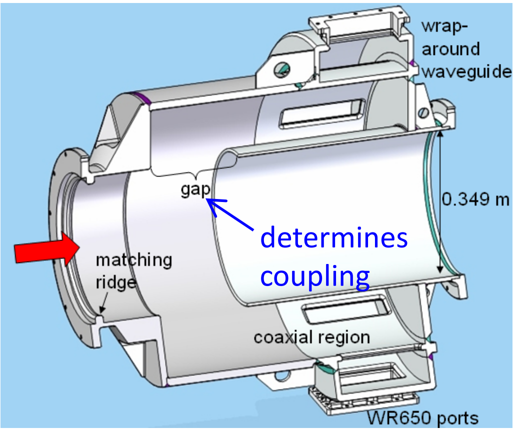
- Main linac rf power is produced in surface buildings and brought down to and along the tunnel in low-loss circular waveguide.
- Many modulators and klystrons are “clustered” to minimize surface presence and required shafts.
- Power from a cluster is combined and then tapped off in equal amounts at 3-cryomodule (RDR rf unit) intervals.

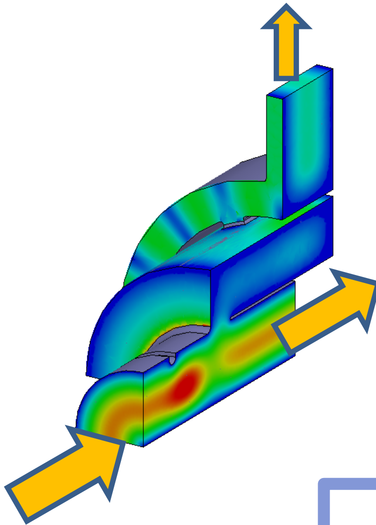


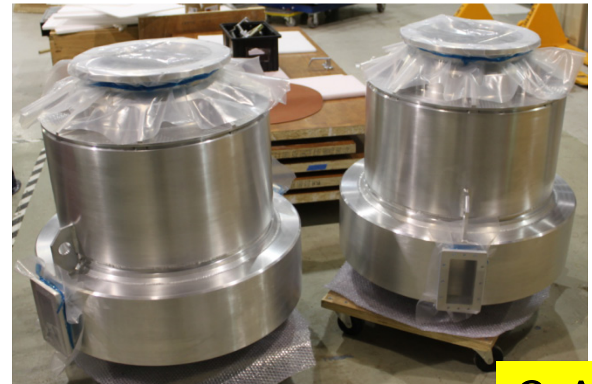
Klystron Cluster Scheme Tests

. Resonantly power a 0.5 m diameter, pressurized (1 atm N2), 10 m long aluminum pipe to 300 MW TE01 mode field equivalent in 1 ms pulses

CTO (Coaxial Tap-Off)







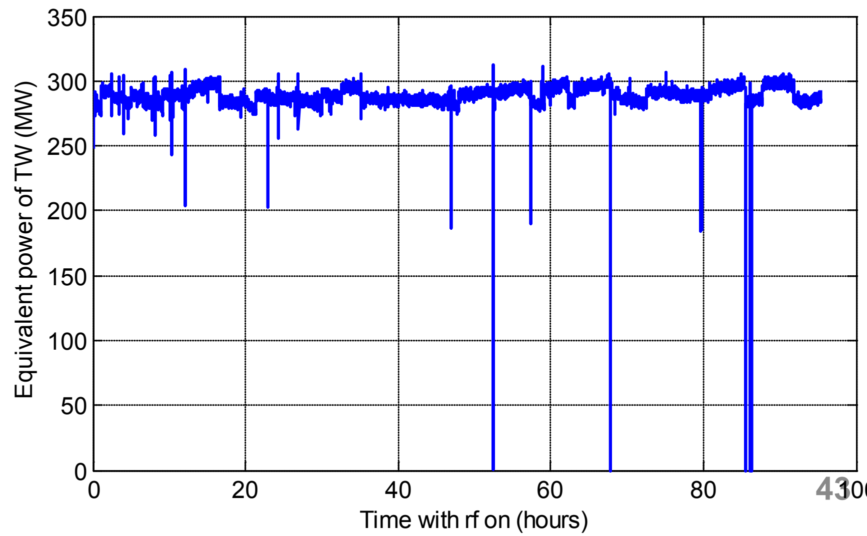
ACTUAL CTO's

C. Adolphsen
C. Nantista

SLAC

10 m Resonant pipe-operational

Few hundred hours 300 MW resonant power (1.1 ms, 5Hz)



TLCC-3 Low Beam Power

- Reduced bunch num 2600 →1300
  - DR Circumference 6.4 → 3.2 km
  - RF power 30-50%
    - KCS: 6.0 mA current, 1.6 ms RF pulse
    - DRFS: 4.5 mA current, 2.2 ms RF pulse
  - **Greatest cost reduction**
- Luminosityの回復
  - stronger focusing at IP
  - travelling focus scheme (~30% gain)
  - High risk (vertical beam control : <0.1 σ_y at IP)
- Full powerへのupgrade
  - modulators/klystrons
  - second positron DR

TLCC-4: Positron Source Relocation

- Relocate undulator-based source at end of main electron linac
  - RDR location: nominal 150 GeV point
- Rationale:
  - Consolidation of sources in central “campus” region (environment etc.)
  - Large energy overhead for driving source for E_{cm}>300 GeV
  - No need to decelerate the beam for E_{cm}<300 GeV
  - Further integration with stand-alone conventional source (AUX source) for commissioning/availability.
- Requires implementation of 10 Hz alternate pulse scheme for E_{cm}<300 GeV
  - Make use of reduce linac power to have separate pulse to generate positrons
  - Implications for RF sources and Damping Rings
    - cost increase
  - Some additional transfer lines and pulsed-magnet systems required in central region (not incl. in cost estimate)

Outline: ***Beam Test Facilities***

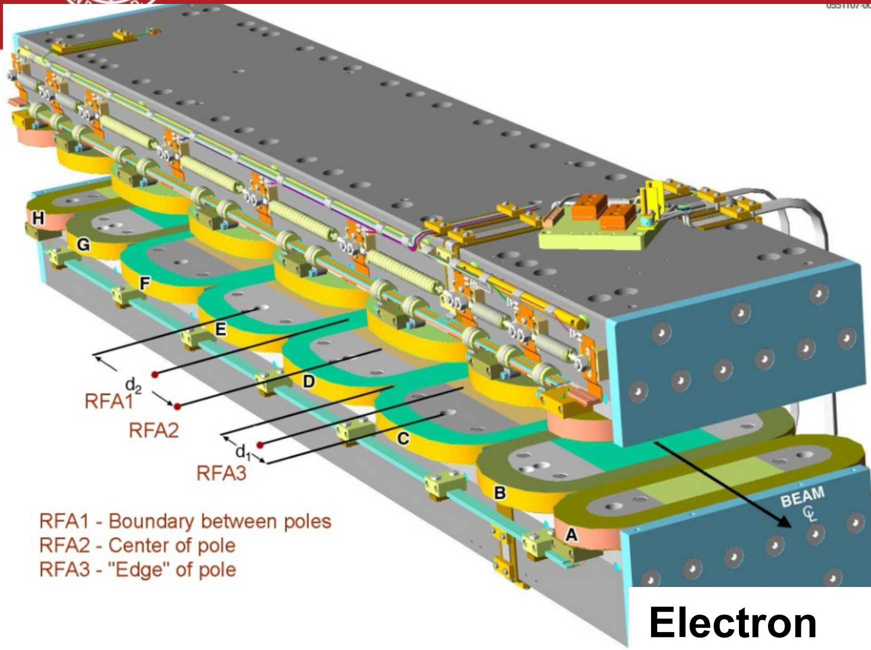
- **High Gradient Superconducting RF R & D**
- **Siting**
- **Design Optimization**
- **Beam Test Facilities**
  - CesrTA (Cornell)
    - Simulation and demonstration of electron cloud mitigation in different field regions
  - ATF2 (KEK)
    - Tuning strategy convergence demonstration – 2012/13
    - Demagnification demonstrated – FFTB (1995)
- **Next Steps**

CesrTA (Cornell) Electron Cloud Mitigations:

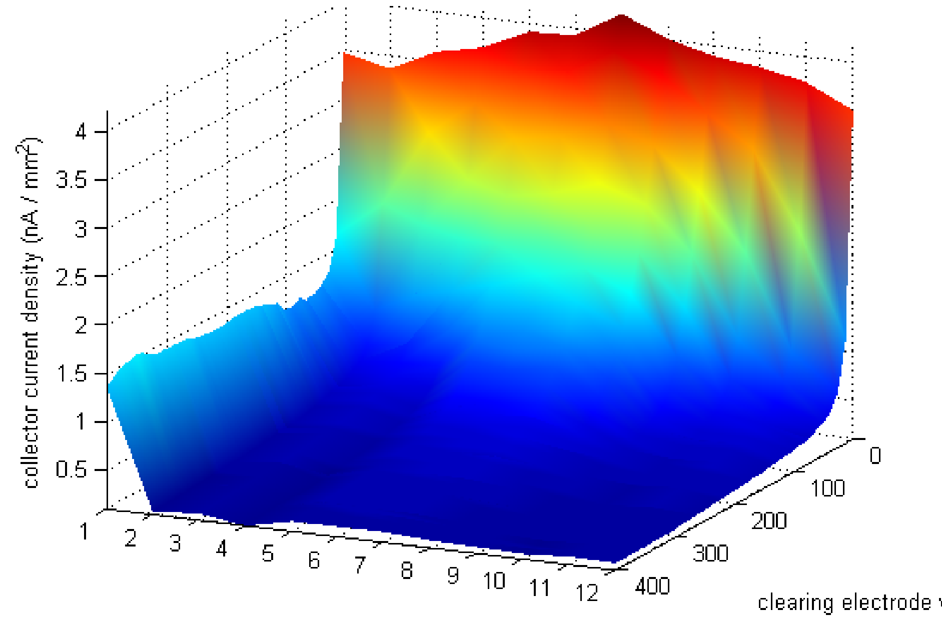
	Drift	Quad	Dipole	Wiggler	VC Fab
Al	✓	✓	✓		CU, SLAC
Cu	✓			✓	CU, KEK, LBNL, SLAC
TiN on Al	✓	✓	✓		CU, SLAC
TiN on Cu	✓			✓, ✗	CU, KEK, LBNL, SLAC
Amorphous C on Al	✓				CERN, CU
NEG on SS	✓				CU
Diamond-like C on Al	✓				CU, KEK
Solenoid Windings	✓				CU
Fins w/TiN on Al	✓				SLAC
Triangular Grooves on Cu				✓	CU, KEK, LBNL, SLAC
Triangular Grooves w/TiN on Al			✓		CU, SLAC
Triangular Grooves w/TiN on Cu				✓	CU, KEK, LBNL, SLAC
Clearing Electrode				✓	CU, KEK, LBNL, SLAC

✓ = chamber(s) deployed ✗ = deployed in CESR Arc, Jan 2011 ✓= installed Jan 2011

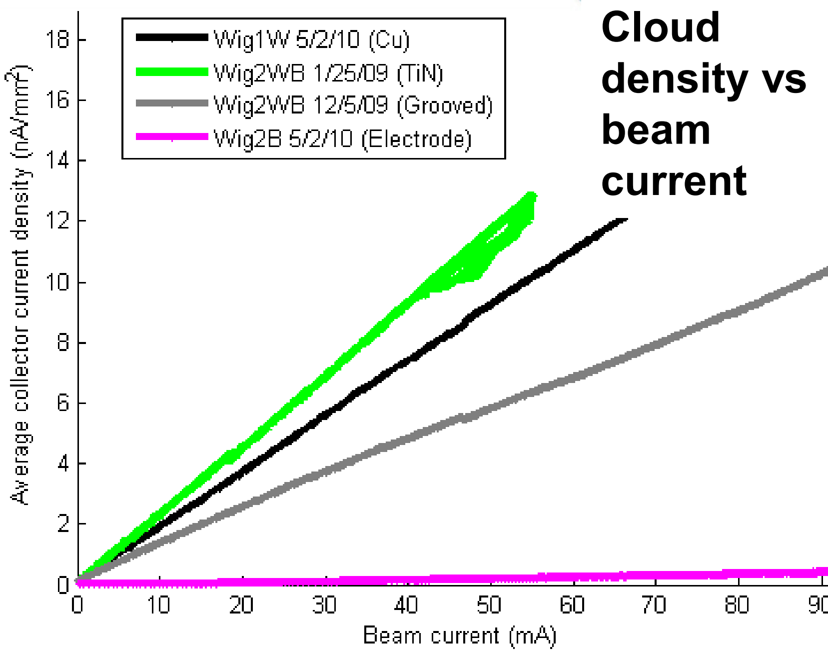
Wiggler Observations



Electron Cloud Profile vs Energy



Electron Cloud density vs beam current



Electron Cloud Supression – W electrode

EC Working Group Baseline Mitigation Plan

Mitigation Evaluation conducted at satellite meeting of ECLOUD`10 (October 13, 2010, Cornell University)

EC Working Group Baseline Mitigation Recommendation

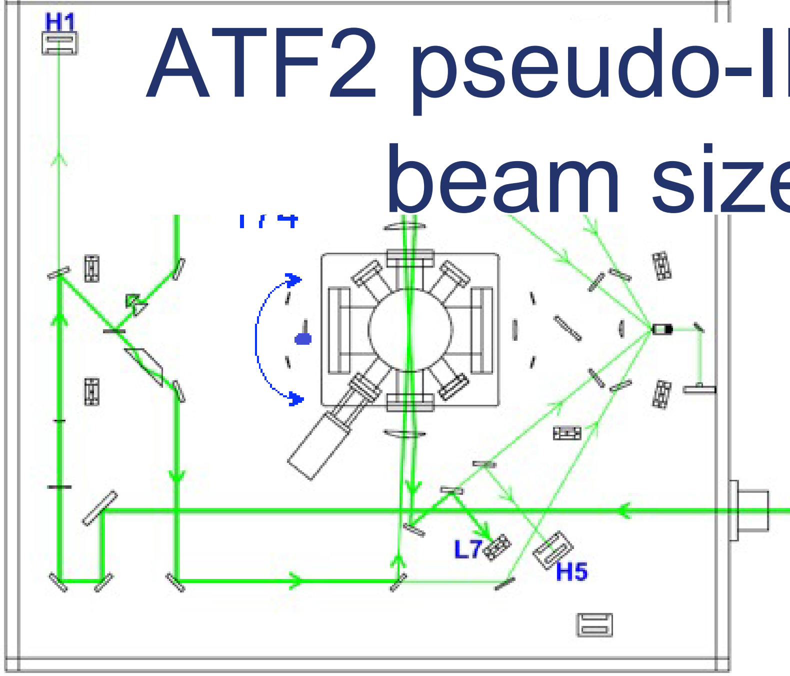
	Drift*	Dipole	Wiggler	Quadrupole*
Baseline Mitigation I	TiN Coating	Grooves with TiN coating	Clearing Electrodes	TiN Coating
Baseline Mitigation II	Solenoid Windings	Antechamber	Antechamber	
Alternate Mitigation	NEG Coating	TiN Coating	Grooves with TiN Coating	Clearing Electrodes or Grooves

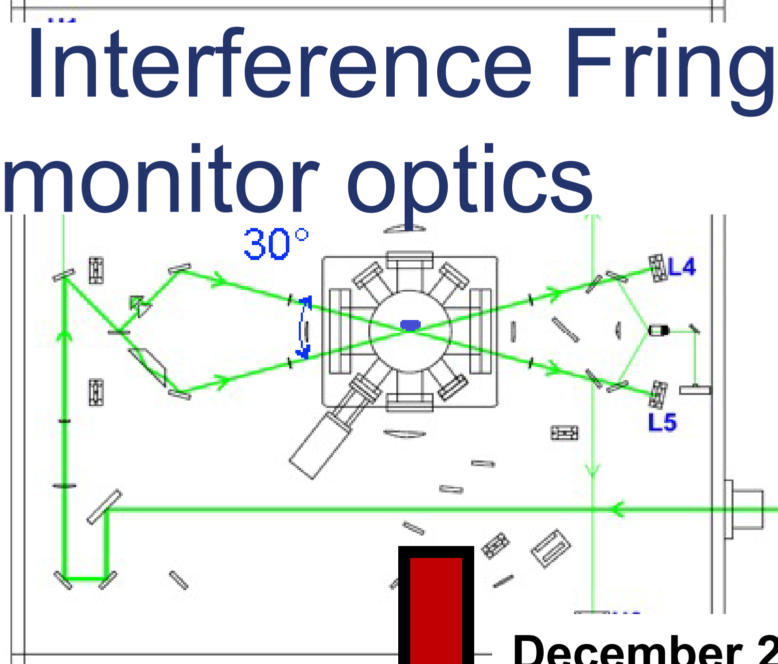
***Drift and Quadrupole chambers in arc and wiggler regions will incorporate antechambers**

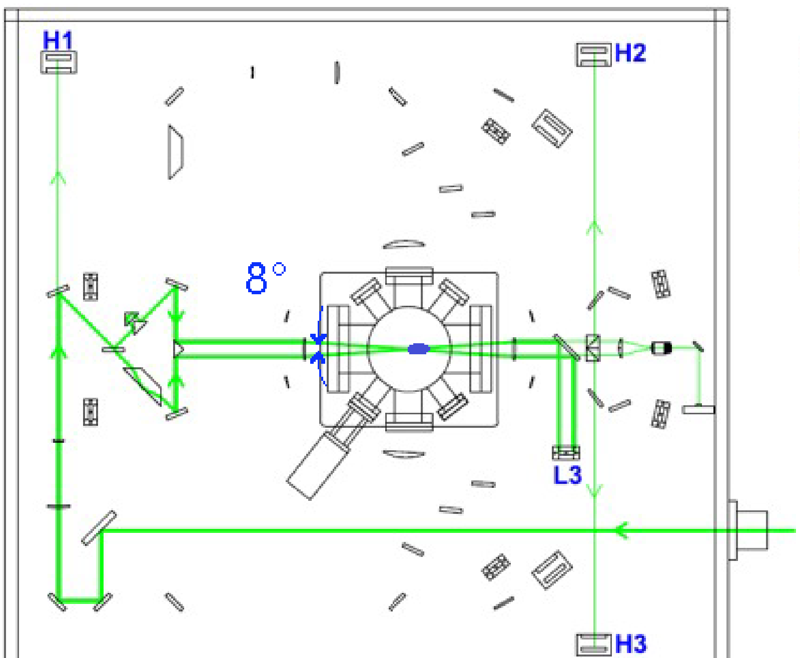
- **Preliminary CESRTA results and simulations suggest the presence of *sub-threshold emittance growth***
  - **Further investigation required**
  - **May require reduction in acceptable cloud density ⇨ reduction in safety margin**
- **An aggressive mitigation plan is required to obtain optimum performance from the 3.2km positron damping ring and to pursue the high current option**

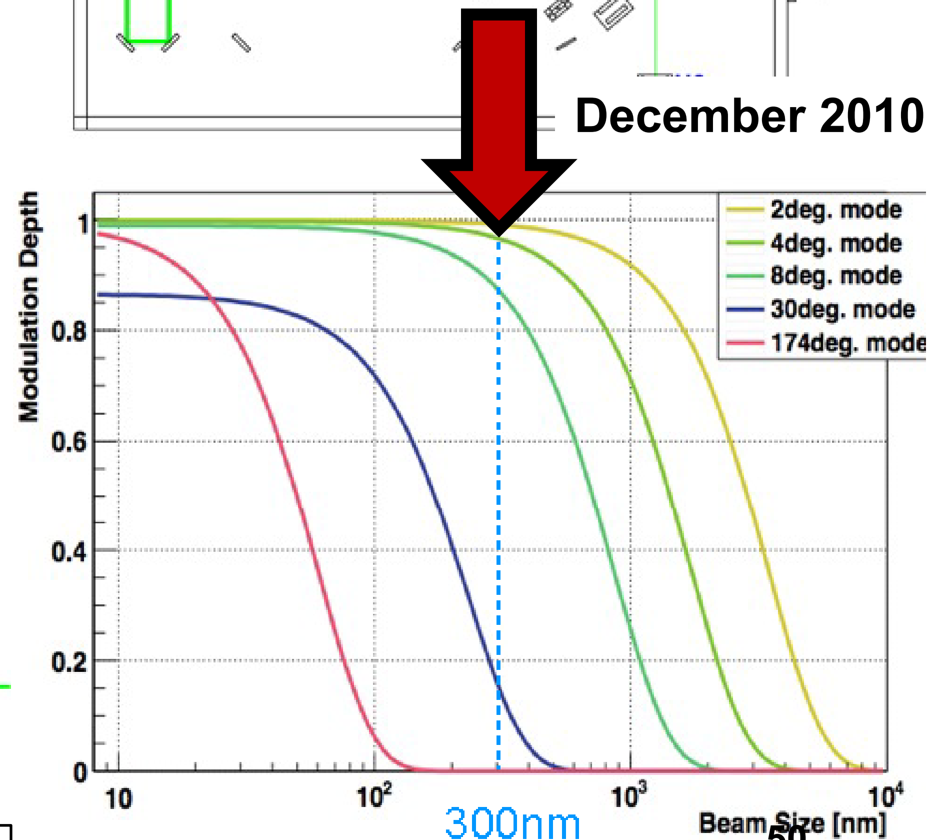
TUPC030 Recommendation for Mitigations of the Electron Cloud Instability in the ILC M. Pivi
MOPS084 Status of Electron Cloud Dynamics Measurements at CESR-TA M. Palmer

ATF2 pseudo-IP Interference Fringe beam size monitor optics



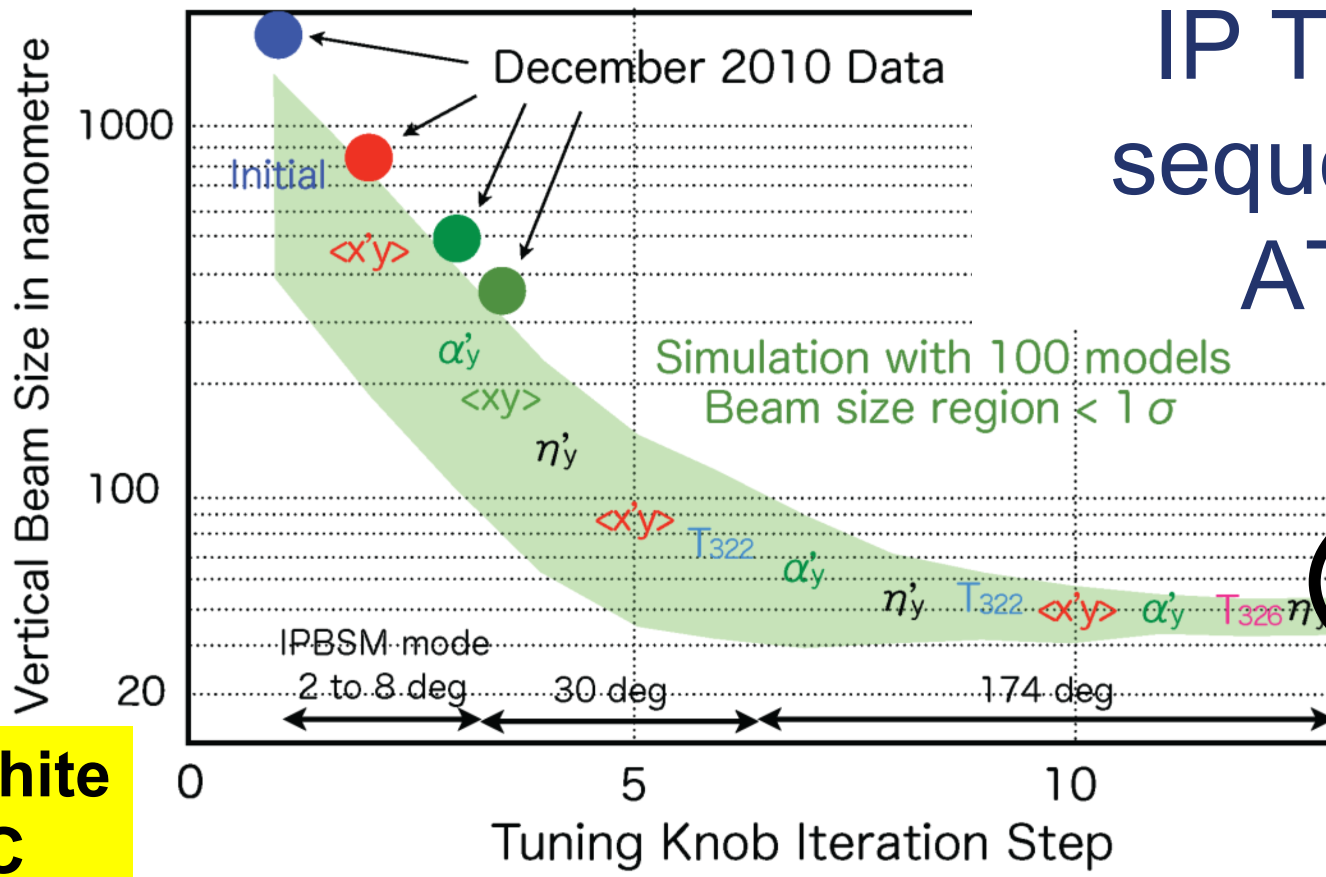






TUPC119 A Comprehensive Study of Nanometer Resolution of the IPBPM Y. Kim

IP Tuning sequence – ATF2



Chromaticity Cor.

Goal:

37nm

G. White
SLAC

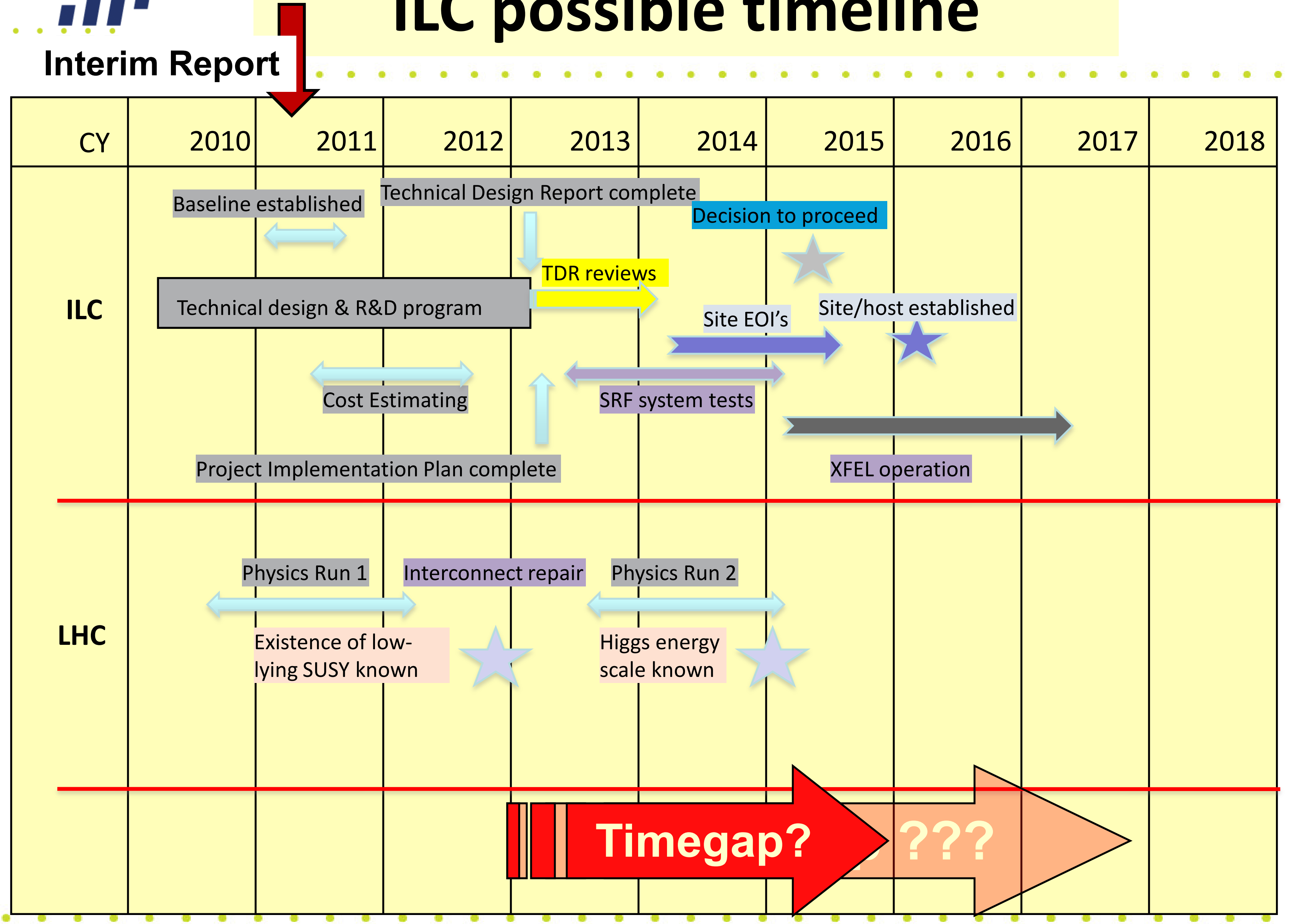
Figure 10-1 : Performance of beam size tuning at IP. The experimental data in December 2010 are plotted together with the expectations ones. First data shows the initial beam size before any correction with the beam size measurement by the IPBSM, and <x'y>, α'y, <xy>, η'y, T322 and T326 are tuning knobs of horizontal angle, the vertical waist, coupling, vertical dispersion, second order aberrations of horizontal angle (T322) and dispersion (T326), respectively.

TUPC016 Status of the ATF2 Lattices E. Marin
MOPO017 Latest Performance Results from the FONT5 Intra-train Position and Angle Feedback System at ATF2 G. Christian

Outline: ***Next Steps 2012-15***

- **High Gradient Superconducting RF R & D:**
- **Siting**
- **Design Optimization**
- **Beam Test Facilities**
- **Two primary missions proposed:**
  - Accelerator Design and Integration:
    - Incorporate new R & D results; develop options for running at other energies; analyze site specific designs
  - Coordination of R&D on improving the performance and reducing the cost of the SCRF systems.
    - Deploy SRF linac test facilities for value engineering aimed at reducing the remaining cost risk and pursuing higher gradient for ~1 TeV extension of ILC.

ILC possible timeline



(some) ILC – related presentations IPAC11:

- MOPC085 Establishing High Yield for High-gradient Cavities **Felix Schlander**
- MOPC111 Progress of ILC High Gradient SRF Cavity R&D at Jefferson Lab **Rongli Geng**
- MOODA02 S1-Global Module Tests at STF/KEK **Eiji Kako**
- THPC081 Status of the Free Electron Laser FLASH at DESY **Mathias Vogt**
- TUPC017 Civil Engineering Studies for Major Projects after LHC **John Andrew Osborne**
- MOPC156 Operation Test of Distributed RF System with Circulator-less Waveguide Distribution in S1-Global Project at STF/KEK **Eiji Kako**
- MOPC155 Performance of the Micro-TCA Digital Feedback Board for DRFS Test at KEK-STF **Eiji Kako**
- MOOCA03 Updates to the International Linear Collider Damping Rings Baseline Design **Susanna Guiducci**
- MOPS083 Update on Electron Cloud Mitigation Studies at CesrTA **Joe Calvey**
- TUPC030 Recommendation for Mitigations of the Electron Cloud Instability in the ILC **Mauro Pivi**
- MOPS084 Status of Electron Cloud Dynamics Measurements at CESR-TA **Mark Palmer**
- TUPC119 A Comprehensive Study of Nanometer Resolution of the IPBPM **YoungIm Kim**
- TUPC016 Status of the ATF2 Lattices **Eduardo Marin**
- MOPO017 Latest Performance Results from the FONT5 Intra-train Position and Angle Feedback System at ATF2 **Glen Christian**