



Redundant IOC Introduction

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For KEKB and Linac Control Groups

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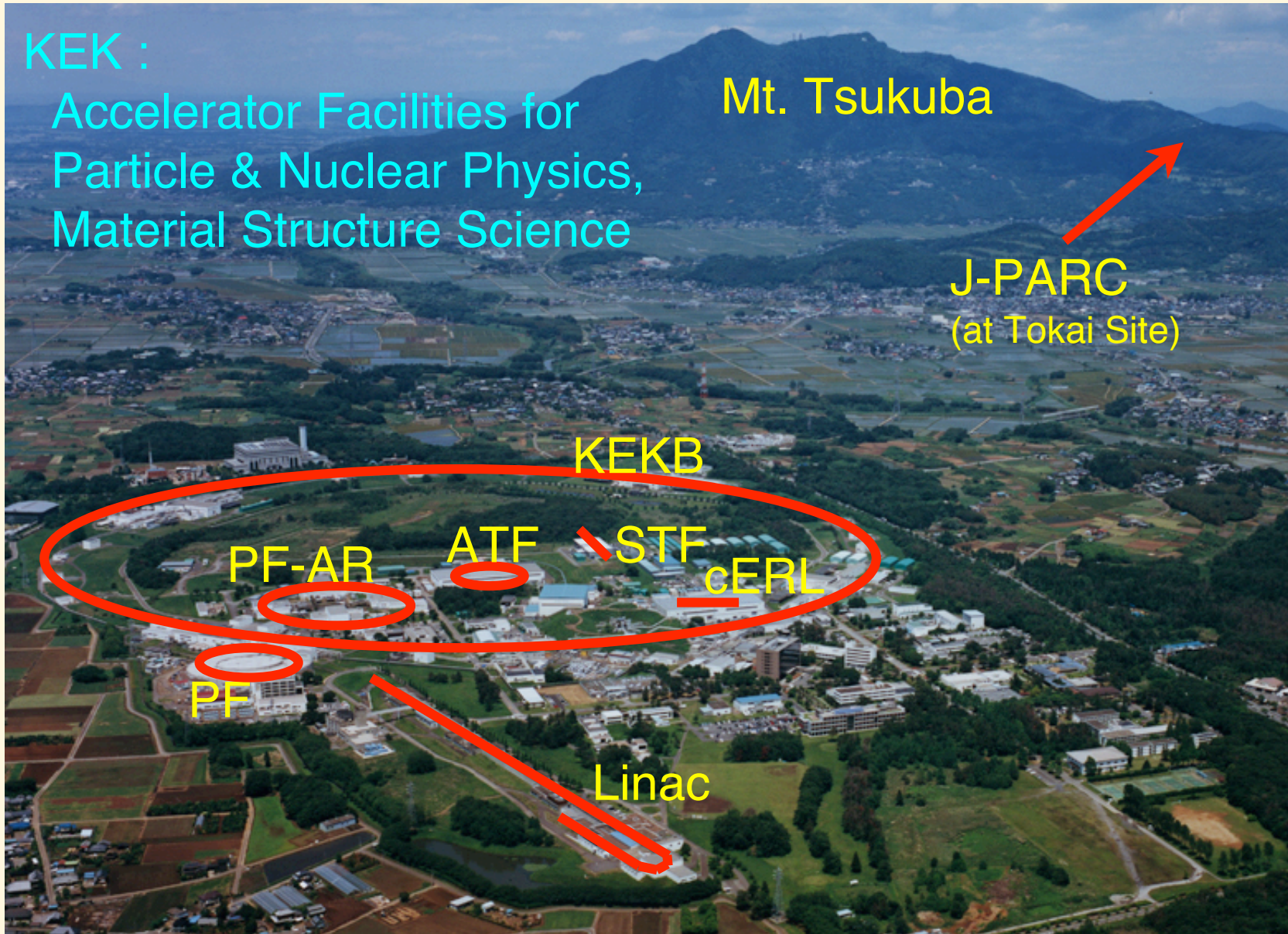


KEK :

Accelerator Facilities for
Particle & Nuclear Physics,
Material Structure Science

Mt. Tsukuba

J-PARC
(at Tokai Site)





Simultaneous Injection Requirements

◆ Linac clients

❖ KEKB

8-GeV e^- 1nC x2

3.5-GeV e^+ 1nC x2

(with 10nC primary e^-)

❖ PF 2.5-GeV e^- 0.1nC

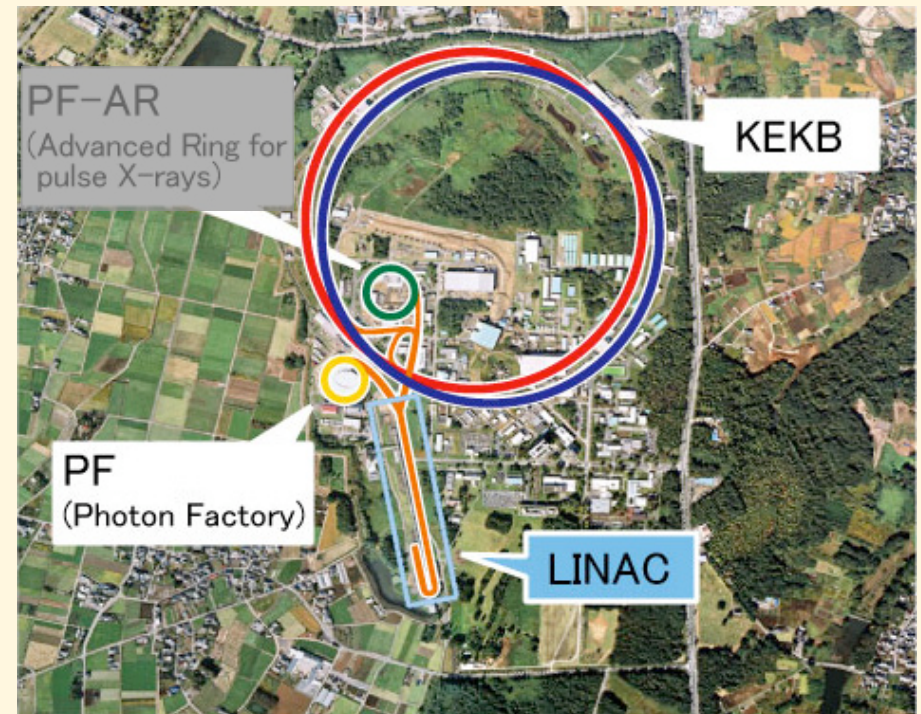
❖ (PF-AR 3-GeV e^- 0.2nC)

◆ At first simultaneous

top-up injections to three rings at KEKB and PF

❖ Switching beams at 50Hz

❖ For stable operation and higher quality exp. results





Redundancy of Servers at KEK

◆ Redundant Unix Servers at KEK (Linac, KEKB)

- ❖ Was good for File server, Name server, Boot server, etc
- ❖ Was very useful for availability even at maintenance time

◆ Old Injector Linac Controls

- ❖ Needed a gateway (Portable CA Server and Soft IOC)
 - ✧ From old controls to EPICS controls, and vice versa
- ❖ could be a single point of failure

◆ Started an investigation of Linux HA servers

- ❖ Several products including Redhat Advanced server
- ❖ Not good compared with vendor Unix
- ❖ And, of course, no EPICS features
 - ✧ Without internal data replication
 - ✧ No EPICS beacon handling, etc



Redundancy of Controllers at DESY

- ◆ **Cryogenic controls should run all the time**
 - ❖ **Continuously about 2years without interruption**
 - ❖ **Otherwise, it may cause quench**
 - ✧ **That may need long recovery time**
- ◆ **The system for the HERA project was built without EPICS**
- ◆ **The new generation had to be designed for the XFEL project**
- ◆ **Mathias Clausen had a chance to stay at KEK in 2004**
 - ❖ **Discussion of merging the effort of DESY/XFEL and KEK/Linac**

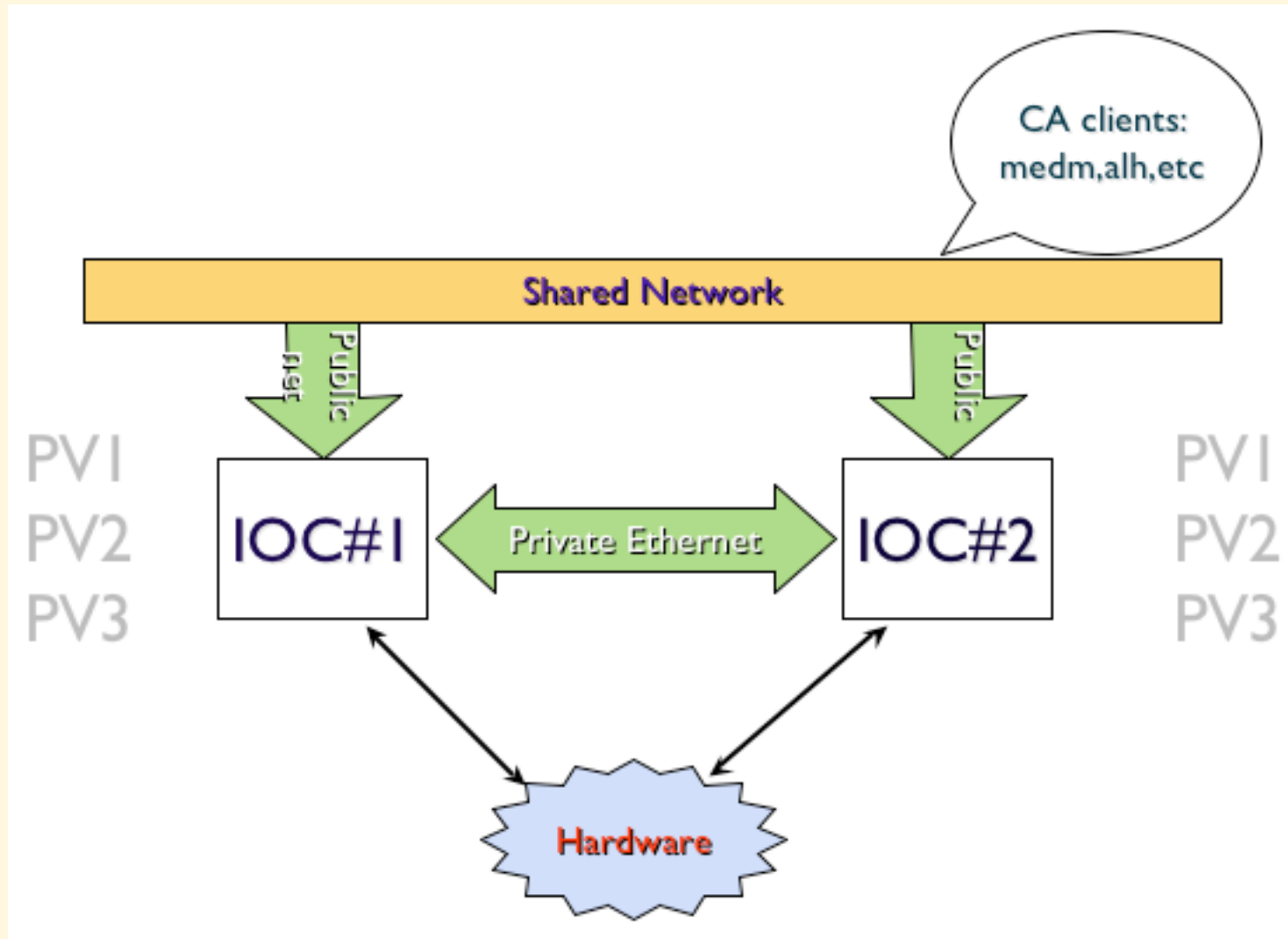


Restart of the Collaboration

- ◆ **DESY continues the project**
 - ❖ **Several companies were asked to design the framework**
- ◆ **I could not allocate resources at KEK until 2006**
- ◆ **In 2006, I proposed Artem Kazakov to attend the development**
 - ❖ **He mainly attend the project in generalizing the code from VxWorks environment to other platforms**
 - ❖ **Using the OSI layer**



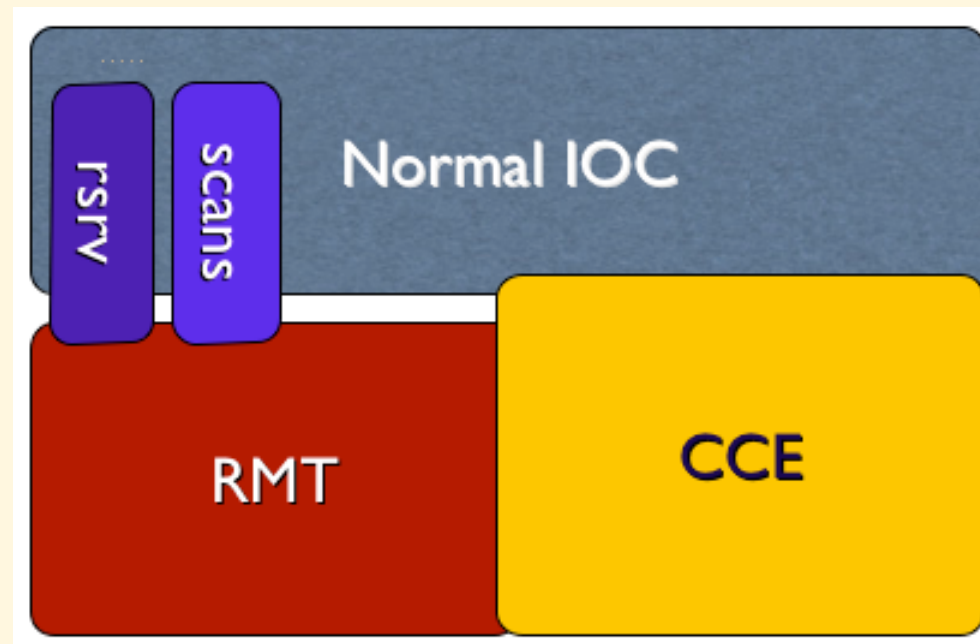
Redundant IOC





Some Internal Components

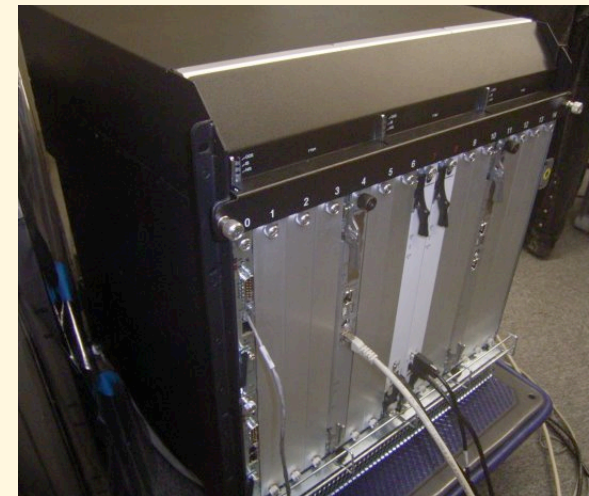
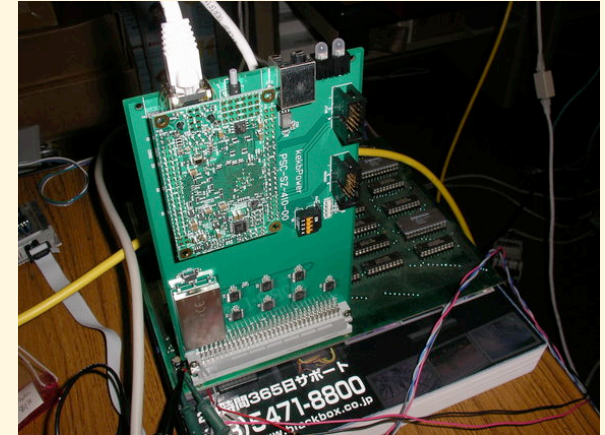
- ◆ **RMT: Redundancy Monitoring Task**
 - ❖ Provides API to drive CCE, Scan, CA-rsrv, etc
- ◆ **CCE: Continuous Control Executive**
 - ❖ Mirror the variables, states, etc





Other EPICS Development Activities at KEK

- ◆ **By A. Akiyama, et al**
 - ❖ Embedded IOC on FPGA-based controller
- ◆ **By M. Satoh, et al**
 - ❖ Embedded IOC on oscilloscopes
- ◆ **By A. Kazakov, et al**
 - ❖ Redundant IOC (RIOC with OSI supports)
 - ❖ Redundant caGateway
 - ❖ ATCA IOC with HPI/SAF support for RIOC
 - ✧ ATCA for STF/ILC-LLRF and μ TCA for ERL-LLRF
 - ❖ Automatic test system environment
- ◆ **By K. Zagar, et al**
 - ❖ Wireshark protocol analyzer for CA
- ◆ **By K. Furukawa, et al**
 - ❖ Event-based fast control system





Thank you