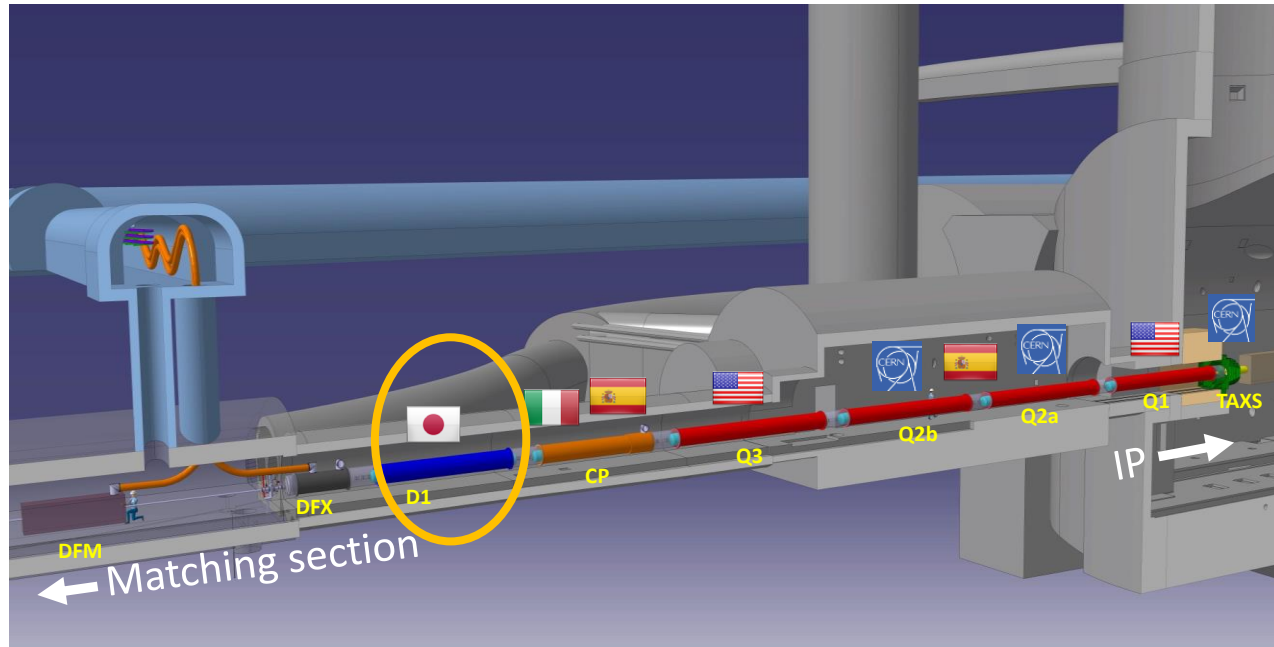
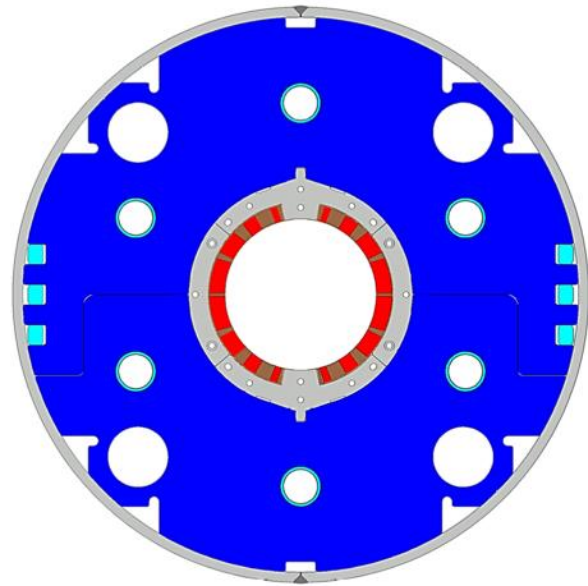


Status of KEK Contribution to HiLumi (and outlook for ILC)

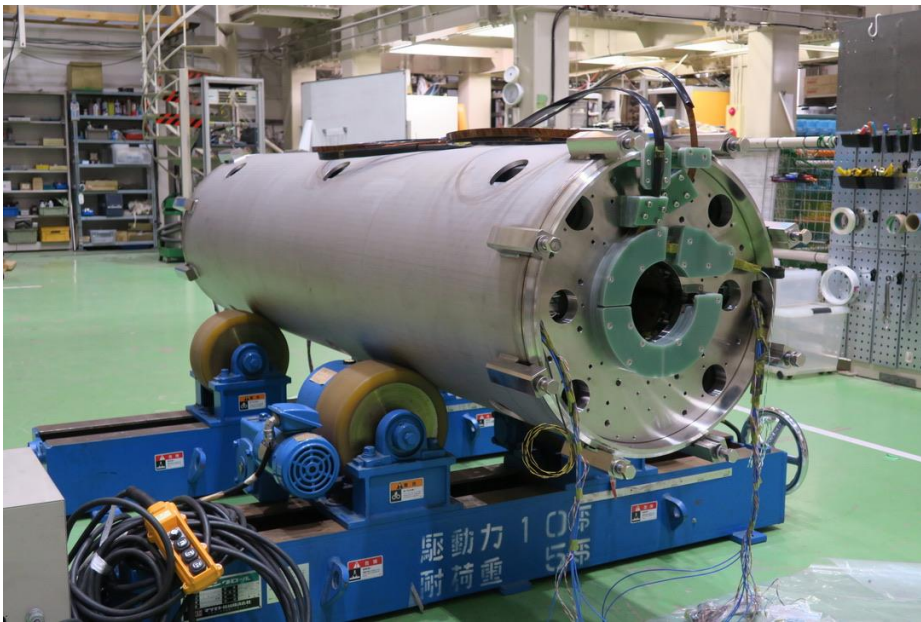
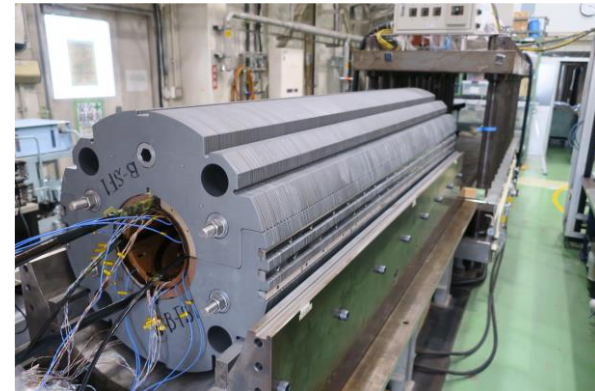
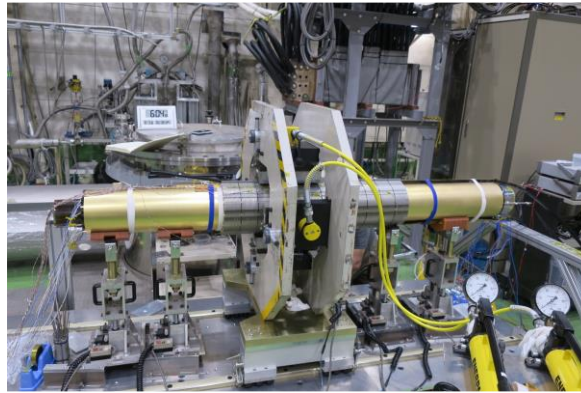
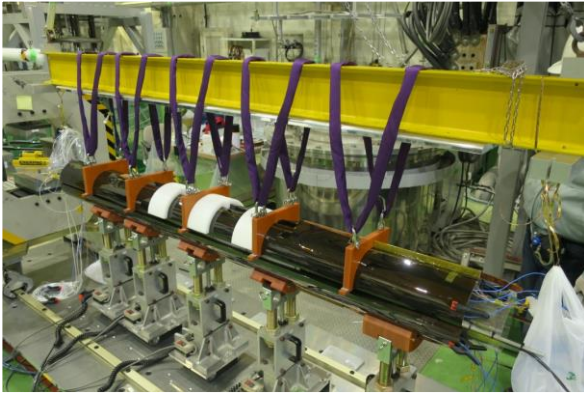
October 15, 2018

**M.Yamauchi
KEK**



- Beam separation dipole (D1) by KEK
 - Design study of D1 for HL-LHC within the framework of the CERN-KEK collaboration since 2011.
 - 150 mm single aperture, 35 Tm (5.6 T x 6.3 m), Nb-Ti technology.
 - Development 2-m long model magnets (3 units) at KEK
- Deliverables for HL-LHC
 - *1 full-scale prototype cold mass (MBXFP)*
 - *6 series cold masses (MBXF1-6)*

Status of Model Magnet Development at KEK



Cold test of the 2nd model magnet is started at KEK in this week (from the 14th of October 2018).

Schedule

	Magnet construction
	Vertical test
	Cold mass assembly
	Cryostating
	Horizontal test

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
		JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON
D1	Short model 1										
	Short model 2										
	Short model 3										
	Prototype										
	Series 1										
	Series 2										
	Series 3										
	Series 4										
	Spare 1										
	Spare 2										

- Model magnet development until 2019.
- A contract of a full-scale 7-m long prototype magnet (MBXFP) will be made at April 2019.
- Production of series magnets (MBXF1-6) will start after the vertical test of the prototype.
- Foreseen milestones: delivery date of cold masses (present baseline)
 - MBXFP (for string test): Sep. 2020.
 - MBXF1-4 (for the HL-LHC machine): Dec. 2022.
 - MBXF1-6 (all): Dec. 2023.

- MOU's were signed on July 6, 2018 at MEXT, Tokyo, in presence of Dr. Isogai, Director General of Research Promotion Bureau, MEXT.

**MEMORANDUM OF UNDERSTANDING
FOR COLLABORATION IN THE HIGH LUMINOSITY LHC PROJECT
AT CERN**

BETWEEN: THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH ("CERN"), an Intergovernmental Organization having its seat at Geneva, Switzerland, as the Host Organization of the High Luminosity LHC project ("HL-LHC Project");

AND: THE INSTITUTES, LABORATORIES, UNIVERSITIES AND THEIR FUNDING AGENCIES AND OTHER SIGNATORIES OF THIS MEMORANDUM OF UNDERSTANDING,

KN4074/TE/HL-LHC

ADDENDUM

to

**THE MEMORANDUM OF UNDERSTANDING FOR COLLABORATION IN THE HIGH
LUMINOSITY LHC PROJECT AT CERN**

between

**THE INTER-UNIVERSITY RESEARCH INSTITUTE CORPORATION,
HIGH ENERGY ACCELERATOR RESEARCH ORGANIZATION (KEK)**

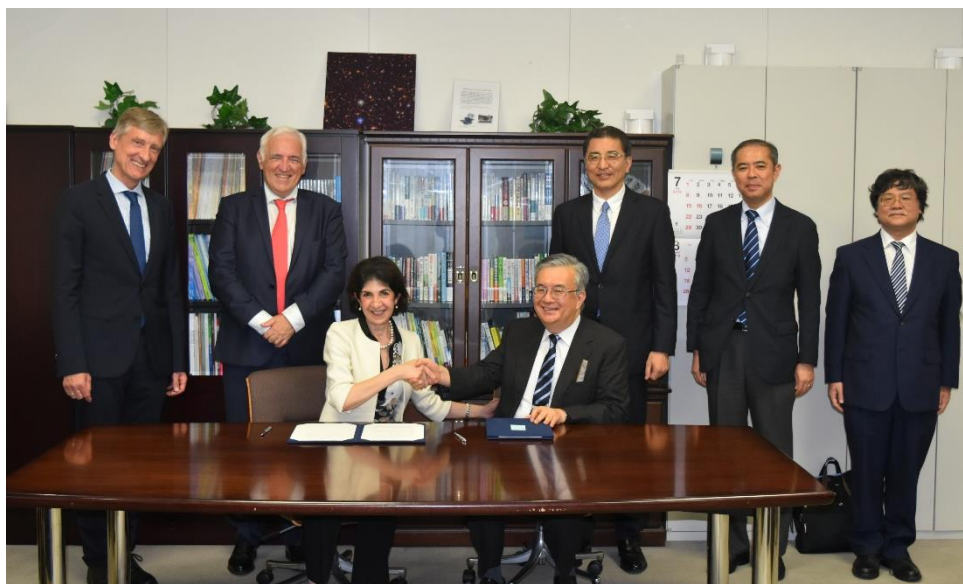
and

THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (CERN)

concerning

**Collaboration in the construction of the superconducting separation dipole magnet D1 in the
framework of the High Luminosity upgrade for the LHC at CERN**

2018

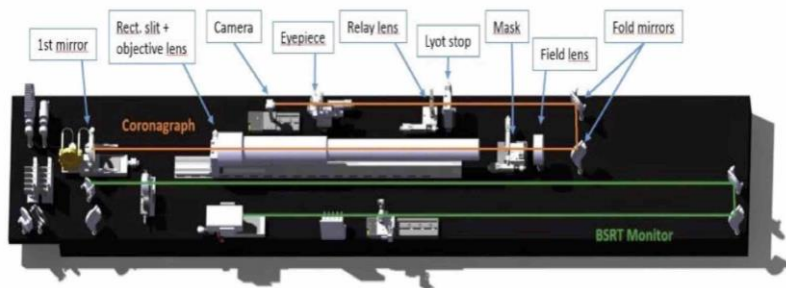


- We already made a commitment to the D1 magnet fabrication as described in the MOU, even if MEXT does not allocate extra fund to support KEK's contribution to HL-LHC.
- We are still working hard to get the extra fund, because it will allow us to:
 - ▶ Offer additional contributions to HL-LHC.
 - ▶ Ship D1 magnets in more completed form.
- MEXT approved the budget and sent it to the finance ministry in August for its confirmation. Final conclusion will be given at the end of this year.

HL-LHC

Beam Halo Monitor (Y. Mitsuhashi)

Observed beam halo in the range of 10^{-3} - 10^{-4} of peak intensity of the core.



FineMet (C. Omori)

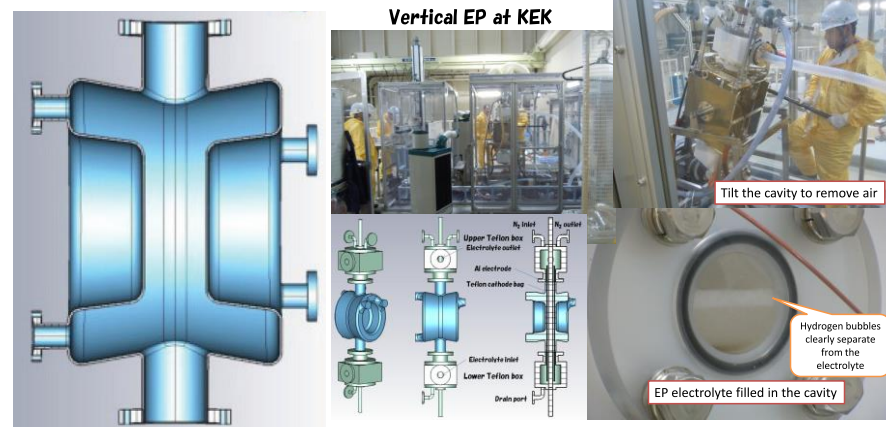
New cavities based on new technology (J-PARC FineMet) has been completed.

A NEW ACCELERATION SYSTEM FOR THE PS BOOSTER



R&D on Crab Cavity (Y. Morita)

Vertical Electro Polishing successfully applied to LHC Crab Cavity

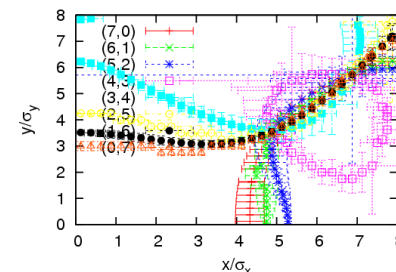
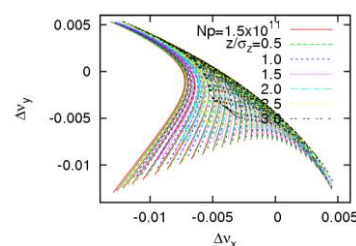


Beam Dynamics (K. Ohmi)

Study for beam-beam induced resonances in HL-LHC


$$H = \frac{\Lambda}{2} P_1^2 + U m (J_R) \cos \psi_1, \quad \Lambda \equiv m_x^2 \frac{\partial^2 U_{00}}{\partial J_x^2} + 2m_x m_y \frac{\partial^2 U_{00}}{\partial J_x \partial J_y} + m_y^2 \frac{\partial^2 U_{00}}{\partial J_y^2}$$

$$\Delta P_1 = 2\sqrt{\frac{U m}{\Lambda}} \quad \Delta J_x = 2m_x \sqrt{\frac{U m}{\Lambda}}$$



FCC

Design of Beam optics(K.Oide)



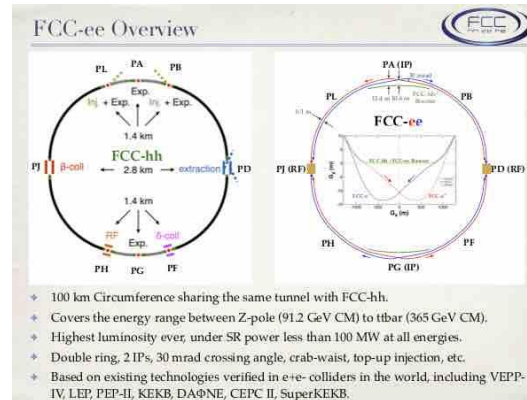

Several Topics on Beam Dynamics in FCC-ee

K. Oide
Contributions by S. Aumon, T. Charles, D. El Khechen, D. Shatilov, T. Tydecks

Many thanks to M. Benedikt, A. Blondel, M. Boscolo, E. Levichev, F. Zimmermann, and the entire FCC-ee Collaboration Team.

Work supported by the European Commission under Capacities 7th Framework Programme project FoCARD-2, grant agreement 312455, and under the Horizon 2020 Programme project CERN-MLN, grant agreement 684106.

September 24, at FACT 2018 @ HKUST Jockey Club Institute for Advanced Study

Summary

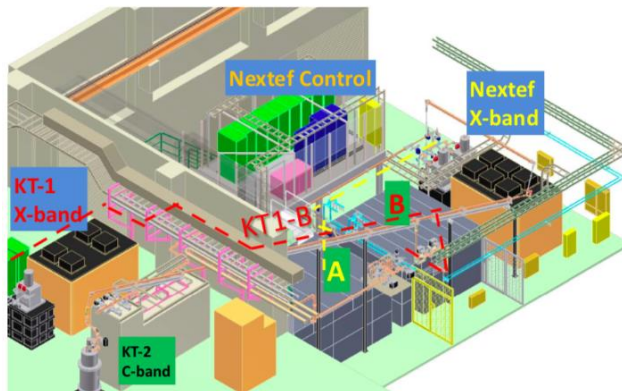
- Several studies on the beam dynamics at FCC-ee: low emittance tuning, dynamic aperture, beam blowup with/without beam beam, are introduced.
- Although not shown here, more studies are going on broader subjects such as beam-beam, polarization & energy calibration, collective effects, beam feedback, synchrotron radiation, beam-gas interaction, radiation shielding, detector background/MDI, injector complex, etc.
- The project will continue to be exciting after the CDR.

CLIC

High Gradient acceleration (T. Higo)

KEK is providing test stand for high gradient evaluation for CLIC prototype structure.

Nextef for high gradient R&D



CLIC test structures; fabrication and test

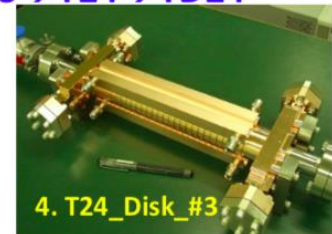
T18 → Quad → TD18 → T24 → TD24



1. T18_Disk_#2
2. Quad. type



undamped



4. T24_Disk_#3



3. TD18_Disk_#2



damped



5. TD24_Disk_#4

Collaboration between KEK and CERN (3)

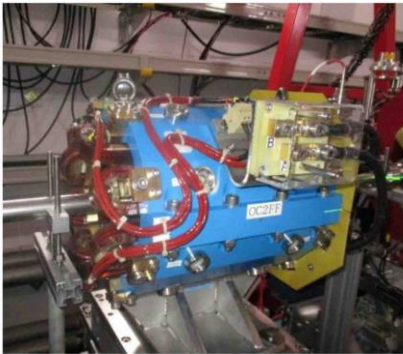
CERN's Activity for CLIC/ILC at ATF2

■ Nanometer Beam Development

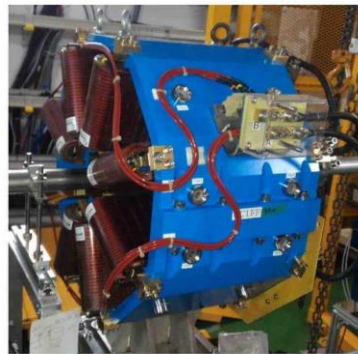
- **Final Focus System studies for LCs**
Wakefield free steering method lead by CERN.



- **Ultra High-beta optics for CLIC**
Two Octupoles by CERN has been installed.



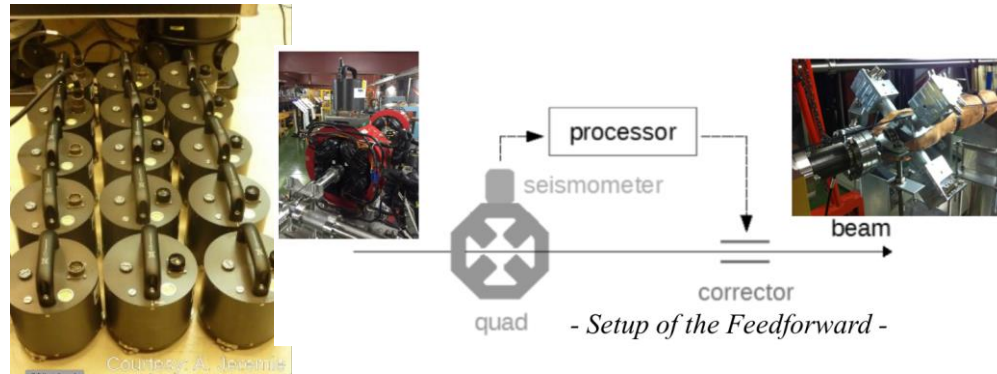
OCTU1 installed in ATF



OCTU2 installed in ATF

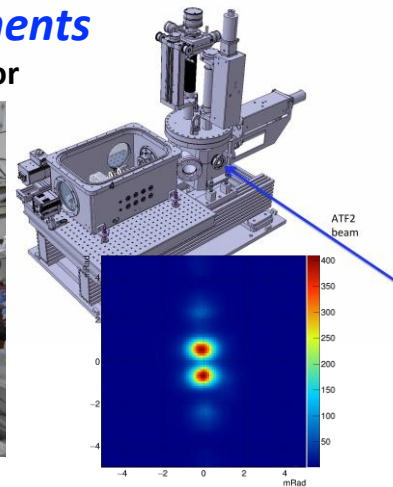
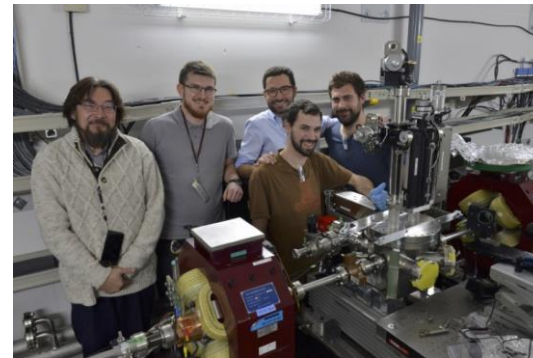
■ Ground Motion Feed-forward for CLIC

14 Geophones has been installed in ATF2 by CERN and LAPP



■ Beam Monitor Developments

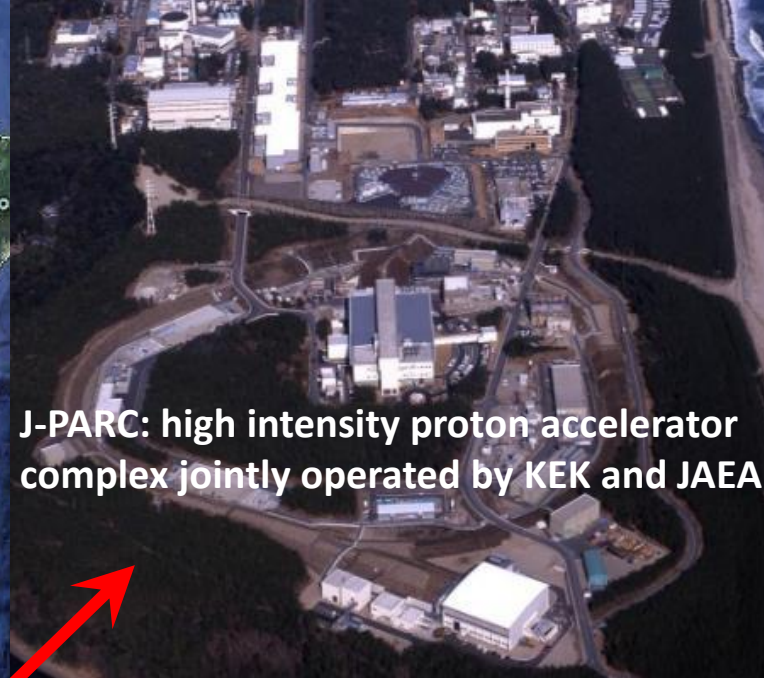
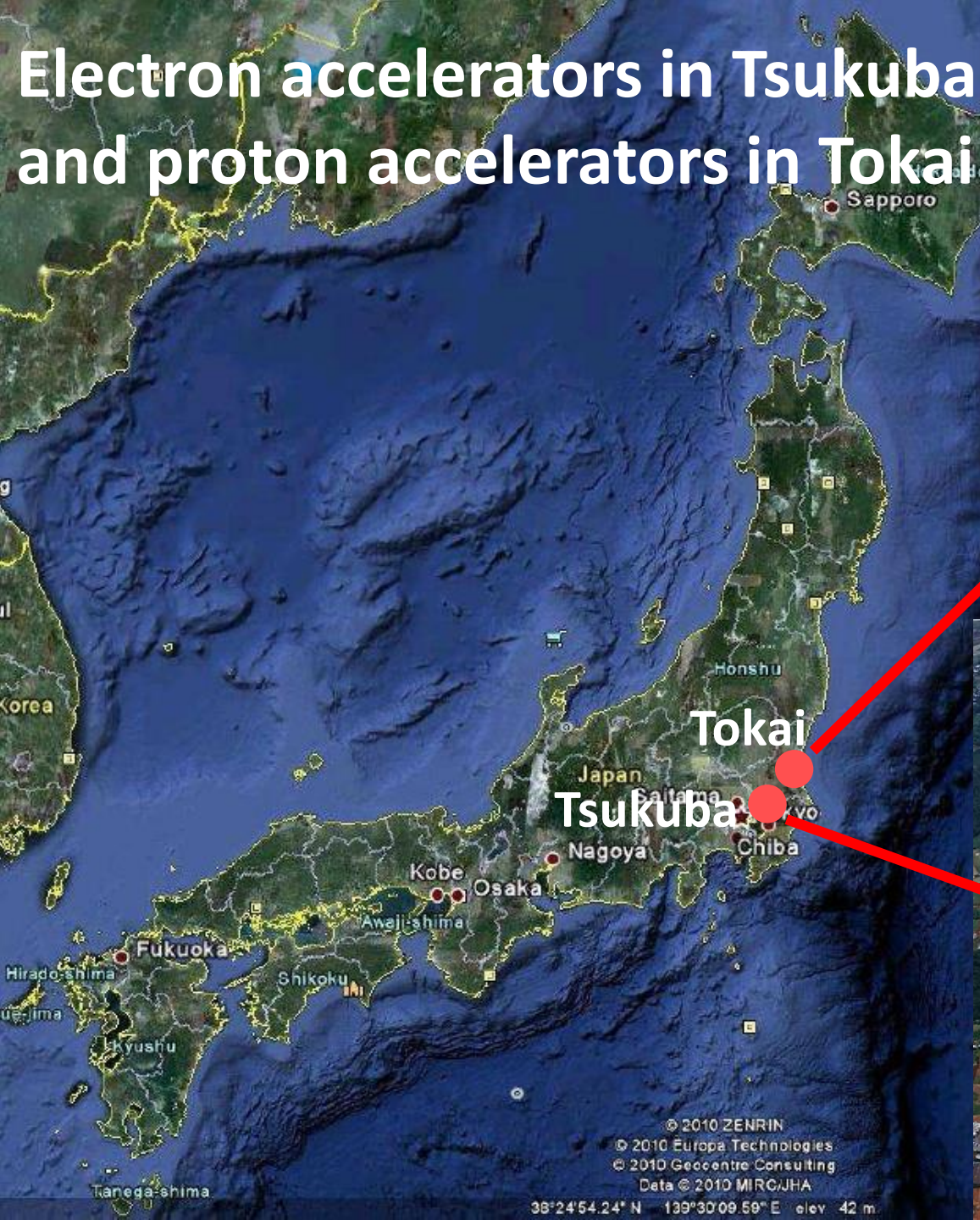
High resolution OTR-ODR monitor



Collaborative Research Contract between CERN and KEK supports the ATF beam operation.

115kCHF(2014), 102kCHF(2016), 102kCHF(2017)

Electron accelerators in Tsukuba and proton accelerators in Tokai

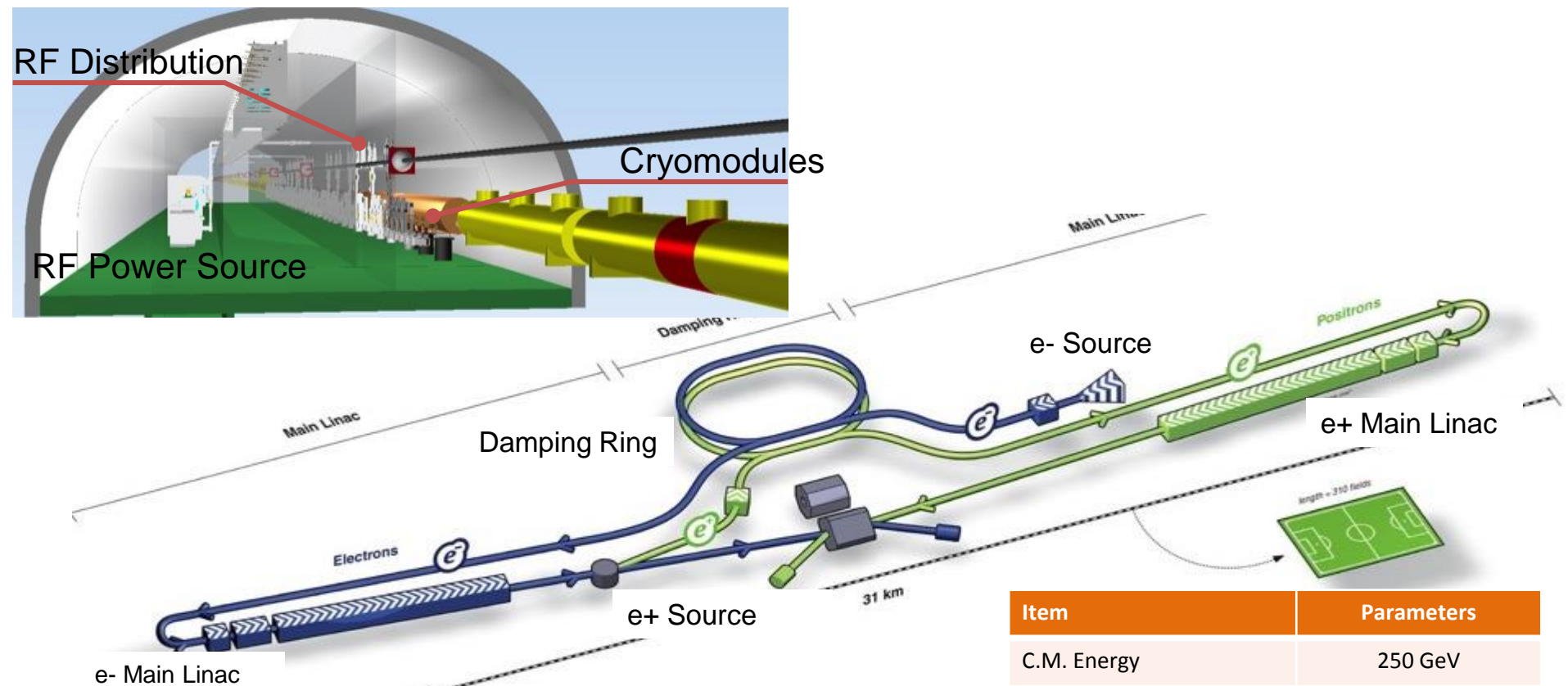


J-PARC: high intensity proton accelerator complex jointly operated by KEK and JAEA



KEK Tsukuba: SuperKEKB, PF, ATF

International Linear Collider



Superconducting
cavity Test Facility



Item	Parameters
C.M. Energy	250 GeV
Length	20 km
Luminosity	$1.35 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
Repetition	5 Hz
Beam Pulse Period	0.73 ms
Beam Current	5.8 mA (in pulse)
Beam size (y) at FF	7.7 nm
SRF Cavity G. Q_0	31.5 MV/m $Q_0 = 1 \times 10^{10}$

- ILC Advisory Panel concluded in July 2018, which summarized all the details of ILC, but no recommendation was given.
- Its report has been sent to the Science Council of Japan (SCJ), which set up a special committee and started discussion. A recommendation is expected in a few months time frame.
- Japanese Government will issue a statement by the end of CY2018. LCB will discuss it in March 2019, and decide if ILC is proposed to the European strategy discussion.