



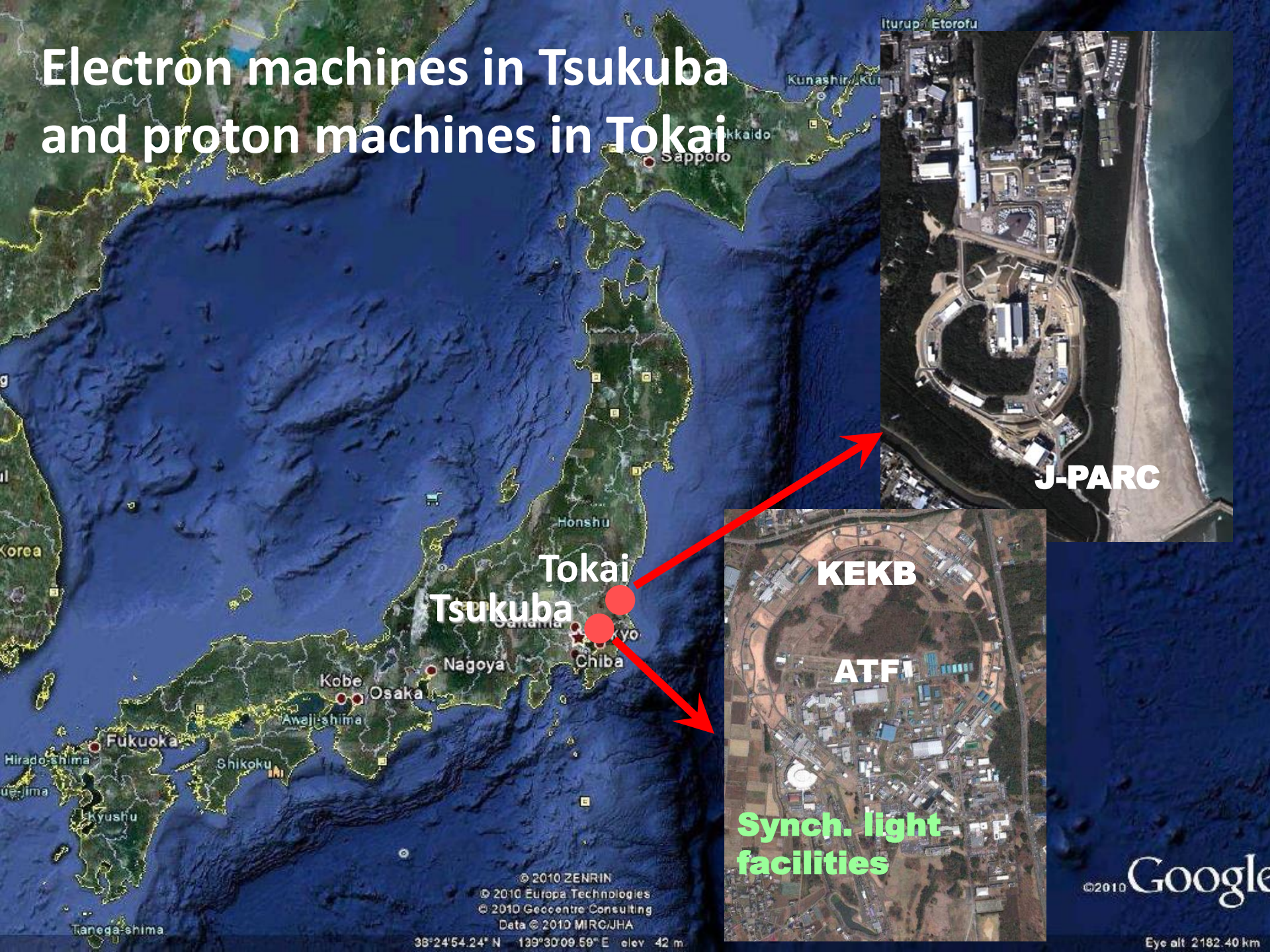
KEK, High Energy Accelerator
Research Organization

- EU-projects- View of non-EU partner : KEK

June 11, 2013

Katsuo Tokushuku
IPNS, KEK, Japan

Electron machines in Tsukuba and proton machines in Tokai



J-PARC

KEKB

ATF1

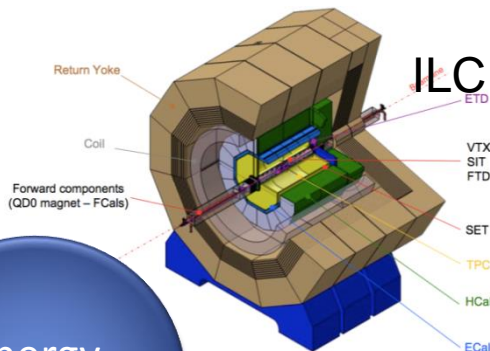
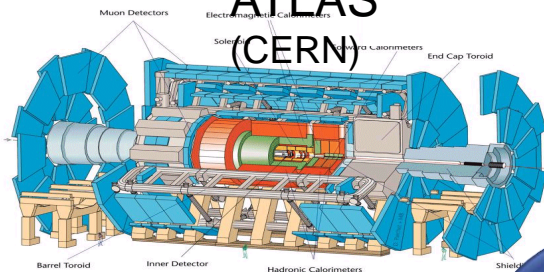
**Synch. light
facilities**

©2010 Google

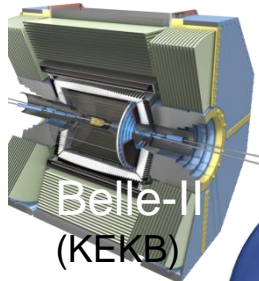
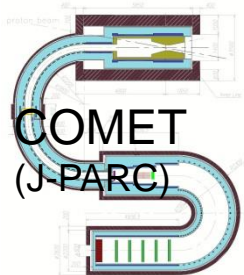
Eye alt 2182.40 km

© 2010 ZENRIN
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© 2010 Geocentre Consulting
Data © 2010 MIRC/JHA
38°24'54.24" N 139°30'09.59" E elev 42 m.

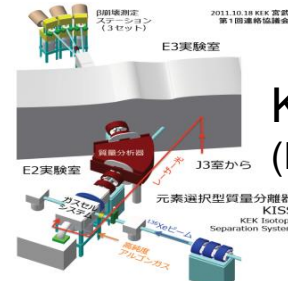
ATLAS
(CERN)



COMET
(J-PARC)



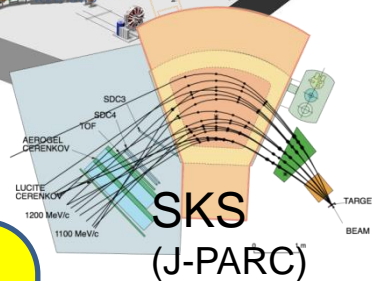
T2K
(J-PARC)



KISS
(RIKEN)



Hadron hall
(J-PARC)



SKS
(J-PARC)

Energy
Frontier

Hadron
and
Nuclear
Physics

Theory

Astro-
particle
Physics

Flavor
Physics

Physics
at KEK

Theory

String theory
Particle physics
Hadron physics
Cosmo-physics
Lattice simulation

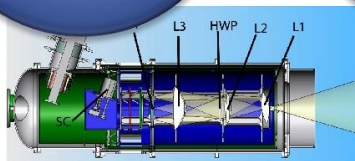


KOTO
(J-PARC)



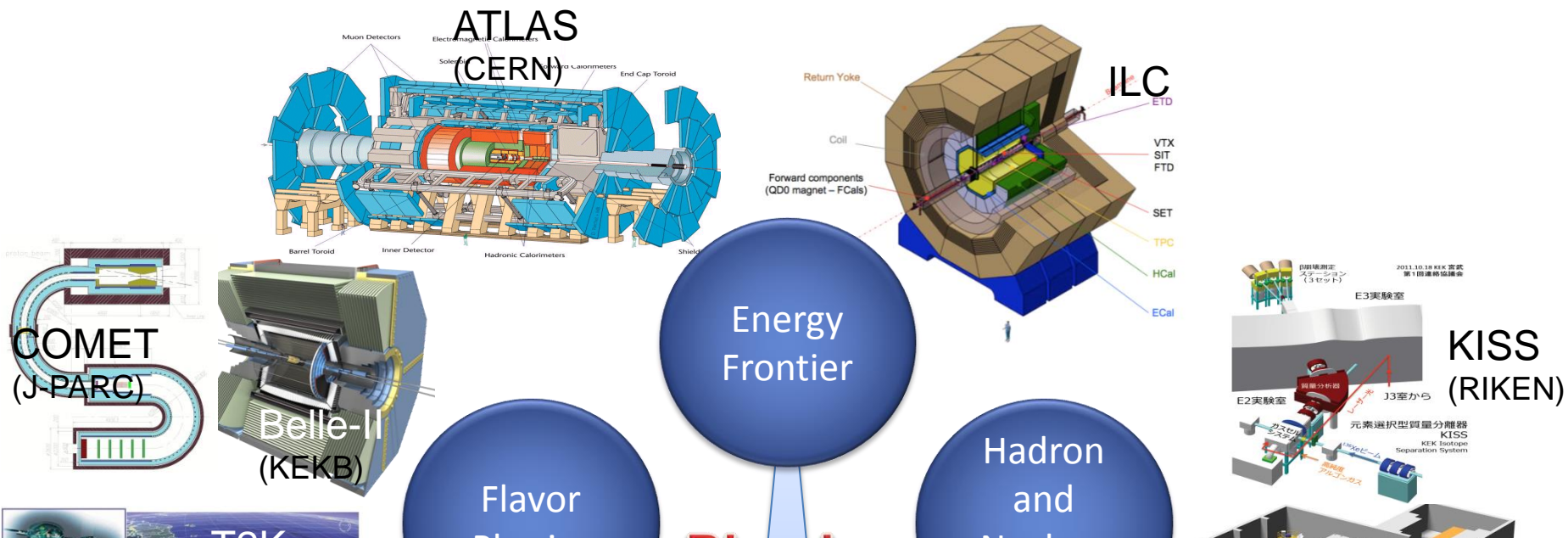
UCN
(RCNP)

QUIET
(Atacama)



PolarBearR
(Atacama)



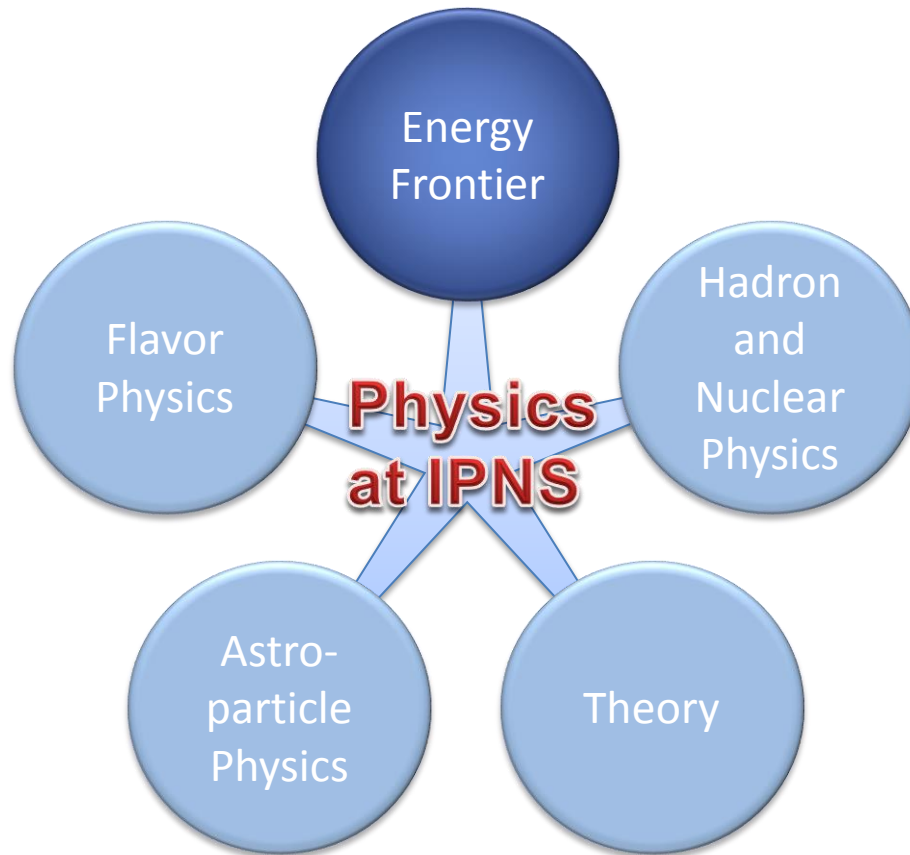


Rich In-house programs on flavor physics (superKEKB and J-PARC), and on Nuclear Physics.

International Collaborations on Energy frontier physics (LHC) with the KEK's expertise.

KEK roadmap:

<http://kds.kek.jp/conferenceDisplay.py?confId=11728>



Long Collaboration with CERN on LHC

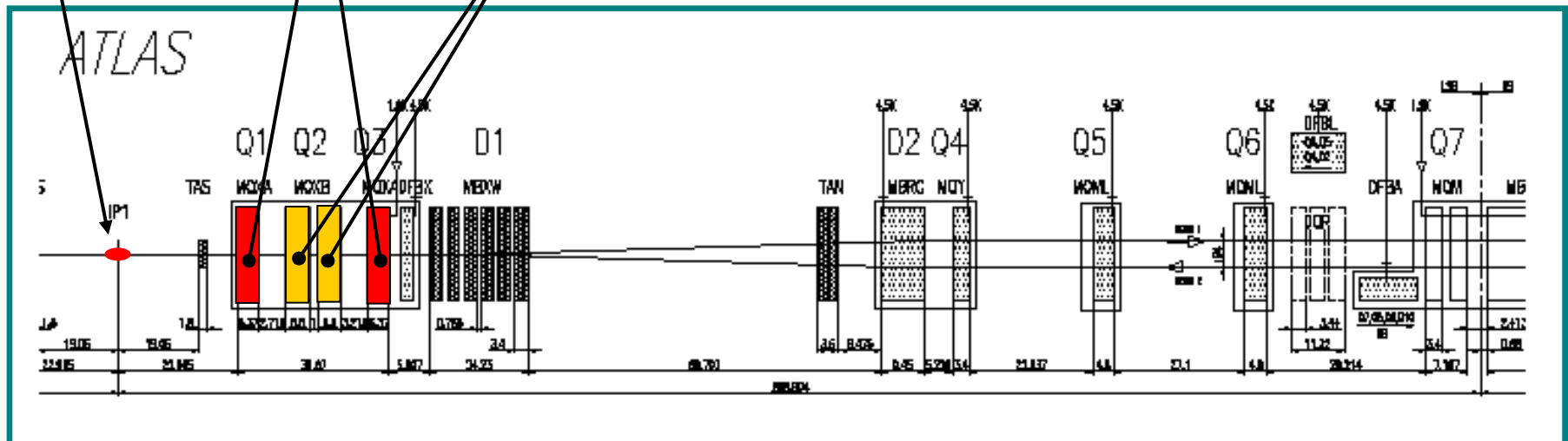
Inner Triplet Quadrupoles

Near the interaction points, triplet quadrupole magnets focus the beam. Two types of superconducting magnets are separately developed and manufactured at KEK and Fermilab. Both magnets were assembled with common cryostat at Fermilab and then shipped to CERN.

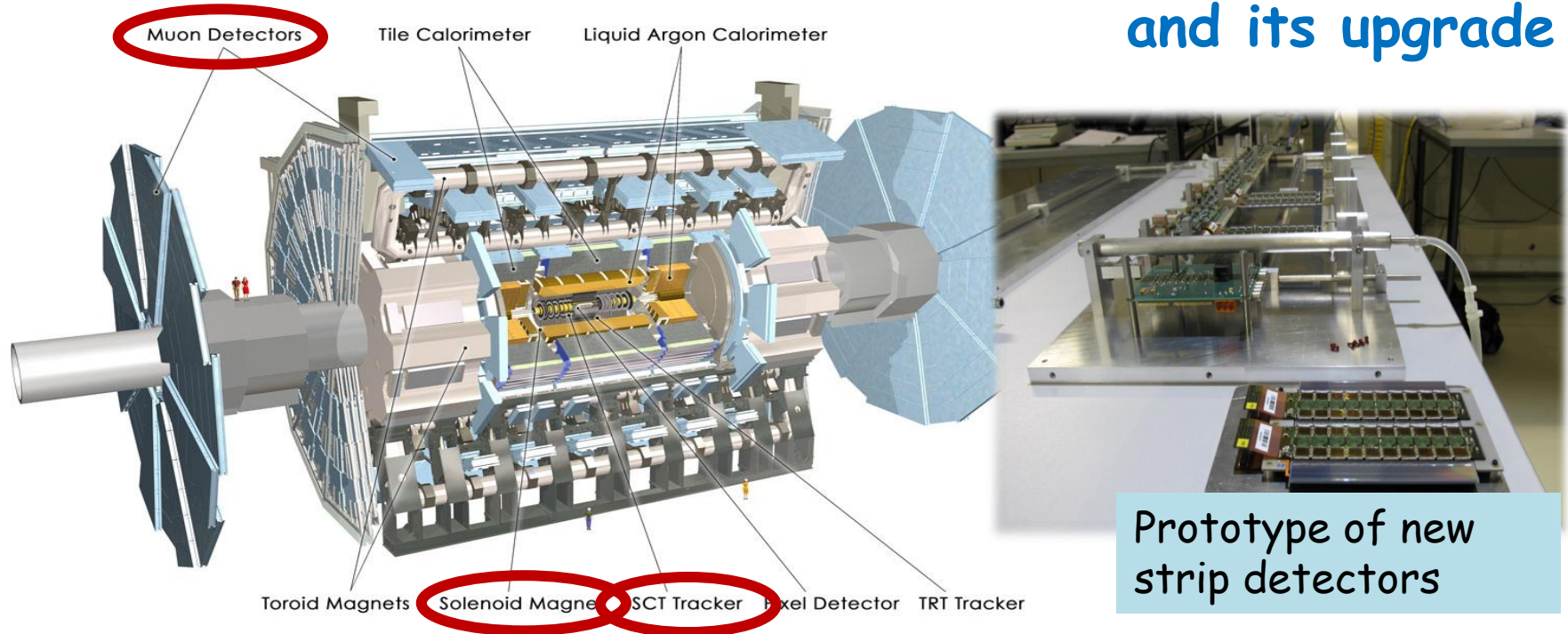


KEK **Fermilab**

Collision point

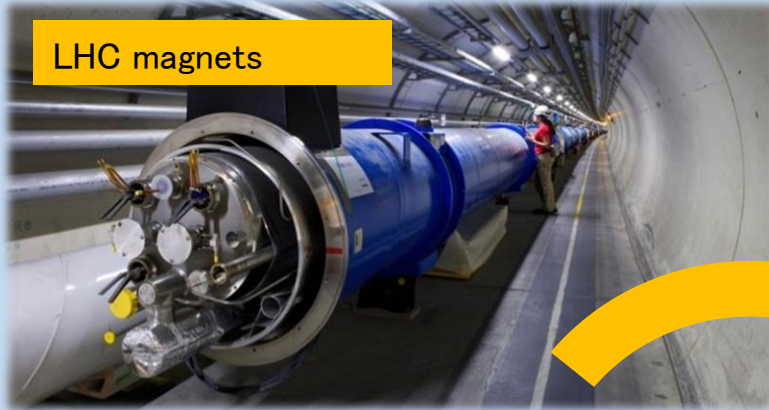


ATLAS: KEK contribution to the ATLAS initial detector and its upgrade



- Superconducting Central Solenoid (Japanese contribution:100%)
- Time-to-digital conversion chips for muon drift tubes (100%)
- End-cap muon triggering system (TGC) (~50%)
 - > New trigger logic system for LVL1
- Silicon microstrip tracking system (SCT) (~20%)
 - > New inner tracker with pixel and strip detectors

Very fruitful collaboration with CERN



LHC magnets



J-PARC neutrino beamline

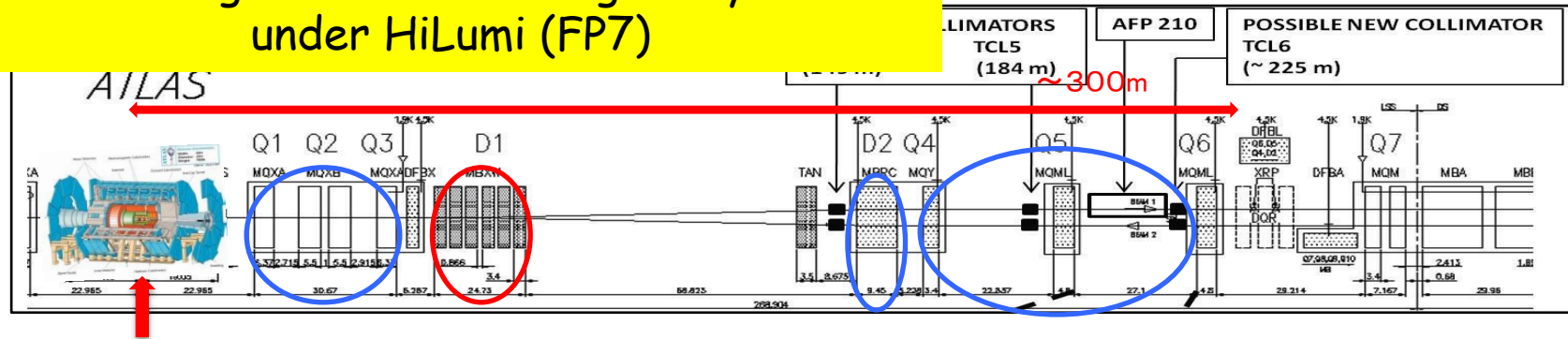


PSB: cavities



J-PARC RF cavities

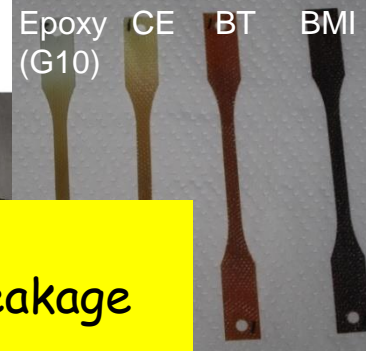
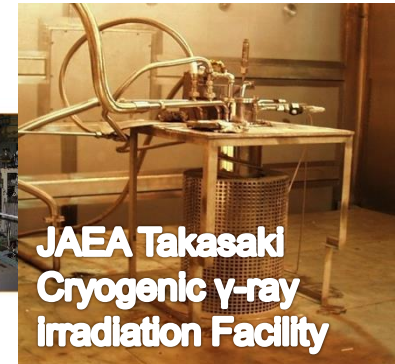
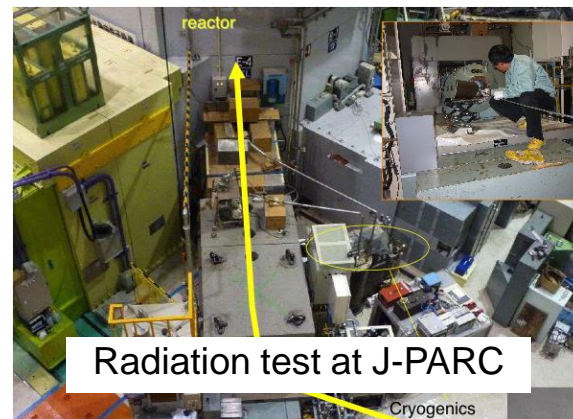
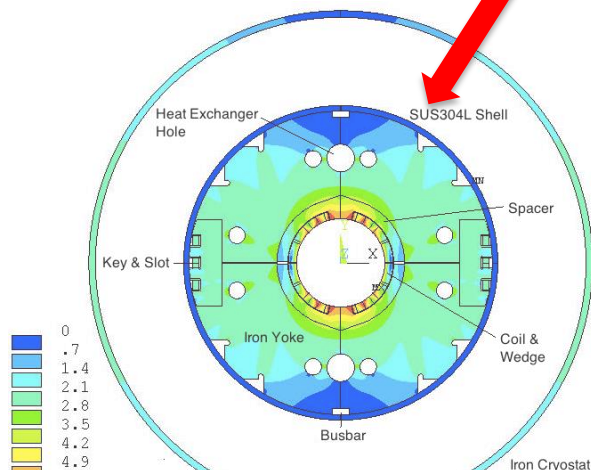
International collaboration has started for the design work of the magnet system under HiLumi (FP7)



Q1-3: US-LARP(Nb3Sn) or CERN(NbTi)
 D1: KEK

D2: BNL

Q4-6: CEA/Saclay

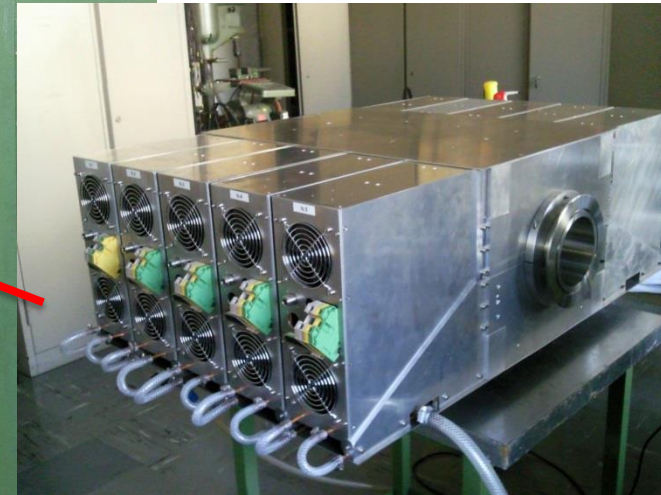
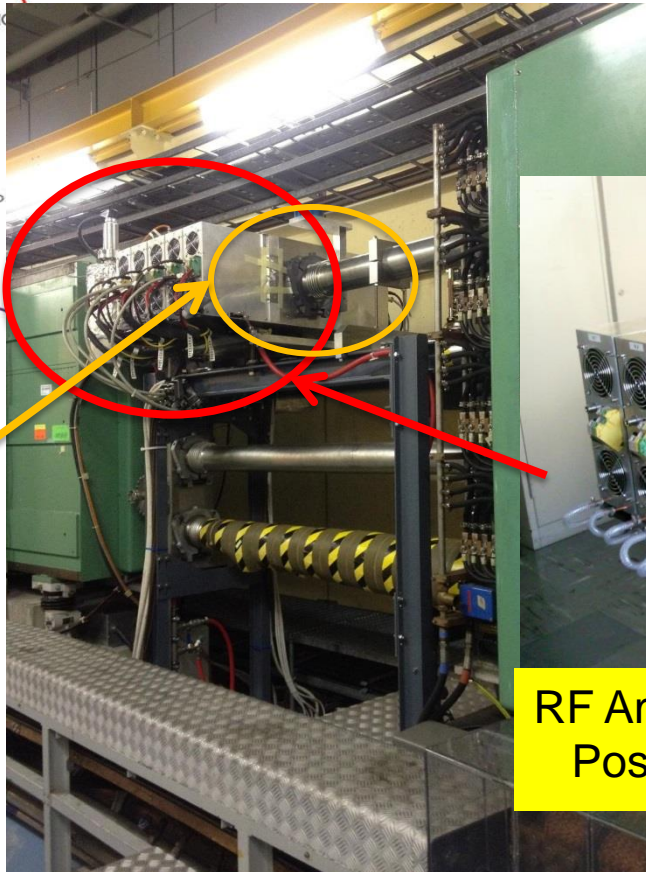
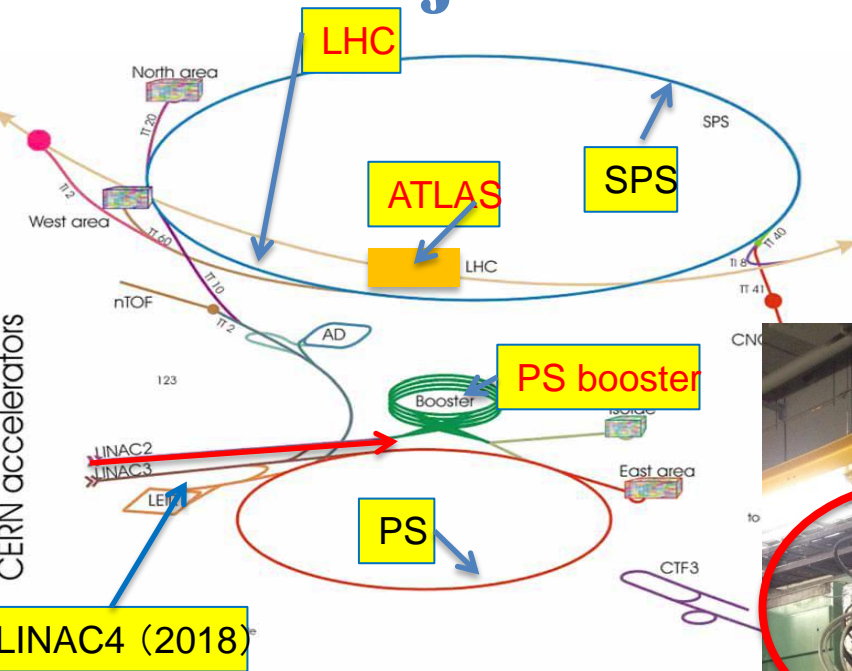


Challenges:

Large aperture ($\phi 130 \sim 150 \text{ mm}$) 6 Tesla magnet: saturation, flux leakage
 High radiation dose: selections of rad-hard materials

There is a CERN-KEK collaboration on high-field magnet Nb_3Sn , Nb_3Al

LHC Injector



RF Amplifiers:
Possible KEK contributions



Magnetic alloys in the RF cavity.
(developed at J-PARC)

EU-project and KEK

Questions from Frank Zimmerman:

- what does KEK think about these EU co-funded projects?
- what are the perceived advantages or drawbacks?
- are there legal issues?
- is the KEK participation in HiLumi an “accident” or could/will it repeat in future projects?
- outlook or wishes from KEK for future EU programmes?

EU-project and KEK

Questions from Frank Zimmerman:

- Are there legal issues?

No serious issues. If the project is still at the R&D stage and if the extra resource is not needed, KEK is very flexible.

If a large resource is needed in the project, KEK needs to submit the request to our FA (MEXT) and it takes time.

For example, we signed for HiLumi, LAGUNA-LBNO with the initiatives of the contacted researchers. But this does not mean that KEK is ready to contribute to the full project of HL-LHC (or LBN in Europe).

EU-project and KEK

Questions from Frank Zimmerman:

- Is the KEK participation in HiLumi an “accident” or could/will it repeat in future projects?

It was easy to participate to HiLumi because we have been long working collaboration between CERN and KEK on the LHC.

If there is other good projects which attracts KEK people, it can happen.

But there is no direct connection to the funding in Japan to the EU-projects so either we need to collaborate with the existing resources or with a new funding request to the mexit (which is not easy).

EU-project and KEK

Questions from Frank Zimmerman:

- What does KEK think about these EU co-funded projects?
- What are the perceived advantages or drawbacks?

At this stage, there is no coherent strategy to react on the EU-projects. It heavily depends on individual researchers. There is no clear preference between KEK-EU collaboration and bi- or multi-lateral KEK-EU lab(s) collaboration.

Situation may change if there is a Japanese fund linked to EU-programs. There is a EU-Japan science and technology agreement (started March 2011). Some discussions are going on.

EU-project and KEK

Questions from Frank Zimmerman:

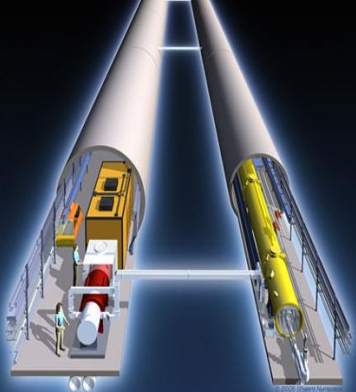
- Outlook or wishes from KEK for future EU programmes

In general, the closer collaborations between world wide accelerator laboratories are more and more important for on-going and future accelerator R&Ds. KEK is willing to participate to the network.

Extra Slides
related to KEK activities

More on KEK activities.

ILC Accelerator R&D:



Accelerator
Test Facility

ATF



Superconducting
Magnet Test Facility

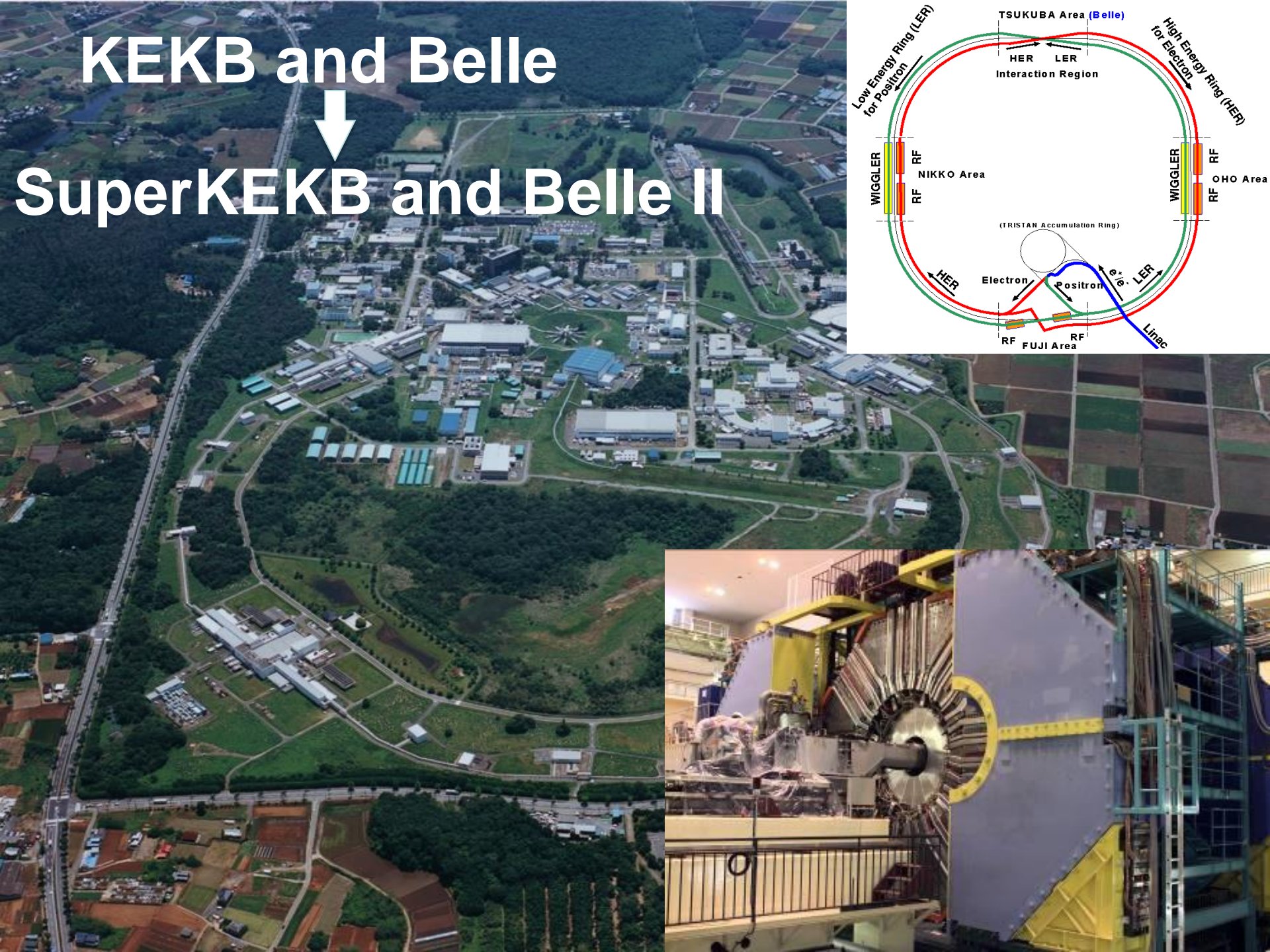
STF



CFF

Cryomodule
Fabrication
Facility

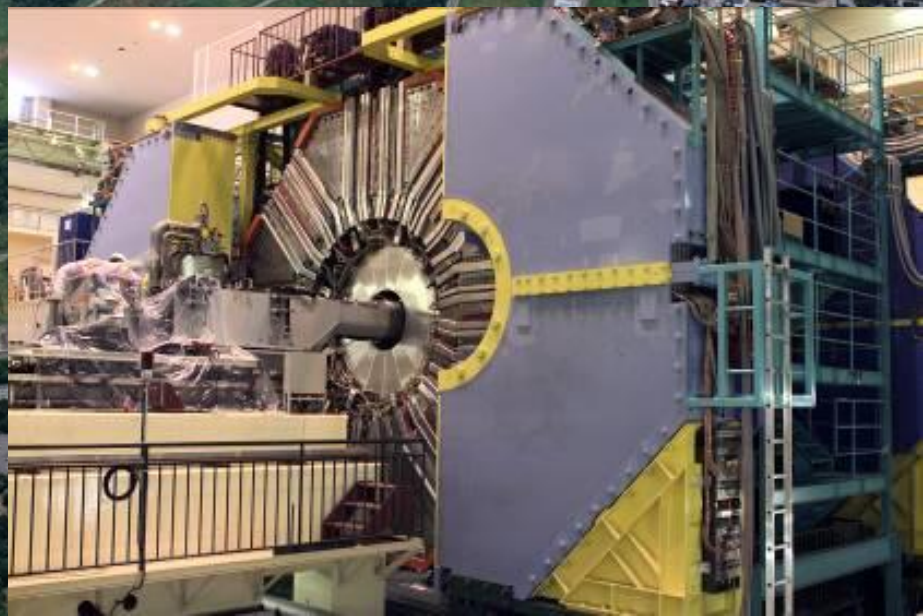
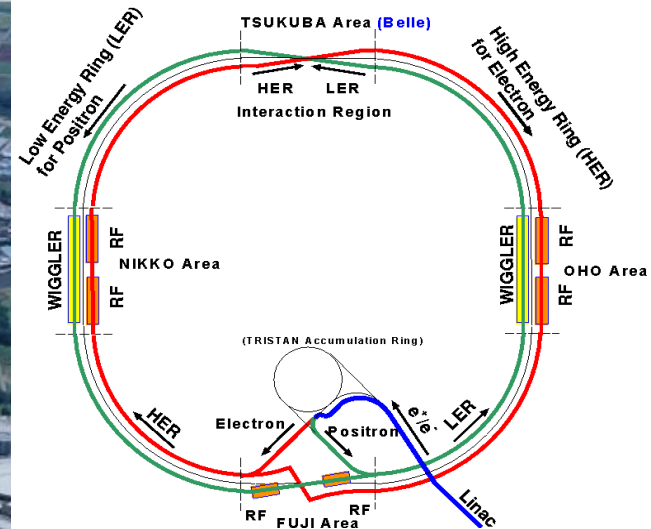




KEKB and Belle



SuperKEKB and Belle II



J-PARC

Joint project between KEK and JAEA

Linac

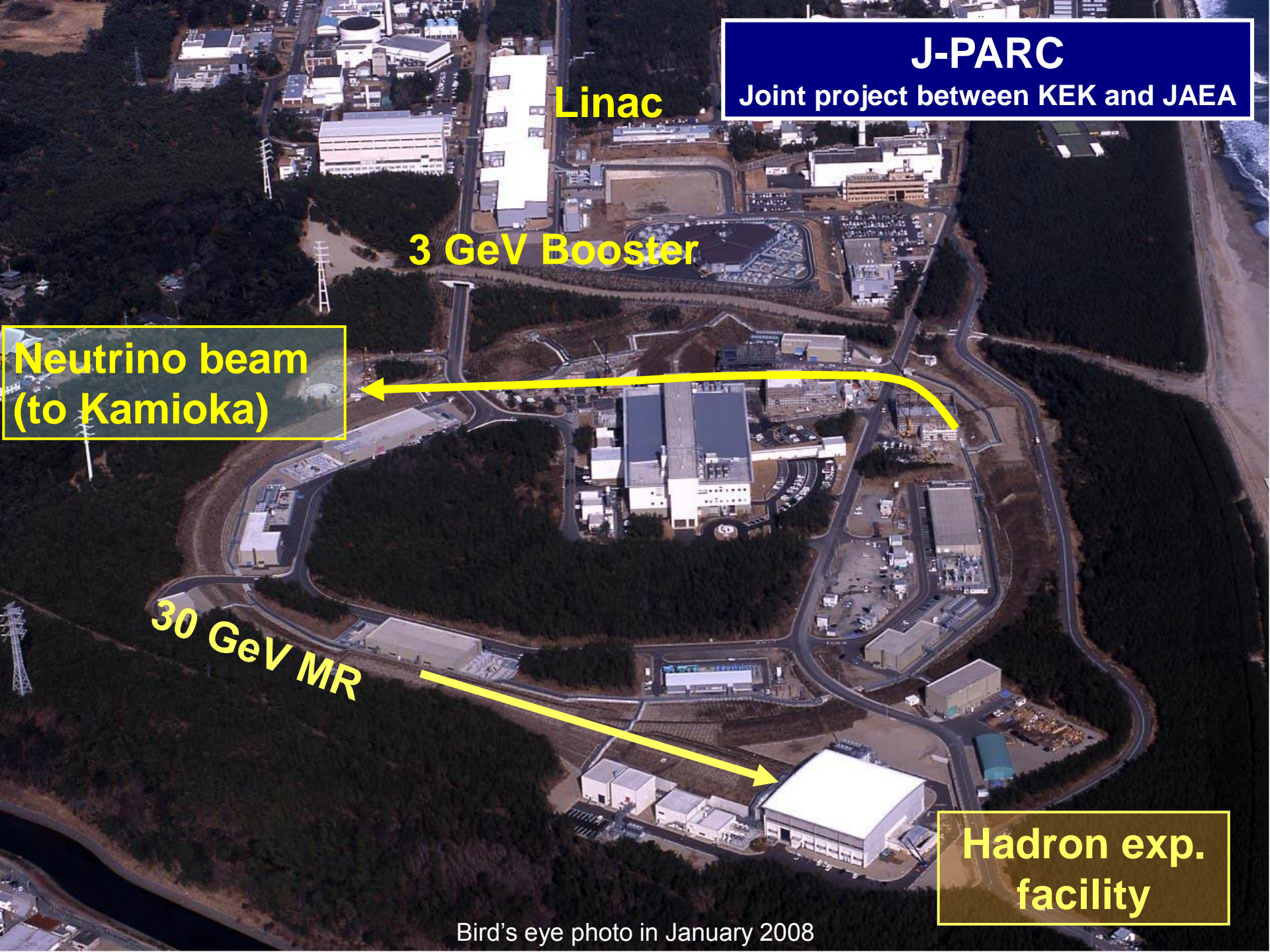
3 GeV Booster

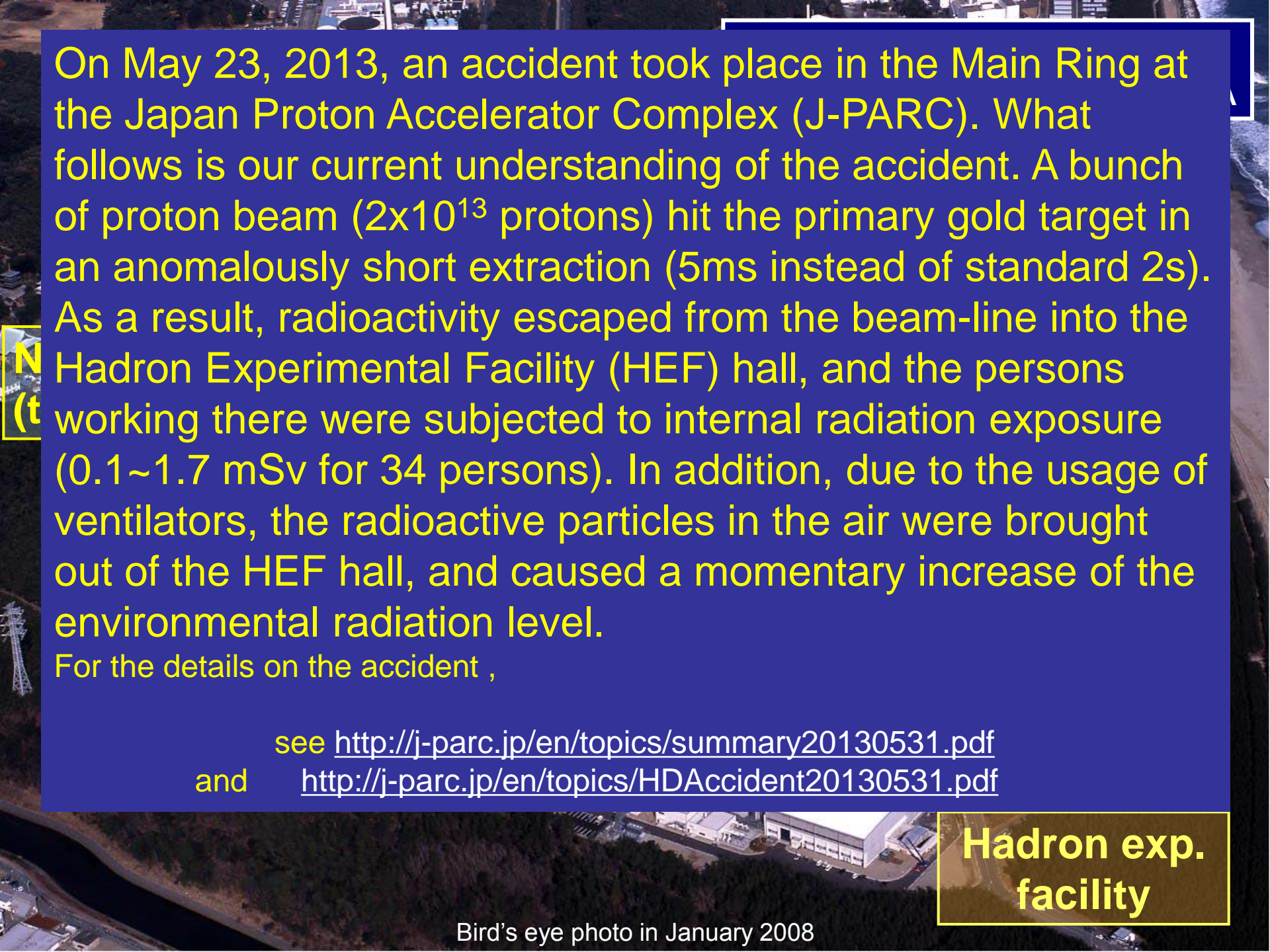
Neutrino beam
(to Kamioka)

30 GeV MR

Hadron exp.
facility

Bird's eye photo in January 2008



An aerial photograph of the J-PARC facility, showing various buildings and a river. A large blue rectangular text box is overlaid on the upper portion of the image, containing yellow text. The text describes an accident that occurred on May 23, 2013, at the Main Ring of the Japan Proton Accelerator Complex (J-PARC). It details the escape of radioactivity from the beam-line into the Hadron Experimental Facility (HEF) hall, the resulting radiation exposure for 34 persons, and the subsequent increase in environmental radiation levels due to the use of ventilators. The text concludes with a reference to two URLs for more details on the accident. A small yellow box with the letters 'N' and '(t)' is visible on the left edge of the blue text box.

On May 23, 2013, an accident took place in the Main Ring at the Japan Proton Accelerator Complex (J-PARC). What follows is our current understanding of the accident. A bunch of proton beam (2×10^{13} protons) hit the primary gold target in an anomalously short extraction (5ms instead of standard 2s). As a result, radioactivity escaped from the beam-line into the Hadron Experimental Facility (HEF) hall, and the persons working there were subjected to internal radiation exposure (0.1~1.7 mSv for 34 persons). In addition, due to the usage of ventilators, the radioactive particles in the air were brought out of the HEF hall, and caused a momentary increase of the environmental radiation level.

For the details on the accident ,

see <http://j-parc.jp/en/topics/summary20130531.pdf>
and <http://j-parc.jp/en/topics/HDAccident20130531.pdf>

**Hadron exp.
facility**

Bird's eye photo in January 2008



Linac

J-PARC

Joint project between KEK and JAEA

KEK is the institution that is primarily responsible for design, construction, operation and management of the HEF. We at KEK extend our sincere apologies to those who are concerned and affected in local, national and international communities. KEK will be making its all possible efforts in investigating the accident and in improving the safety-protection measures and practices, thereby restoring the confidence of all who have been supporting our scientific effort at our research facility in the past and in the future.

For the details on the accident ,

1see <http://j-parc.jp/en/topics/summary20130531.pdf>
and <http://j-parc.jp/en/topics/HDAccident20130531.pdf>

**Hadron exp.
facility**

Bird's eye photo in January 2008