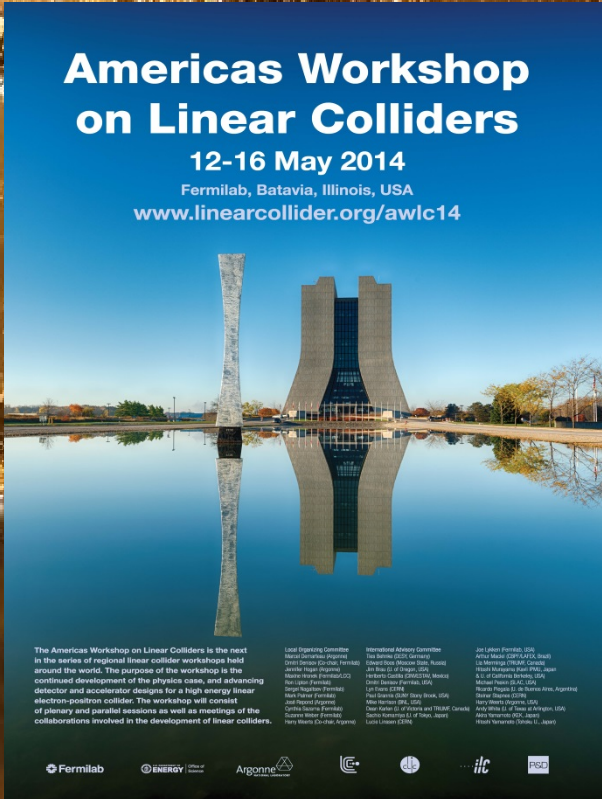
A few Highlights from the 2014 ALCW and P5 report for the ILC

Maxim Titov (CEA Saclay)



ILC Physics Club, CEA Saclay, Irfu / SPP, May 23, 2014

*Aerial view at night, Chicago, Illinois

Action Plan in 2012

at European Strategy Meeting
Dec. 11, 2012

2012 | 2013 | 2014 | 2015~6

Positive Reference from New Prime Minister

HEP Researchers

- Set-up JLCB and JLCC
- Site Decision
- Design ILC Lab.
- Project Proposal to Science Council of Japan

- Establish ILC Pre-J-Lab.

Formal Message on Hosting ILC in Japan

Cite/Host Establish

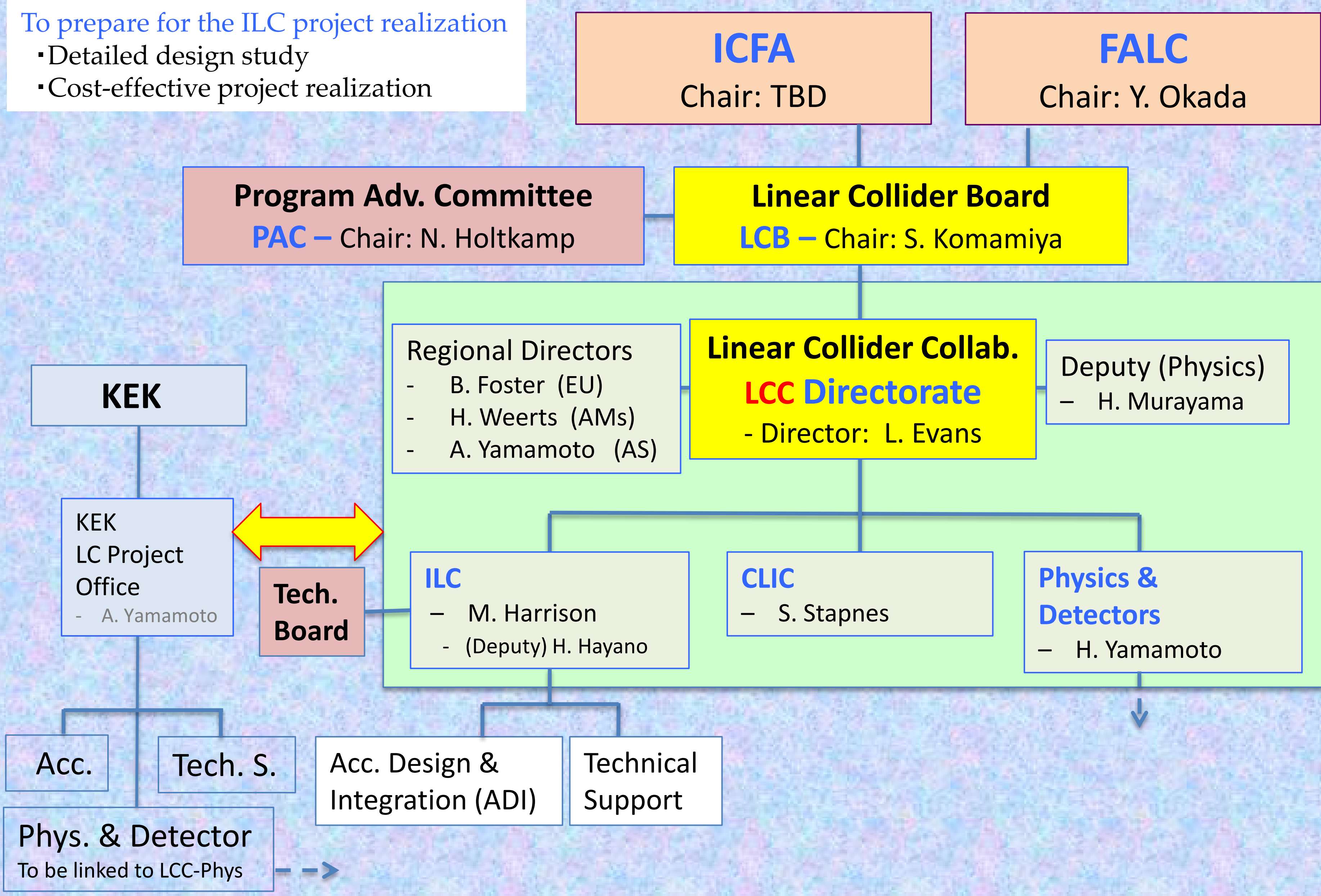
- Proposal of hosting ILC in Japan to Government

Japan Policy Council

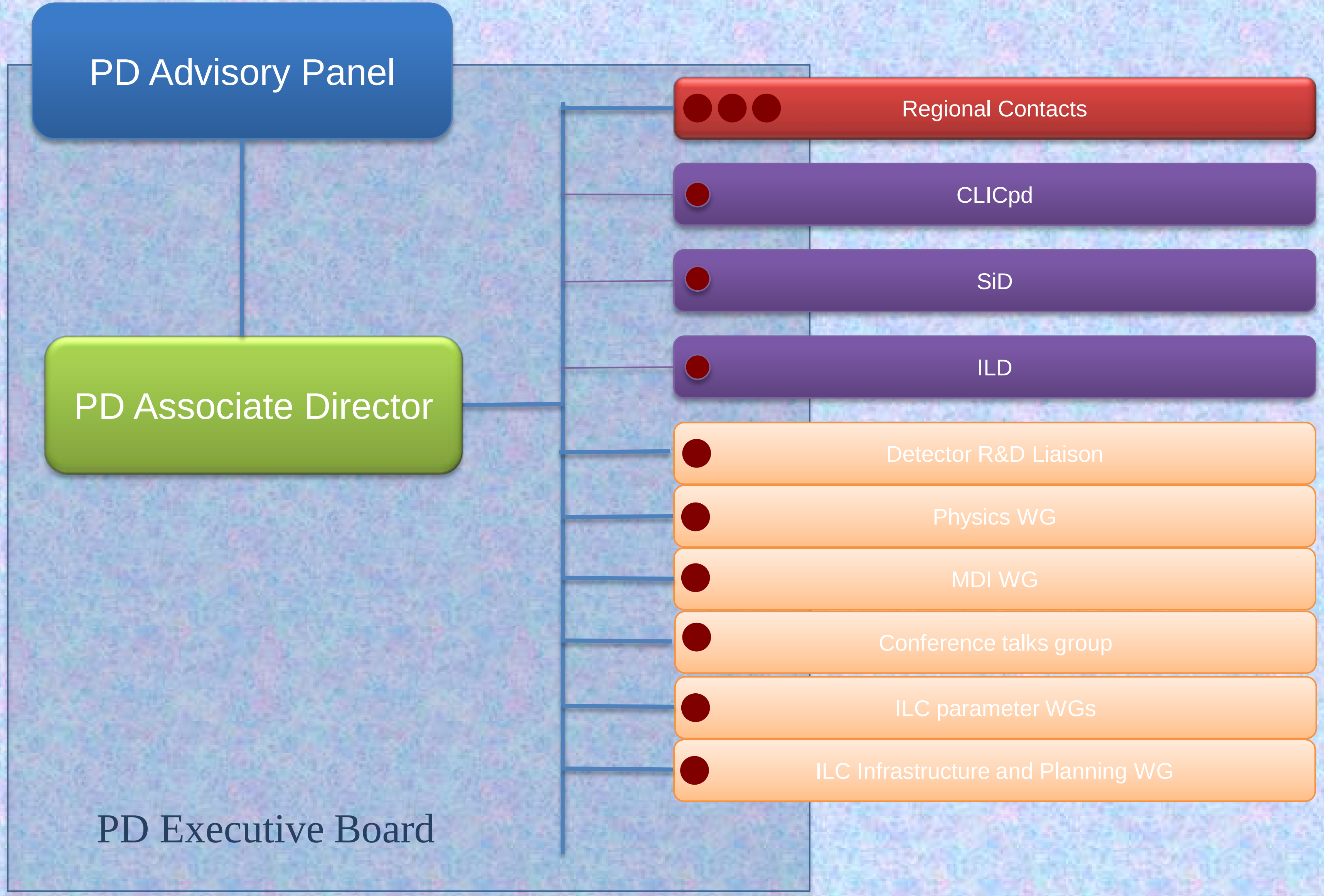
- Detailed Design of International Country

ILC in the Linear Collider Collaboration

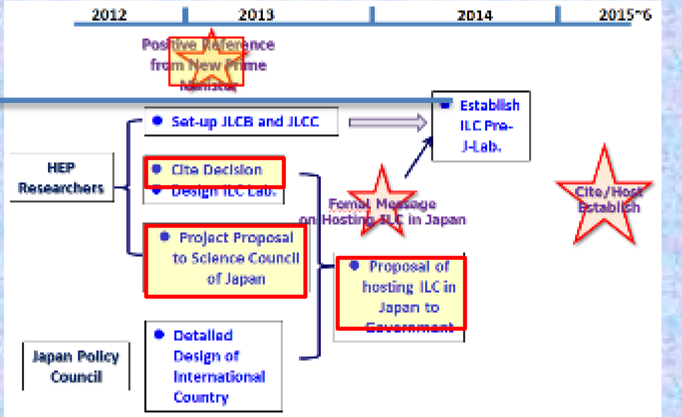
To prepare for the ILC project realization
- Detailed design study
- Cost-effective project realization



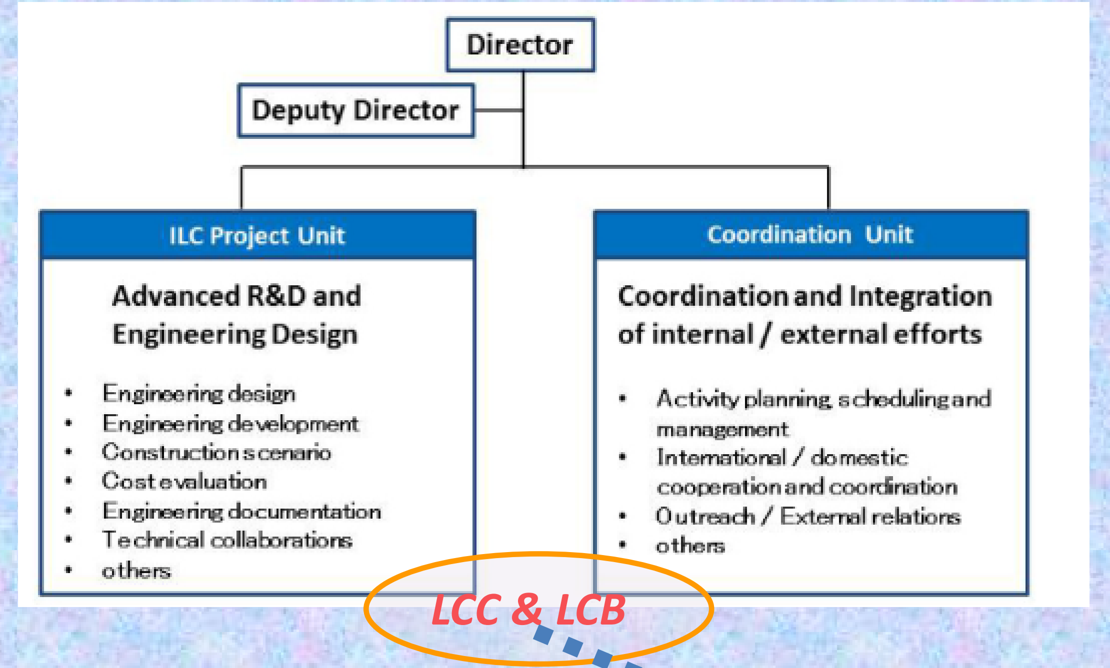
LCC Physics and Detectors Structure



- Establish ILC Pre-J-Lab.



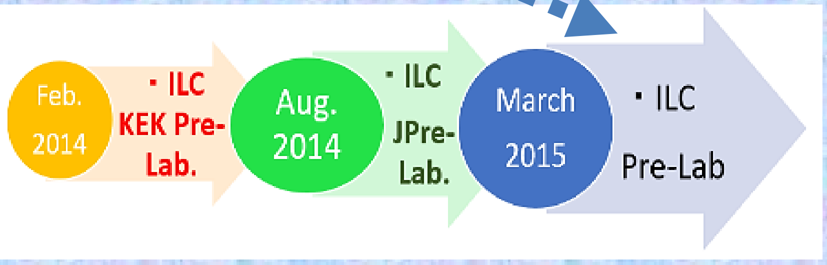
February 6, 2014



From KEK: KEK sets up Planning Office for the International Linear Collider

February

Tsukuba, 6 ~~January 2014~~. KEK, Japan's High Energy Accelerator Research Organization, has set up a Planning Office for the International Linear Collider. The office will be headed by Atsuto Suzuki, Director General of KEK, and will oversee a broad range of activities required for realisation of the ILC, in addition to the ongoing efforts.



February 7, 2014

MEXT MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

Report from ILC Planning Office, KEK March 2014

Dr. Ernest Moniz
Secretary of Energy
Department of Energy
3000 Independence Ave. SW
Washington DC 20585
United States of America

February 7, 2014

Dear Secretary Moniz,

It was a great pleasure to talk with you when I visited the United States recently. In our conversation, I explained the current situation regarding the International Linear Collider (ILC) project in Japan, and I would like to reiterate what I said through this letter.

continuing their R&D with enthusiasm in the ILC project. Considering the significance and benefit of the ILC project, I believe that discussion from a wider perspective is essential. For this, I recognize that working-level informal exchanges of views among Japan, the United States and / or Europe should be started from the current stage.

However, the priorities for academic and scientific projects and the financial status vary between the countries. Therefore, for making a decision of whether or not to join the ILC project, discussion and sharing of the consensus about the scientific significance and challenges between government and scientists in each country that is interested in the ILC project is indispensable. I understand that the project prioritization process in the field of particle physics in the United States is ongoing. The United States is one of the leading countries in

imomura

Similar letters have been send to the:
CERN DG and European Commission

Japan Needs Years to Make Decision on ILC Building: Science Council Panel

Tokyo, Aug. 6 (Jiji Press)--Members of a Science Council of Japan panel agreed in prin[illegible] Tuesday that Japan should spend several years to examine the significance of leading the proposed international project to construct a [illegible] particle accelerator.

After the day's closed-door meeting, University of Tokyo Prof. Yasuhiro Ie, head of the panel reviewing th[illegible] there are uncertain elements to be removed before the panel gives the green light.

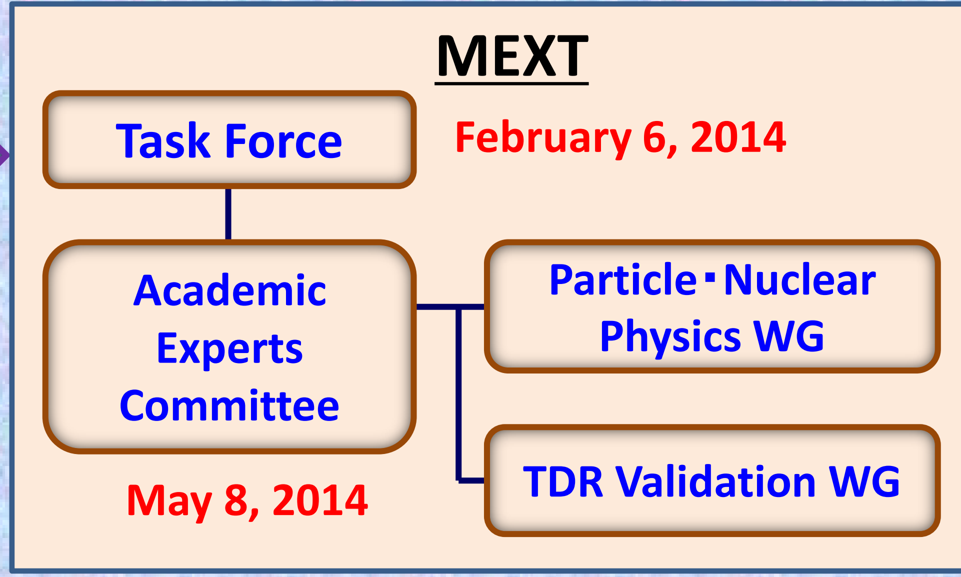
"It is yet to be known if the Japanese public will appreciate huge government spending for such a basic scientific study despite Japan's severe fiscal condition," Ie said. He also expressed concerns about possible cuts in outlays for other research field and difficulty securing more than 1,000 scientists and technicians for the project.

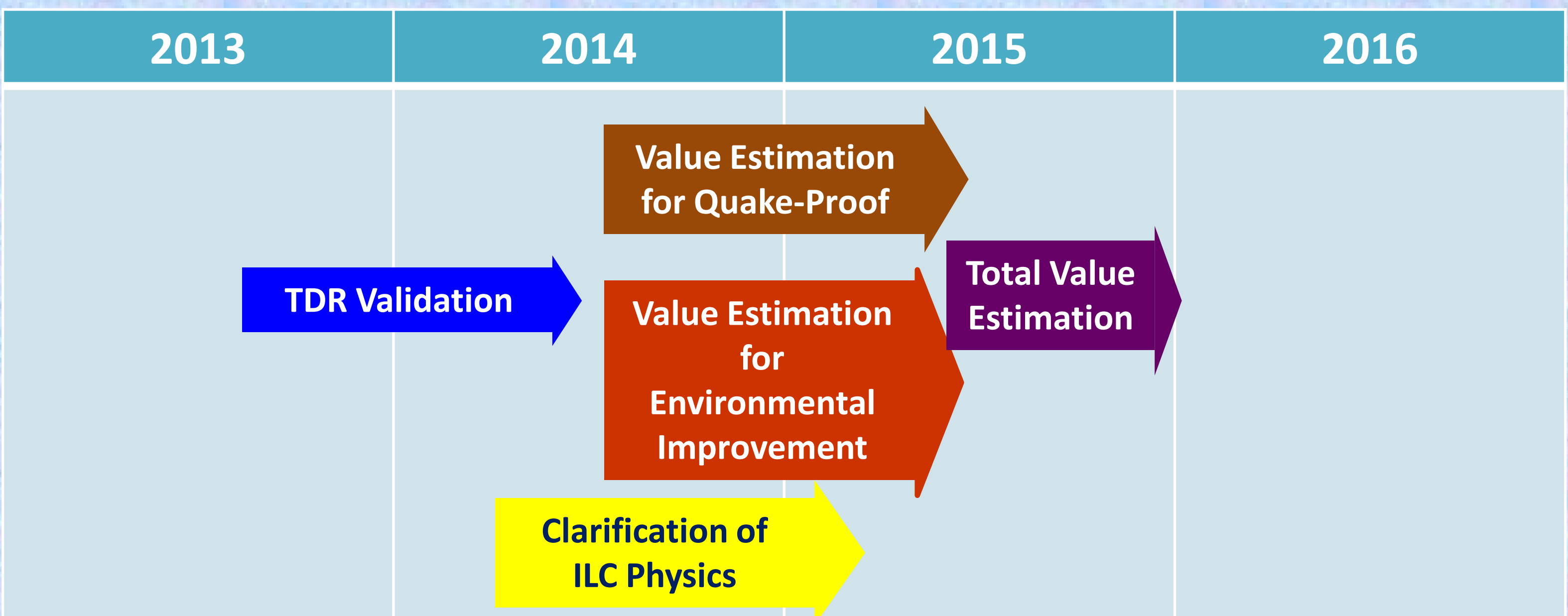
The ILC construction is estimated to cost 630 billion to 830 billion yen, half of which Japan is asked to put up.

An international group of physicists proposed to build the linear collider in either the Kitakami mountains in northeastern Japan or the Sefuri mountains in southwestern Japan.

(2013/08/06-23:28)

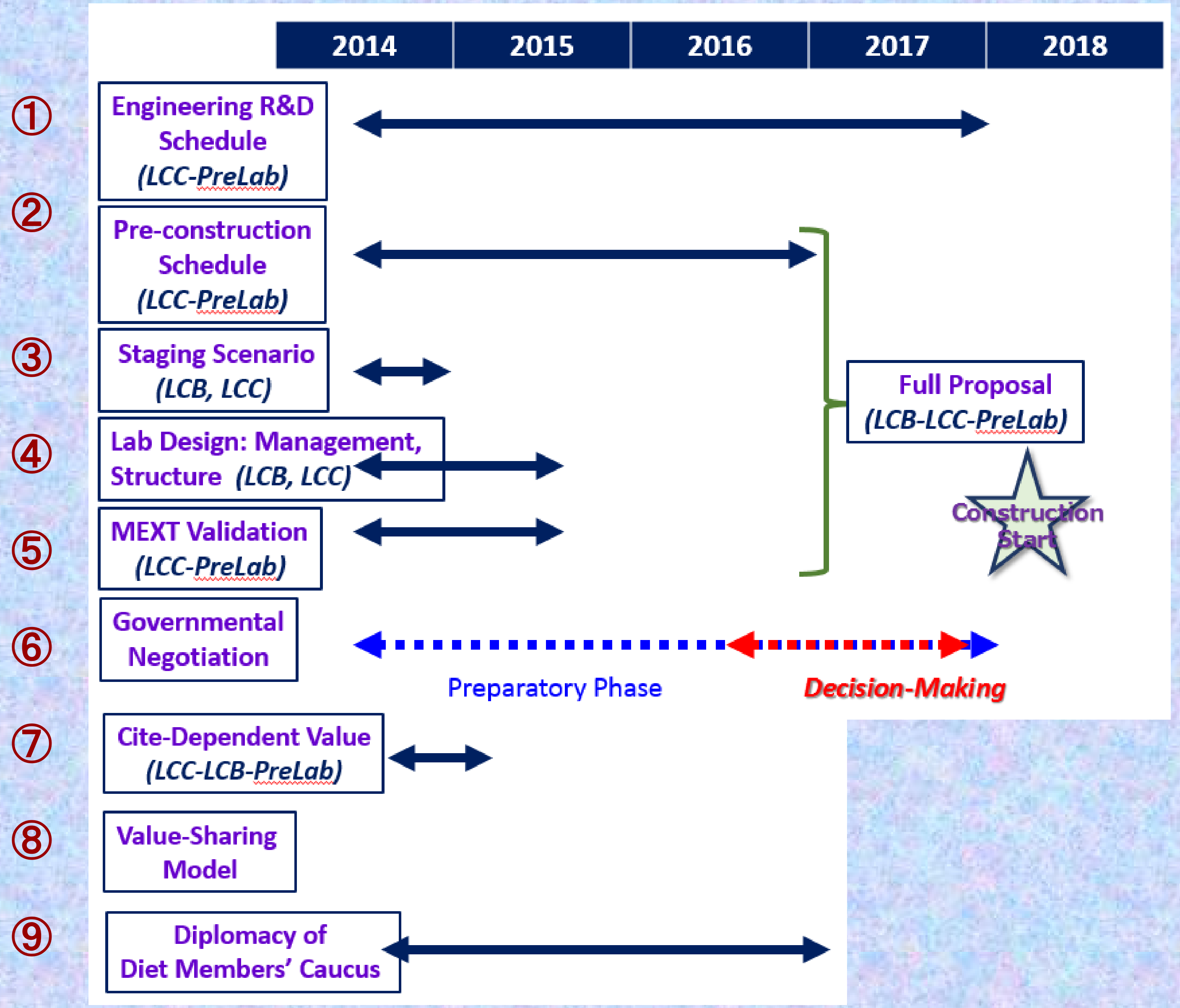
Review by Science Council of Japan





Clean up issues pointed out by the Science Council of Japan (SCJ)
→ Final decision will be done by the Government (not by the SCI)

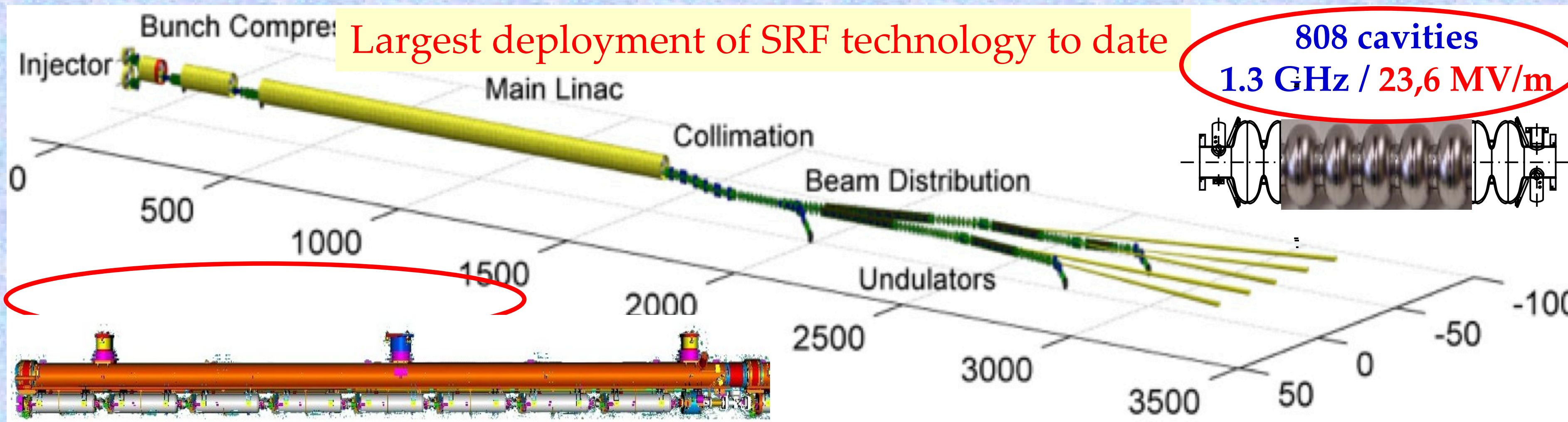
Summary: Further Action Plan before Construction



European XFEL @ DESY

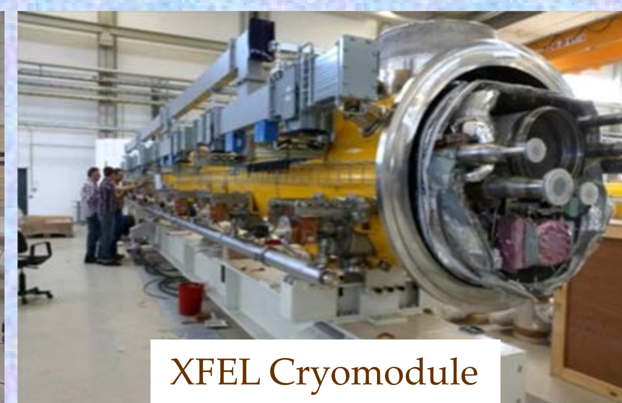
Largest deployment of SRF technology to date

808 cavities
1.3 GHz / 23,6 MV/m




Vertical Cavity RF Test @ DESY


Cavity String Assembly @ CEA


XFEL Cryomodule

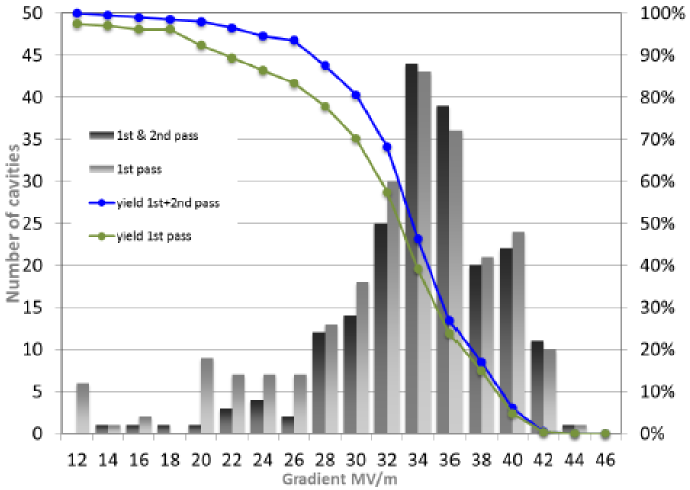
Institute	Component 7 Task
CEA Saclay / IRFU, France	Cavity string and module assembly; cold beam position monitors
CNRS / LAL Orsay, France	RF main input coupler incl. RF conditioning
DESY, Germany	Cavities & cryostats; contributions to string & module assembly; coupler interlock; frequency tuner; cold-vacuum system; integration of superconducting magnets; cold beam-position monitors
INFN Milano, Italy	Cavities & cryostats
Soltan Inst., Poland	Higher-order-mode coupler & absorber
CIEMAT, Spain	Superconducting magnets
IFJ PAN Cracow, Poland	RF cavity and cryomodule testing
BINP, Russia	Cold vacuum components

The ultimate ‘integrated systems test’ for ILC

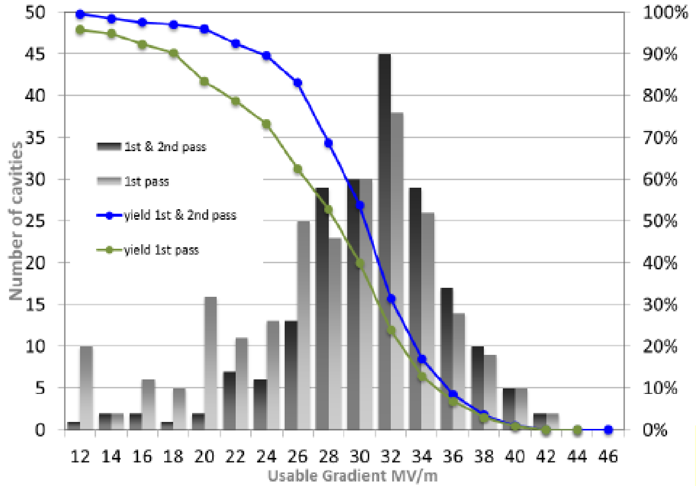
→ Commissioning with beam 2nd half 2015

Towards High Performance Cavities

- 800 XFEL @ DESY cavities (5% of ILC @500 GeV)
  → unique statistical sample to study properties of mass-produced cavities



Average **maximum** gradient:
(32.8 + 4.7) MV/m



Average **usable** gradient:
(29.3 + 5.1) MV/m

Industrial production (RI, ZANON) yields gradients well above 23.5 MV/m

→ 207 XFEL cavities (2nd pass: some after retreatment)

Status-March 14, 2014
D. Reschke / TTC2013
to be published

- 24 ILC-HiGrade cavities added to the mass production of 800 cavities:
  → detailed studies of performance limitations and allow for post-processing of cavities
- Yield for high-gradient cavities is limited by local defects in individual cells by:
  → quench of cavity or eventually field emission at large gradients
- ILC-HiGrade tries to localize, analyse and remove local defects thorough:
  → optical inspection of defects, quench localization and development of optimized post-processing methods to improve maximum field

SRF Technology – XFEL Cryomodule Production @ CEA Saclay

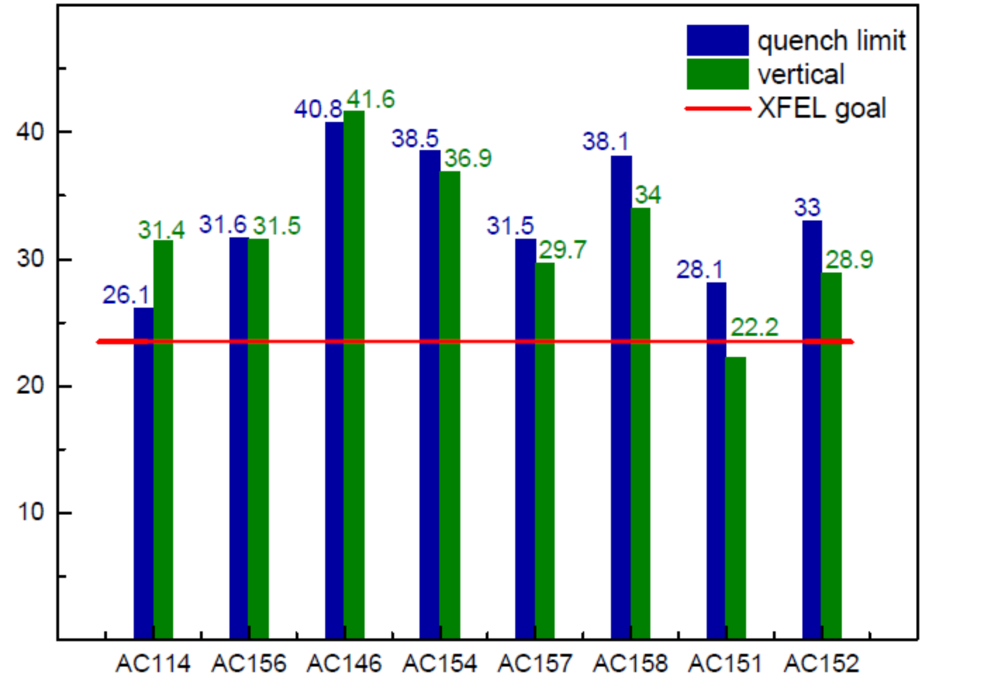
XFEL Cryomodule Production line @ CEA Saclay:

- 6 modules delivered & 3 tested
- 7 modules in the production line
- Rate up to 1/two weeks

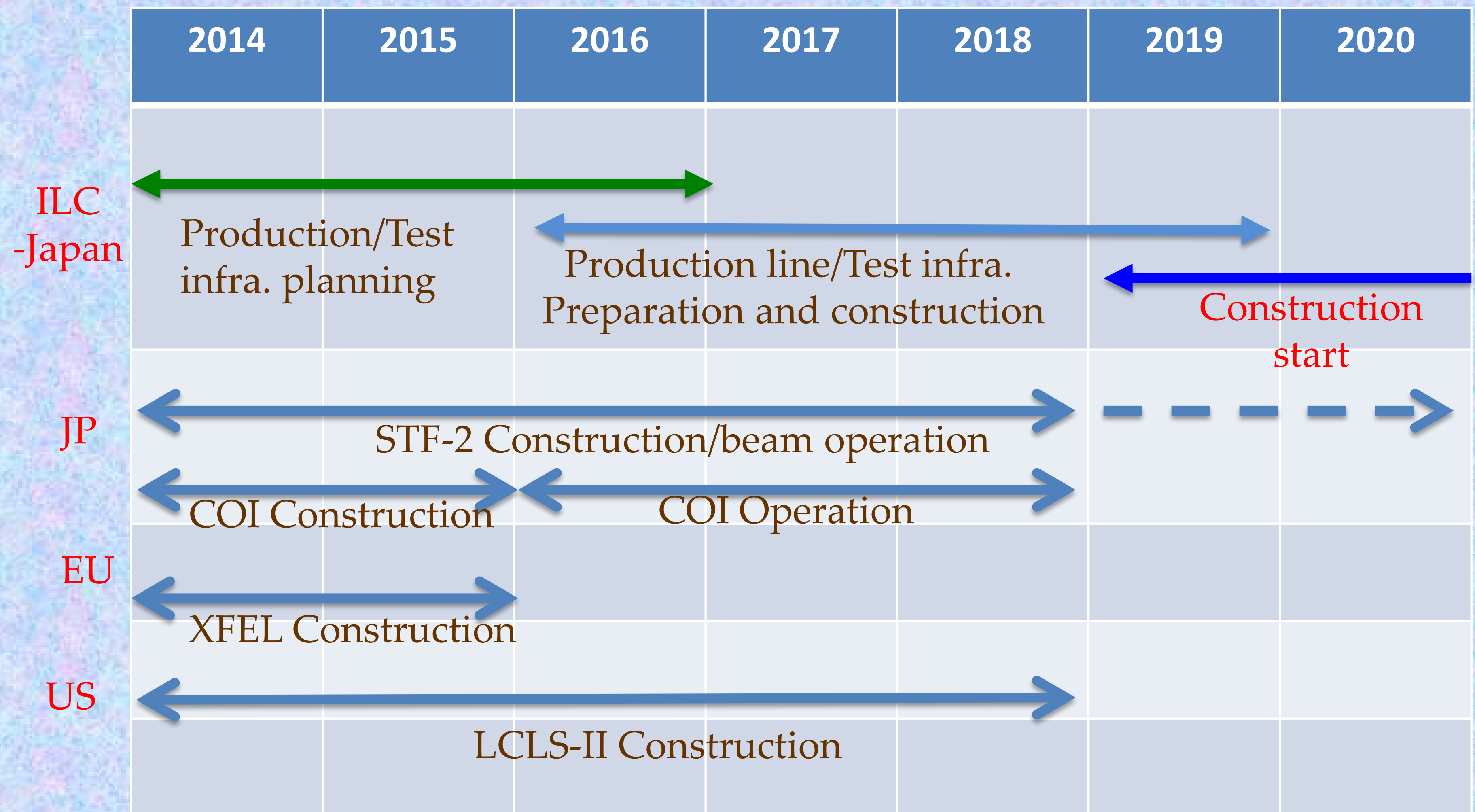
Seven workstations at CEA Saclay:

optimized for five working day sequences, form an assembly chain of 7 weeks, yielding a throughput of 1 cryomodule/week

No degradation observed after the cavities are assembled into cryomodule



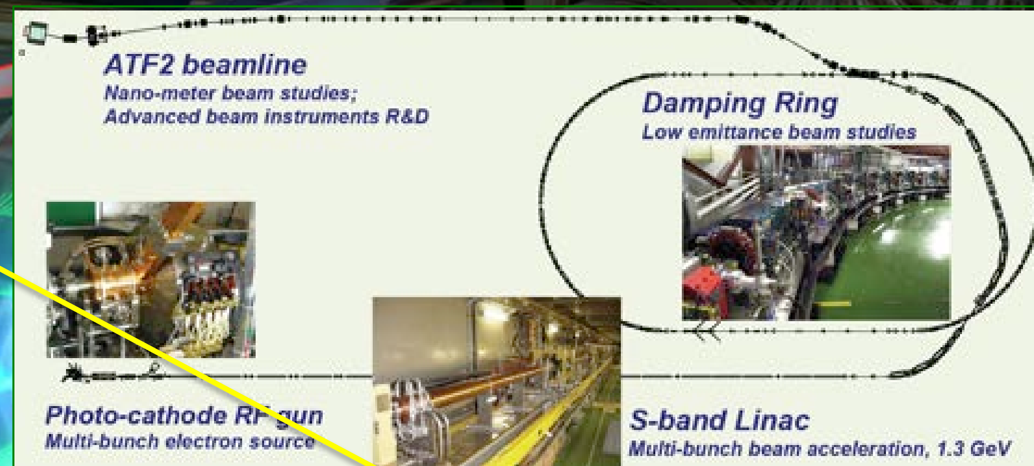
SRF Technology – Global Cryomodule Development Timeline

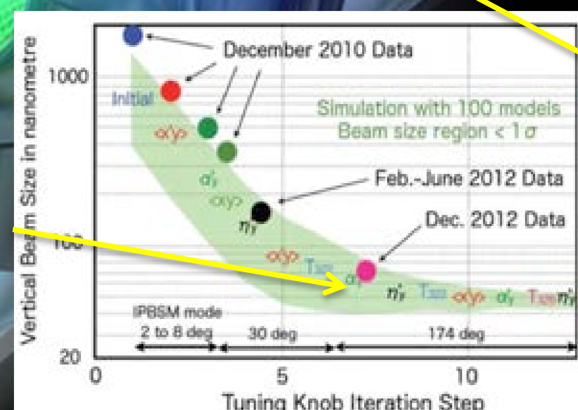


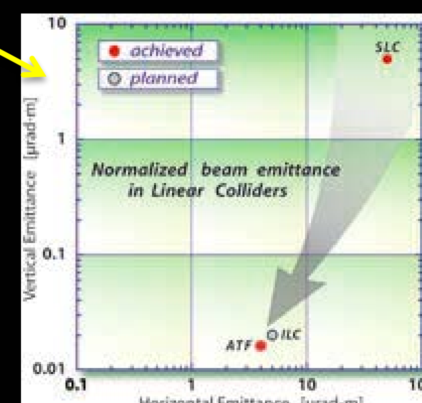
ATF2 Progress by 2013

Ultra-small beam

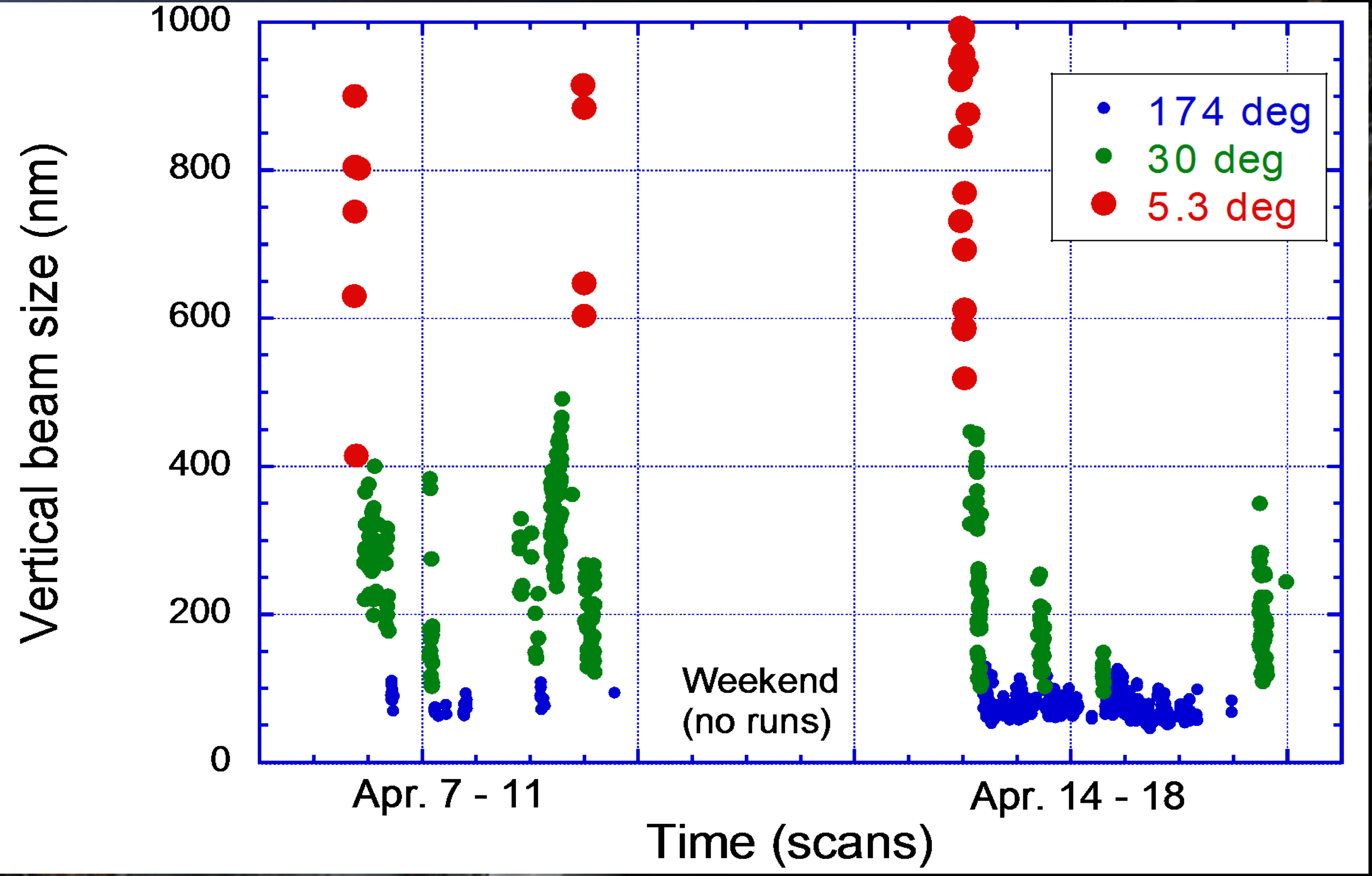
- Low emittance : KEK-ATF
  - Achieved the ILC goal (2004).
- Small vertical beam size : KEK ATF2
  - Goal = 37 nm,
    - 160 nm (spring, 2012)
    - 65 nm (April, 2013) at low beam current





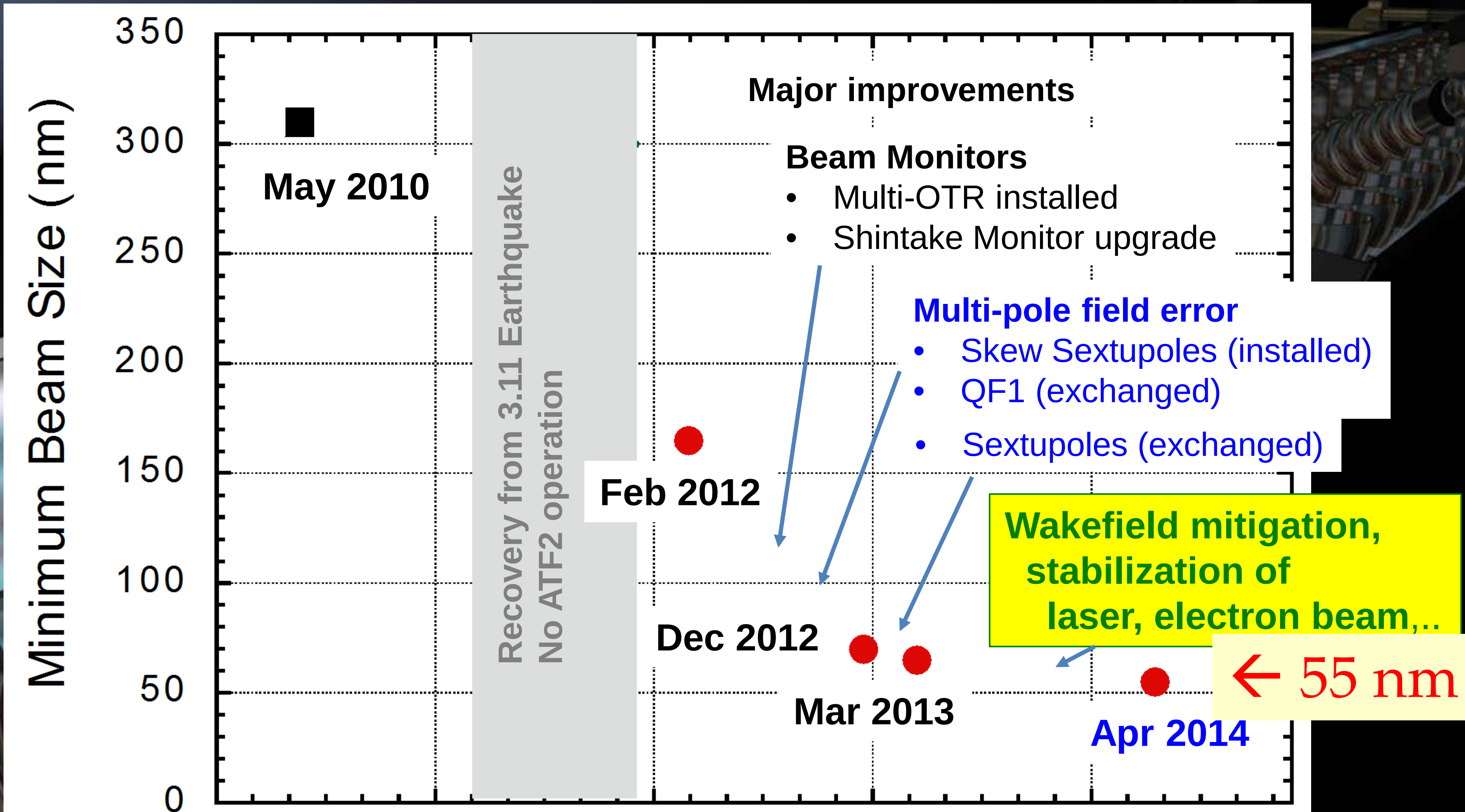


History of Beam Size Tuning, April 2014 Runs



- ❖ Quick recovery of the small beam size, down to 50-60 nm
- ❖ Good reproducibility

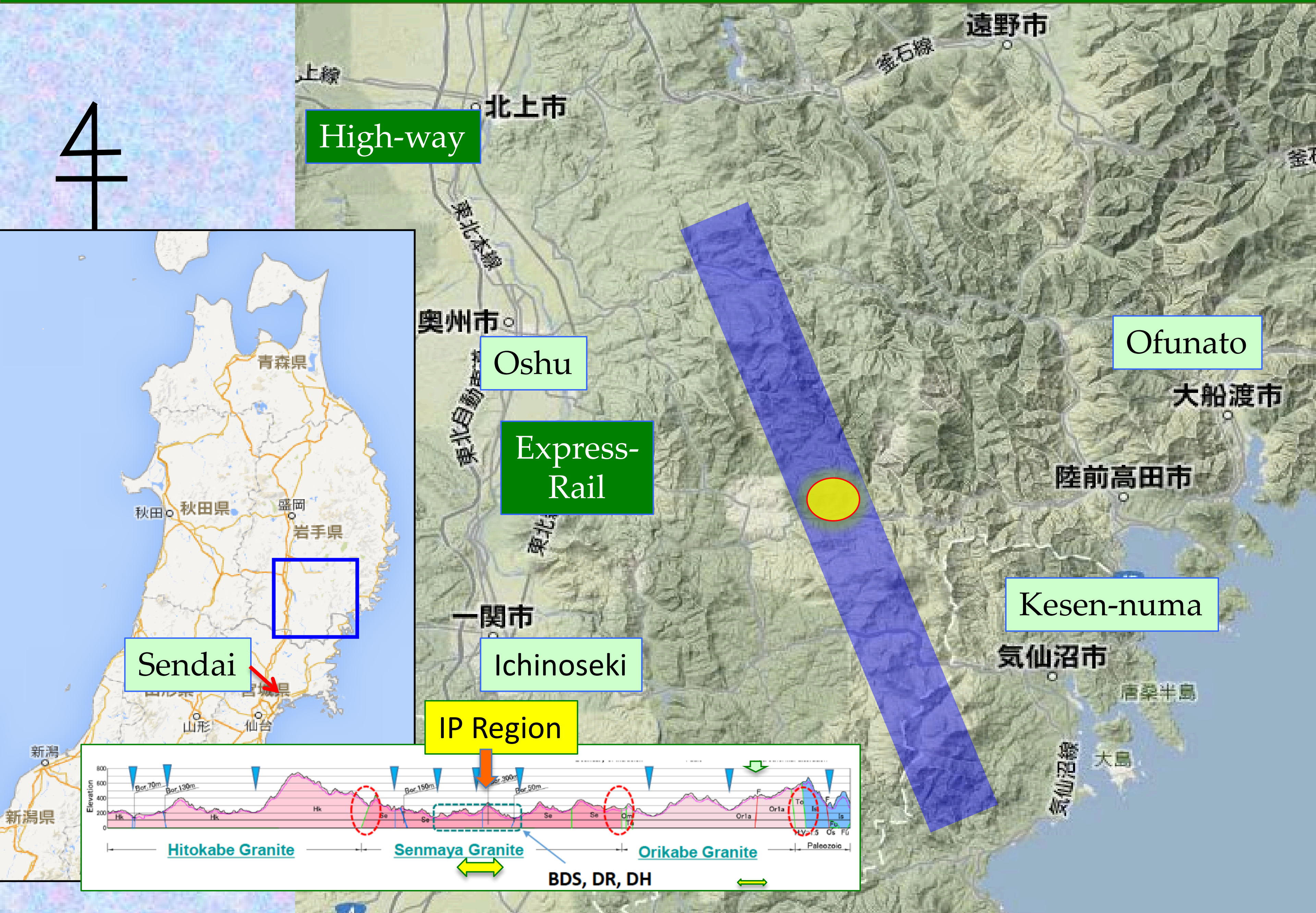
ATF2: Minimum Beam Size Update



Goal - 1 : to achieve the beam size: 37nm (beam-size monitor improvement inevitably required; optics for final focusing to be established)

Goal - 2 : to achieve the stability: 2 nm (repeat of beam tests and instrumentation improvement to reach IPBPM resolution of 2 nm, with long term effort for 2 ~ 3 years)

ILC Site Chosen by the Japanese HEP Community: Kitakami



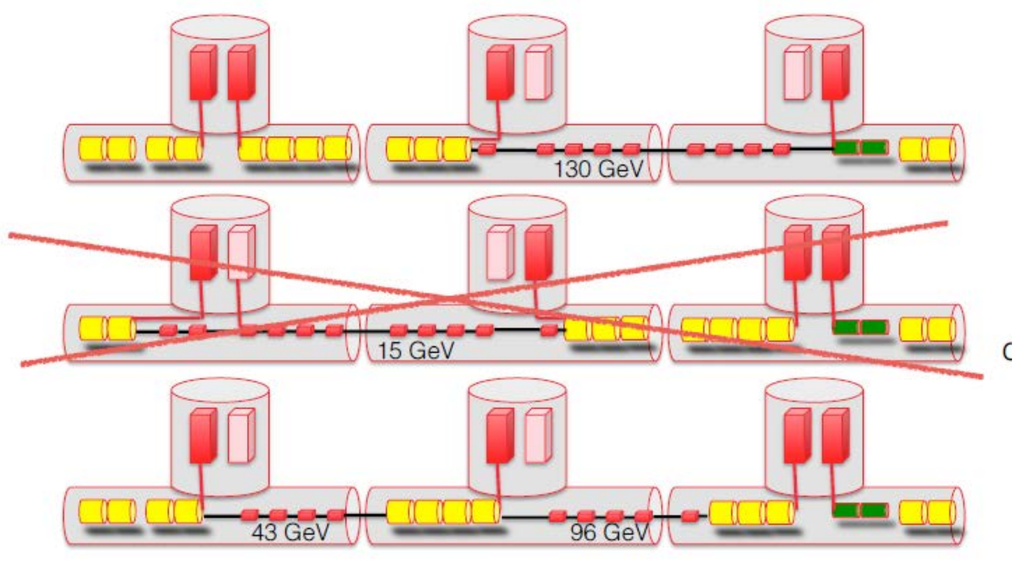
Kitakami Site, ILC Accelerator

One of the most important features of the ILC EDMS is its ability to enable three-dimensional global Computer-Aided Design (CAD) collaboration.

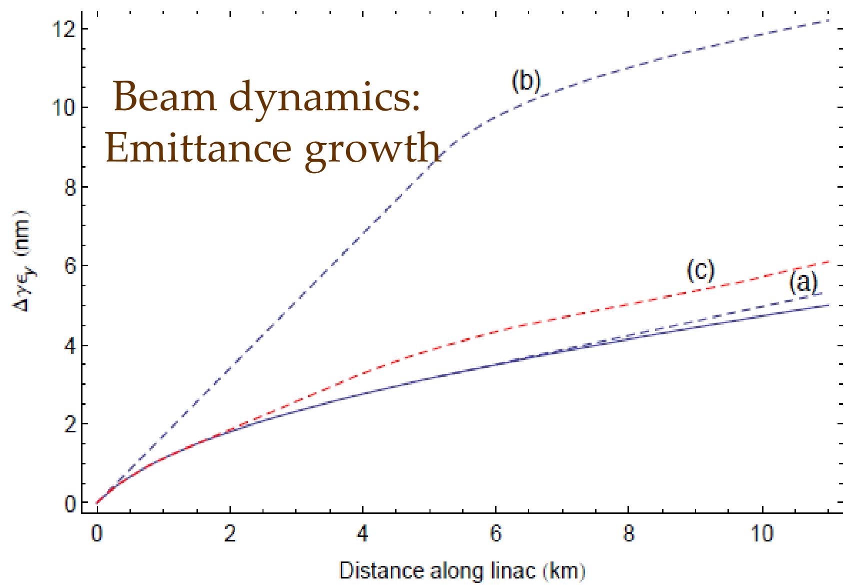
ILC Installation Scenarios

Basic Assumptions:

- ❖ Initial civil engineering construction for full TDR spec. 500 GeV collider (tunnel)
- ❖ Sources, Damping Rings, BDS as in the TDR
- ❖ First phase 250 GeV (50% main linac installed @ full gradient (31.5 MV/m) – AC and cooling power available)
- ❖ Next "energy phase" (500 GeV) only requires additional main linac



Benno



P5 Report: The Roadmap of the HEP in the USA

Building for Discovery

Strategic Plan for U.S. Particle Physics in the Global Context

Released May 22, 2014:

Report of the Particle Physics Project Prioritization Panel — May 2014

Project/Activity	Scenario A	Scenario B	Senario C
Large Projects			
Muon program: Mu2e, Muon g-2	Y, Mu2e small reprofile needed	Y	Y
HL-LHC	Y	Y	Y
LBNF + PIP-II	Y, LBNF components delayed relative to Scenario B.	Y	Y, enhanced
ILC	R&D only	R&D, possibly small hardware contributions. See text.	Y
NuSTORM	N	N	N
RADAR	N	N	N

29 recommendations → 2 directly relevant to ILC

#1 (HEP global nature) → US should:
"Pursue the most important opportunities wherever they are, and host unique, world class facilities that engage the global scientific community"

#11 (ILC Project): Motivated by the strong scientific importance of the ILC and the recent initiative in Japan to host it, the U.S. should engage in modest and appropriate levels of ILC accelerator and detector design in areas where the U.S. can contribute critical expertise. Consider higher levels of collaboration if ILC proceeds →re-start official ILC activities in the USA; another step towards realizing the ILC and a potential US contribution

Executive Summary: as the physics case is extremely strong, all scenarios include ILC support at some level through a decision point within the next 5 years.

P5 Report: The Roadmap of the HEP in the USA

Building for Discovery

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HL-LHC	Y	Y	Y
LBNF + PIP-II	Y, LBNF components delayed relative to Scenario B.	Y	Y, enhanced
ILC	R&D only	R&D, possibly small hardware contributions. See text.	Y
NuSTORM	N	N	N
RADAR	N	N	N

Unconstrained budget scenario focus on three additional high-priority US activities (one is the ILC):

Play a world-leading role in the ILC experimental program and provide critical expertise and components to the accelerator, should this exciting scientific opportunity be realized in Japan.

→ Even if there are no additional funds available, some hardware contributions may be possible in Scenario B, depending on the status of international agreements at that time.

Participation by the U.S. in ILC project construction depends on a number of key factors, some of which are beyond the scope of P5

→ This is a reminder that the financial scale of the ILC in Japan is such that high-level political agreements need to be established between the host country and the US side