

# KEK status and plans

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# Recent Changes of people in KEK-CRC

- Tomoaki Nakamura was appointed as an Associate Professor in August 2014
  - He was in charge of T2 Tokyo before
- Yoshimi will come back to the work in April 10<sup>th</sup> , 2015
- Prof. Masanori Yamauchi will be new DG of KEK from April 1<sup>st</sup>
  - Director of IPNS will be Katsuo Tokushuku
  - Head of KEK-CRC will be Toshiaki Kaneko (no change)

# General status

- After the earthquake and tsunami happened on March 11th 2011, our budget situation became very hard
  - Restoration of the area is still continuing and needs more time
  - Fukushima-1
- KEK has recovered from physical damages almost
- The schedules of the projects at KEK are delaying a lot still

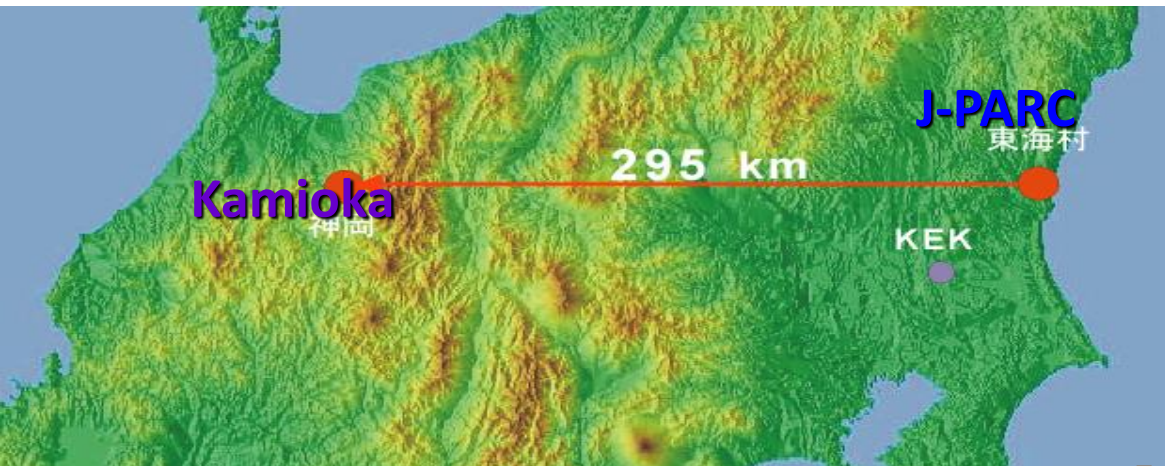
# Introduction of KEK facilities and their status

- J-PARC
  - Joint project between JAERI and KEK
  - Particle physics, nuclear science, materials, life science and etc
- SuperKEKB
  - BelleII
- Photon factory
  - Materials, life science and etc.

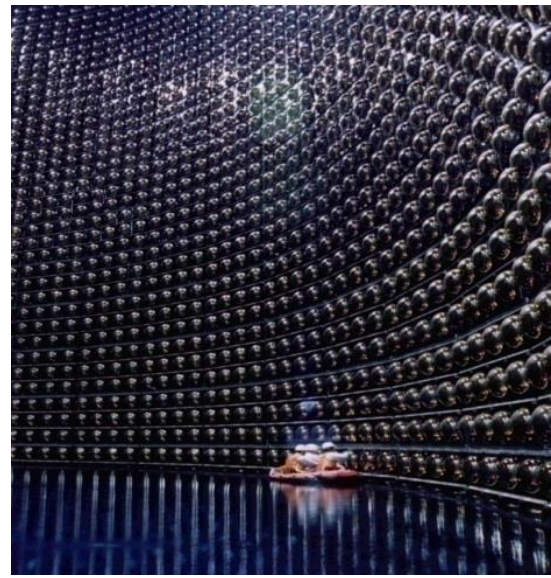
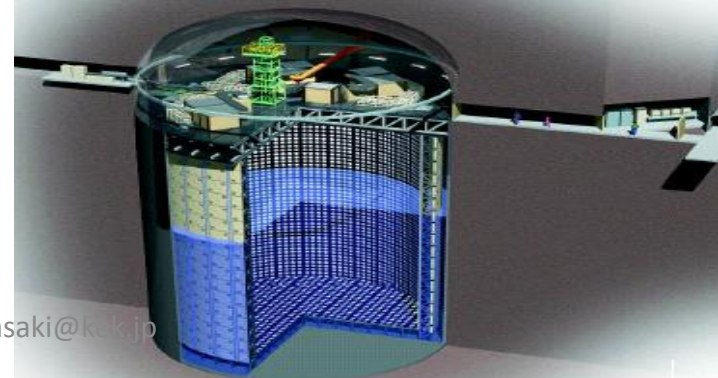




# J-PARC (*T2K Experiment*)



## *Super-Kamiokande*

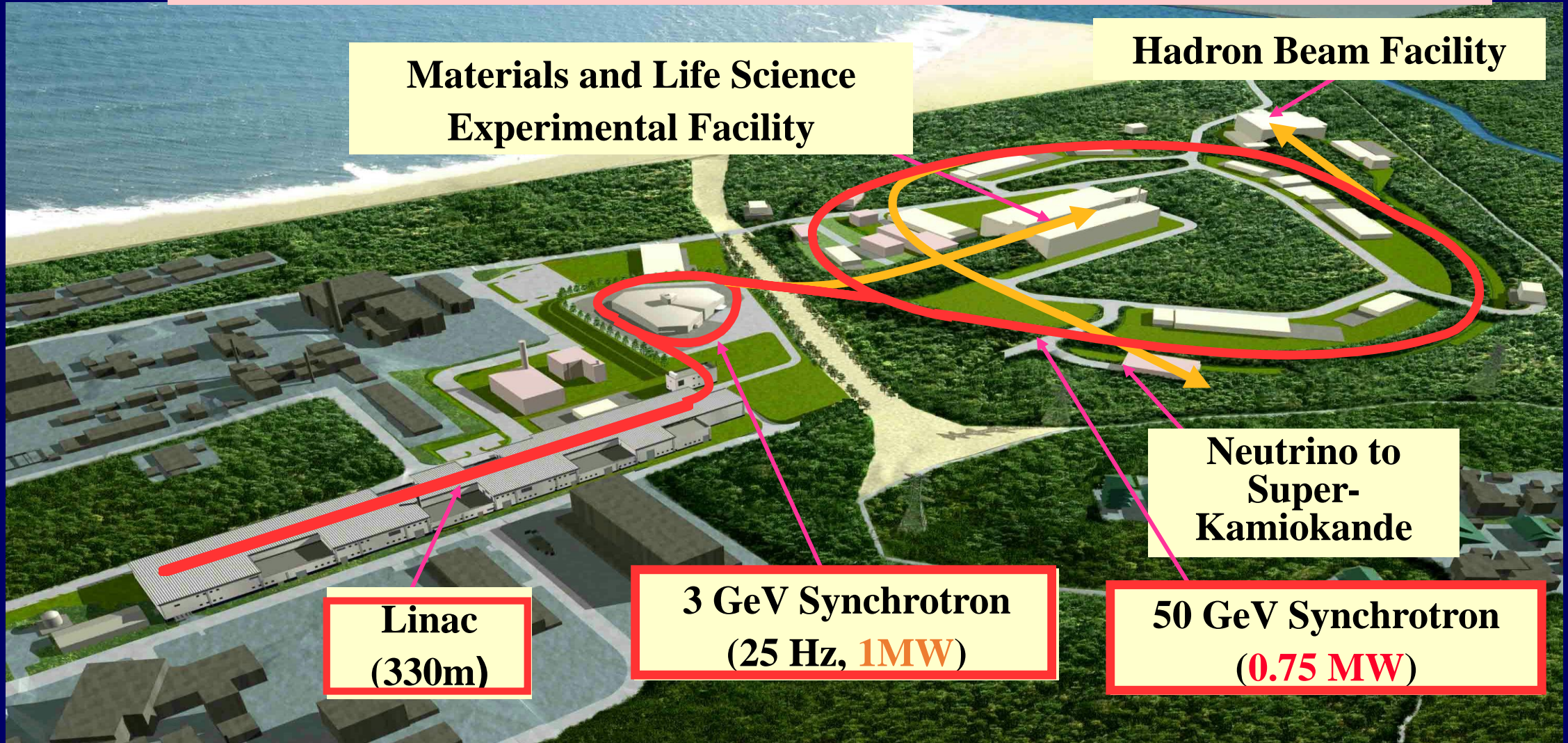






# J - PARC ( Tokai )

*J-PARC = Japan Proton Accelerator Research Complex*

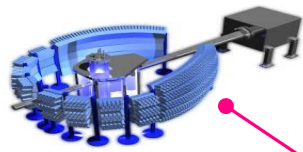


**Joint Project between KEK and JAEA**



# J-PARC( Materials & Life Science Facility)

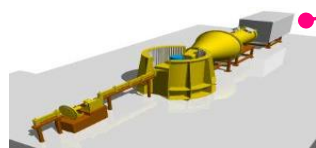
Versatile powder diffractometer  
- JAEA



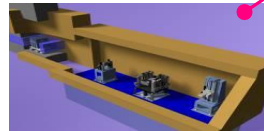
Protein Dynamics Analysis Instrument (DIANA)  
- JAEA



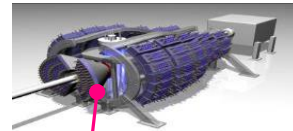
Cold Neutron Double Chopper Spectrometer (CNDCS)  
- JAEA



High-intensity SANS (HI-SANS) - JAEA



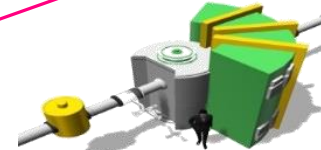
Engineering Diffractometer  
- JAEA



IBARAKI Biological Crystal Diffractometer  
- Ibaraki Prefecture



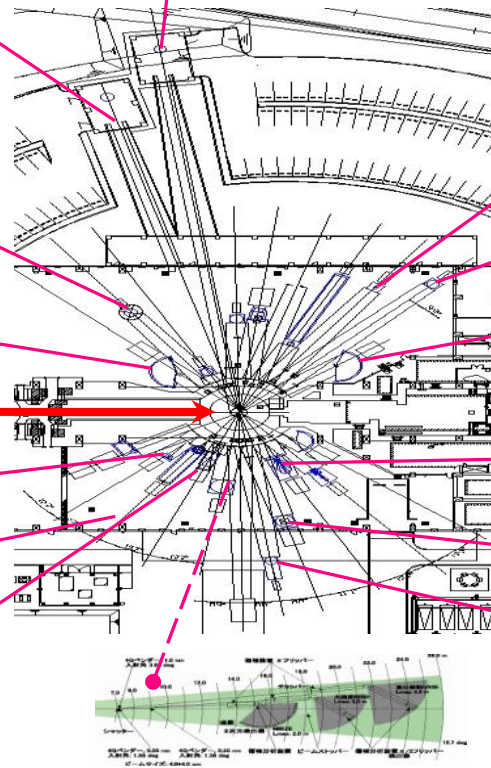
Diffractometer for Biological X-ray Tomography (BIX-PN) - JAEA



4d Space Access Neutron Spectrometer(4SEASONS)  
- Grant-in-Aid for Specially Promoted Research, MEXT



IBARAKI Materials Design Diffractometer  
- Ibaraki Prefecture



# J-PARC status

- An accident happened at the hadron hall in 2013
  - Radioactive gas has been exposed to the environments in accident
  - The government committee ordered to fix the experiment hall to prevent such gas exposure
- They are planning to start the operation of the main ring of J-PARC for T2K and neutron beam lines
  - They are still waiting for the approval from the government (national/prefectural) for the hadron hall
  - J-PARC is inside of JAEA and much strict rules are applied
- MLF (Materials and Life Science Facility) is in operation
  - iRODS is used to transfer data from J-PARC to KEK
- Budget situation is not yet very easy
  - J-PARC operations costs will be funded almost the half of the requested in JFY2015



# KEK Tsukuba campus



*Mt. Tsukuba*

*Belle II Experiment*

*SuperKEKB*

*Photon Factory-AR: 6.5 GeV*

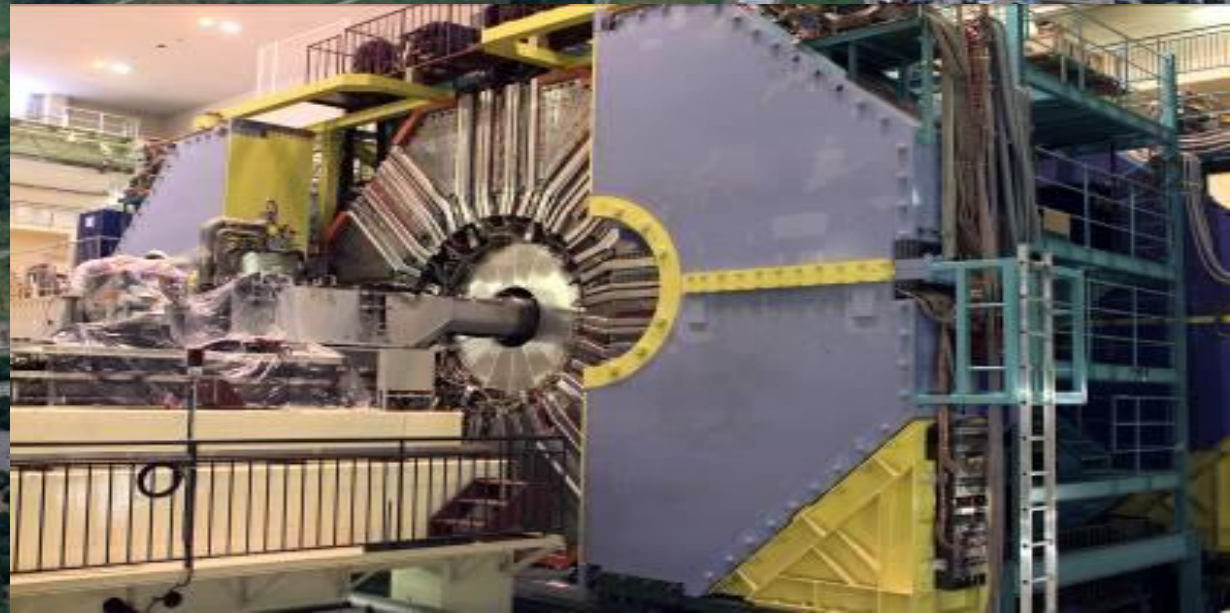
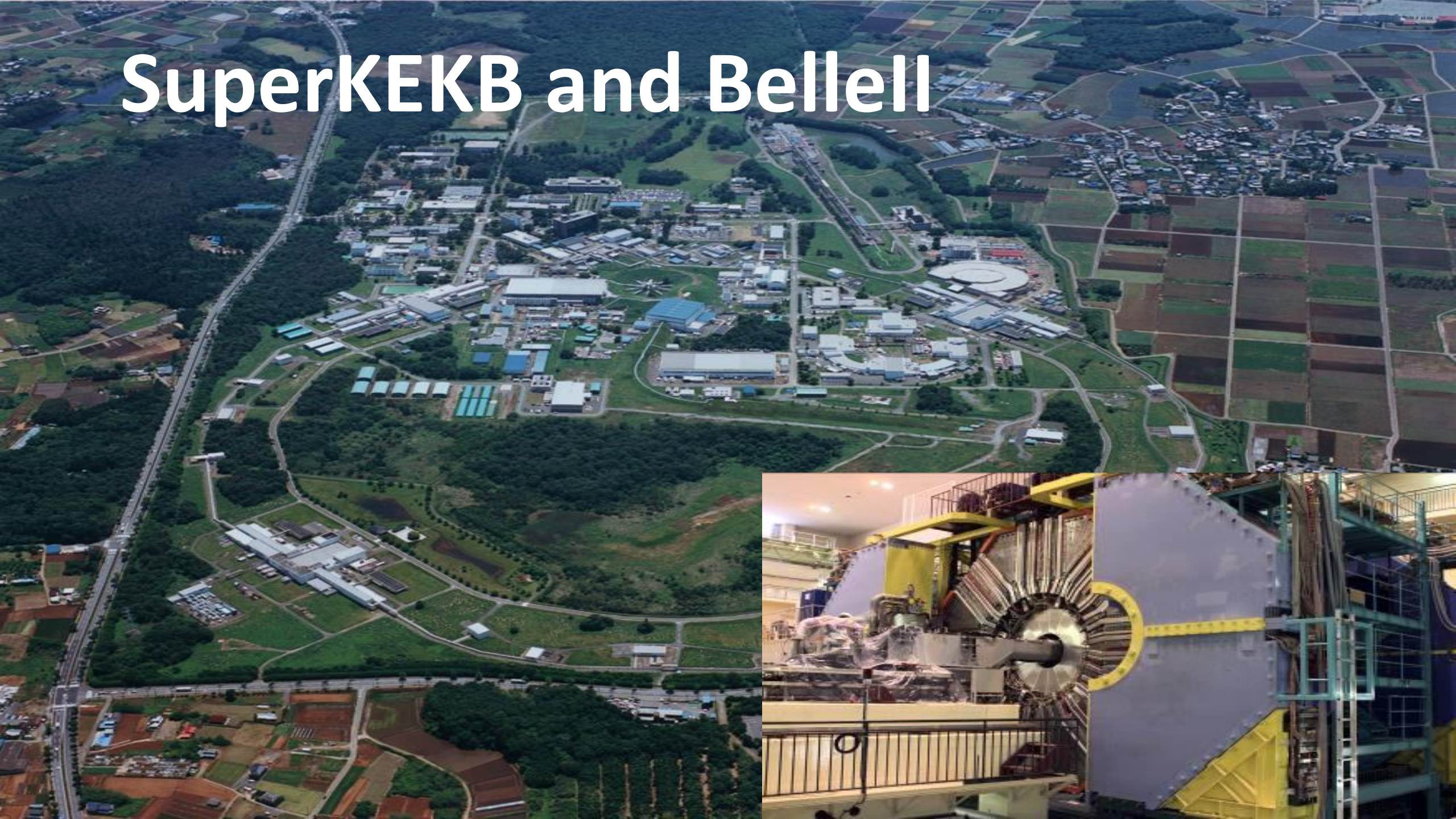
*Photon Factory: 2.5 GeV*

*Computing Research Center*

*$e^+ e^-$  Linac*



# SuperKEKB and BelleII

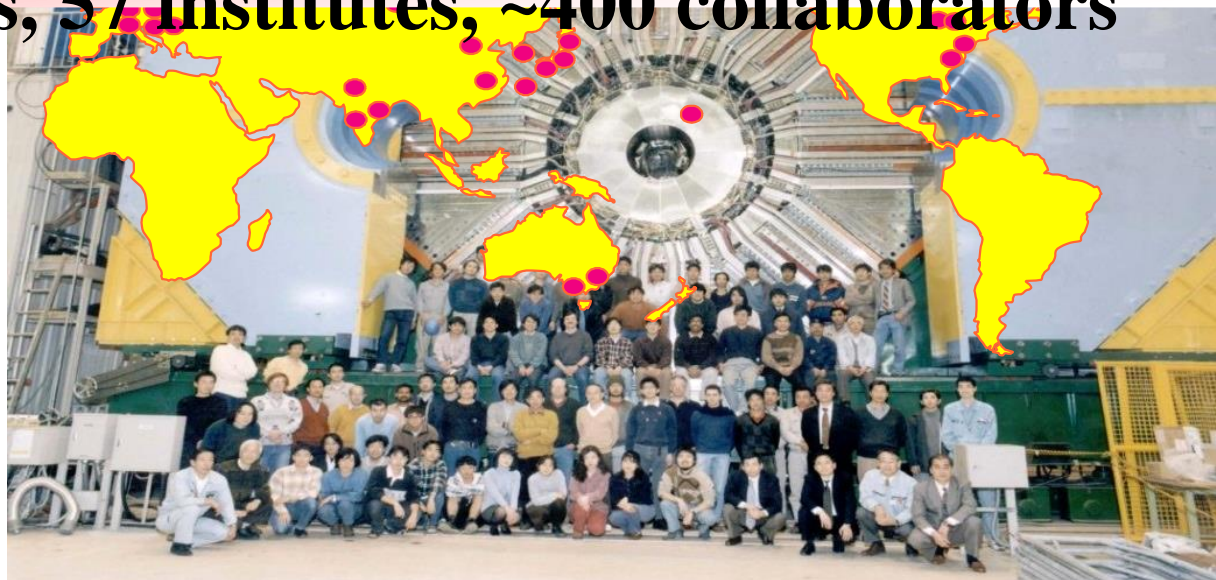
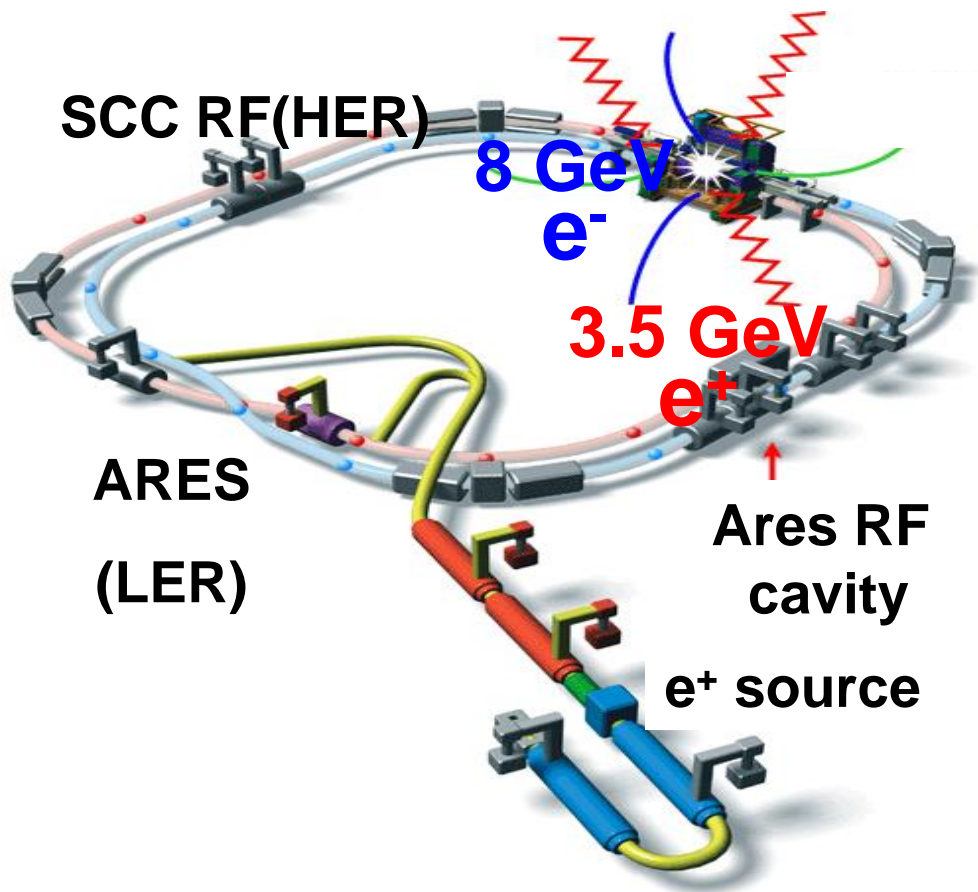




# KEKB $e^+ e^-$ Collider

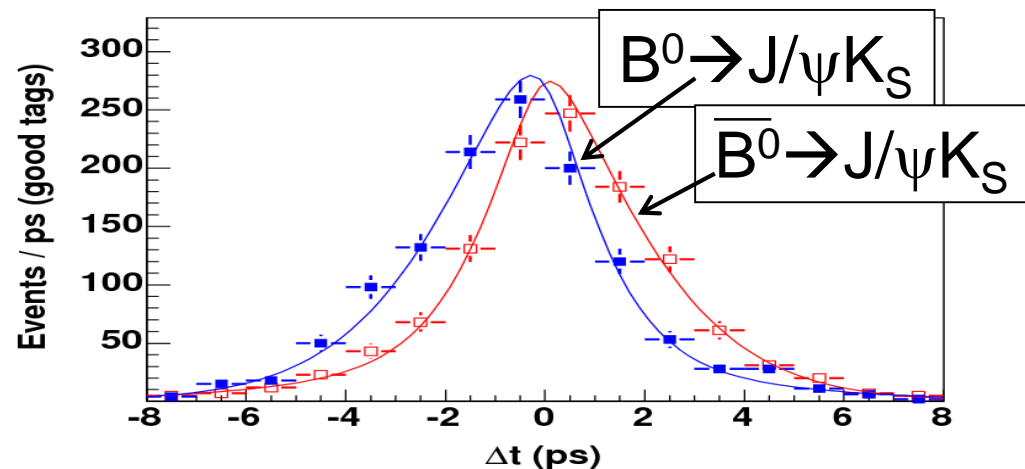
## Belle Experiment

13 countries, 57 institutes, ~400 collaborators



Observation of CPV  
in the  $B$  meson system

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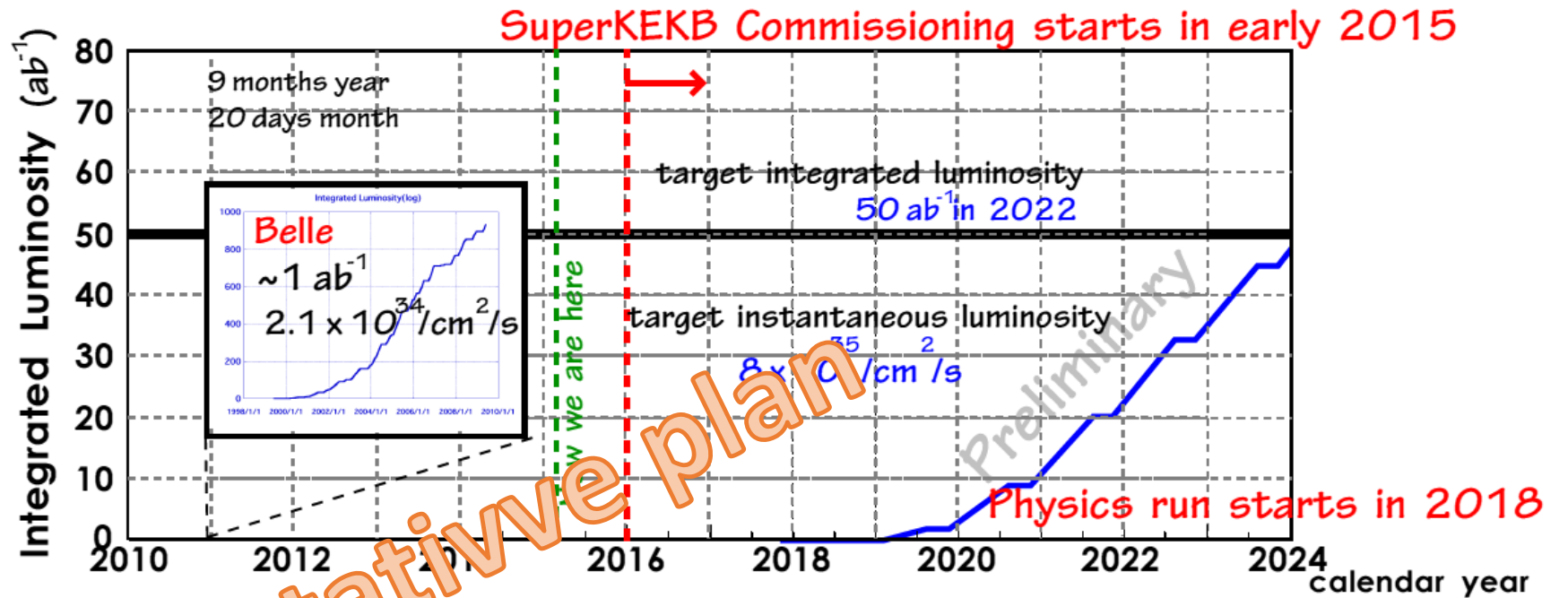


小林・益川ノーベル賞受賞





# Luminosity Prospect



Experiment	Event size [kB]	Rate @ Storage [event/sec]	Rate @ Storage [MB/sec]
Belle II	300	6,000	1,800 (@ max. luminosity)
ALICE (Pb-Pb)	50,000	100	4,000
ALICE (p-p)	2,000	100	200
ATLAS	$\sim 700$	600	400
CMS	$\sim 1,000$	500	several 100s
LHCb	55	4,500	250

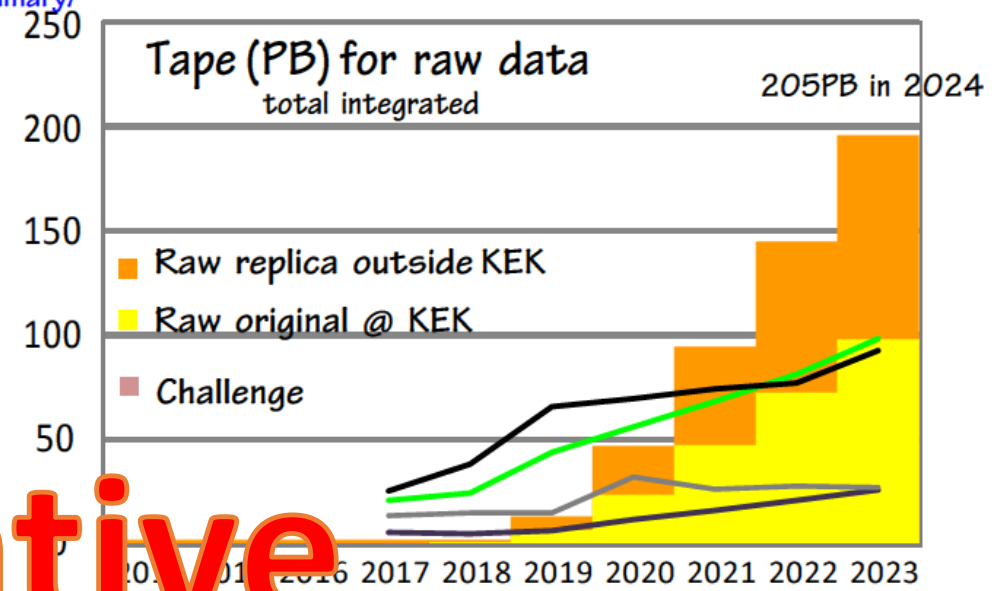
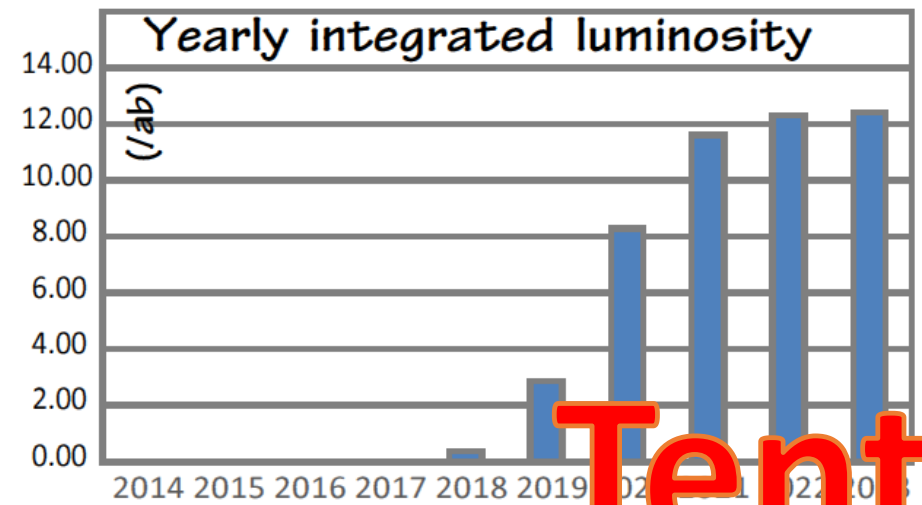
(LHC experiments : as seen in 2011/2012 runs)



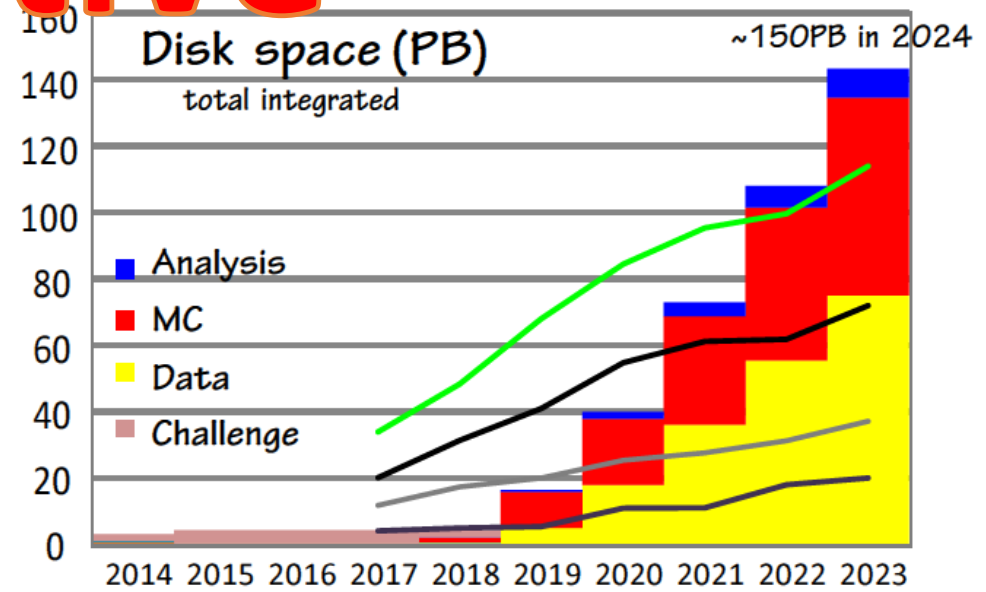
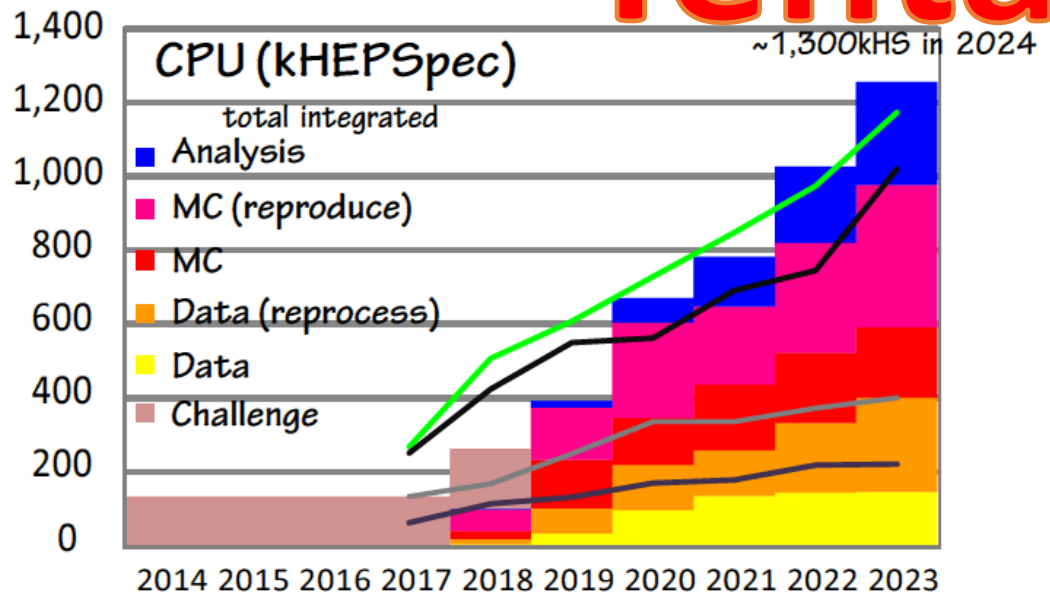
# Hardware Resources for Belle II

Pledge summary of LHC experiments : <http://wlcg-rebus.cern.ch/apps/pledges/summary/>

— ATLAS — CMS — ALICE — LHCb



**Tentative**





# Interoperability with DIRAC

KIT, CNAF, CESNET, SiGNET, HEPHY, UA-ISMA, ULAKBIM, CYFRONET, .....



GRID Middlewares



SiGNET (future)



Seen as a large site having multiple clusters

Krakow A part of DIRAC



- Provided as a DIRAC plugin
- Need additional installation
- Multiple cloud sites allowed
- Handle each cloud as a site
- No modification in cloud site

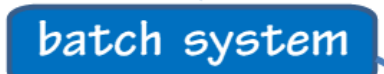
CREAM CE



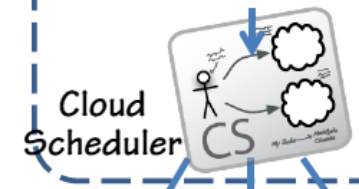
- Seen as a traditional CREAM CE site
- Installed in each cloud site

Melbourne

SSH tunnel or DIRAC SiteDirector



Direct submission GE, TORQUE, LSF, ...



BINP & NSU

- Provided by dedicated scheduler site
- Multiple cloud sites allowed
- No modification in cloud site

UVic, PNNL



# BelleII and SuperKEKB

- The accelerator system will be commissioned in 2015
  - Beam tuning will be started
- Physics run will begin in 2018
- KEK wants to join WLCG as an observer
- Huge amount of computing resources are required after JFY2021 and later

# ILC

- The candidate location has been decided by the international committee
- MEXT has a budget for exploring the possibility to host ILC in Japan
  - Detailed cost estimation should be done in 2015 JFY
- We surprised to see that no computing center costs was included in the initial proposal
  - We sent a person to the ILC team as a liaison from KEK-CRC

# Computer systems at KEK

- Super computer
  - Mostly for lattice QCD
  - Currently BlueGene-Q 1PFlops + Hitachi
  - The next replacement will in 2017
    - One year delayed because the influence of the earthquake and the tsunami
- Central computer system
  - BelleII, J-PARC and etc
  - The next replacement will in 2016
    - Originally scheduled in 2015, but postponed



# The purchase model for the ICT systems

- Japanese governmental agencies and universities never purchase hardware itself only but services for large systems
  - The period can be decided by the organizations
  - The vendor is chosen in bidding
    - Not only costs, but performance is taking into account
- The systems come with human resources for the required operation
  - Hardware are leased and maintenance costs are included
- In house man power is very poor
  - KEK CRC has only 25 persons including secretaries, engineers and researchers
    - Researchers have duties for computing center business instead of teaching in classes
    - Still researchers are encouraged to take grad-students

# Our concerns for future ICT infrastructure

- Energy efficiency
  - Electricity
- Virtualization
  - Private cloud
    - OpenStack or commercial solution ?
- Distributed computing
  - Grid and the next
- Network
- New building
  - Cooling and energy efficiency
  - We need more space!

# Research programs at KEK-CRC

- Geant4
  - GPGPU
- Automatic Feynman diagram calculations
- DAQ
- Distributed computing
- Green 500 challenge

# Summary and conclusions

- KEK has various accelerator systems for multi disciplinary sciences
  - More French participation are very welcome
- The schedule of the major projects are still far behind
- Renovation of ICT must keep continued
  - Energy efficiency is the key
- Good relationship between CC-IN2P3 and KEK should maintain in long toward the future projects
  - ILC, T2H and etc



# CHEP2015 at Okinawa

- Registration for the participation is still open
- More than 400 people registered already
- See you at Okinawa again, soon!