A PC/Linux-based Control System with EPICS for RFGTB

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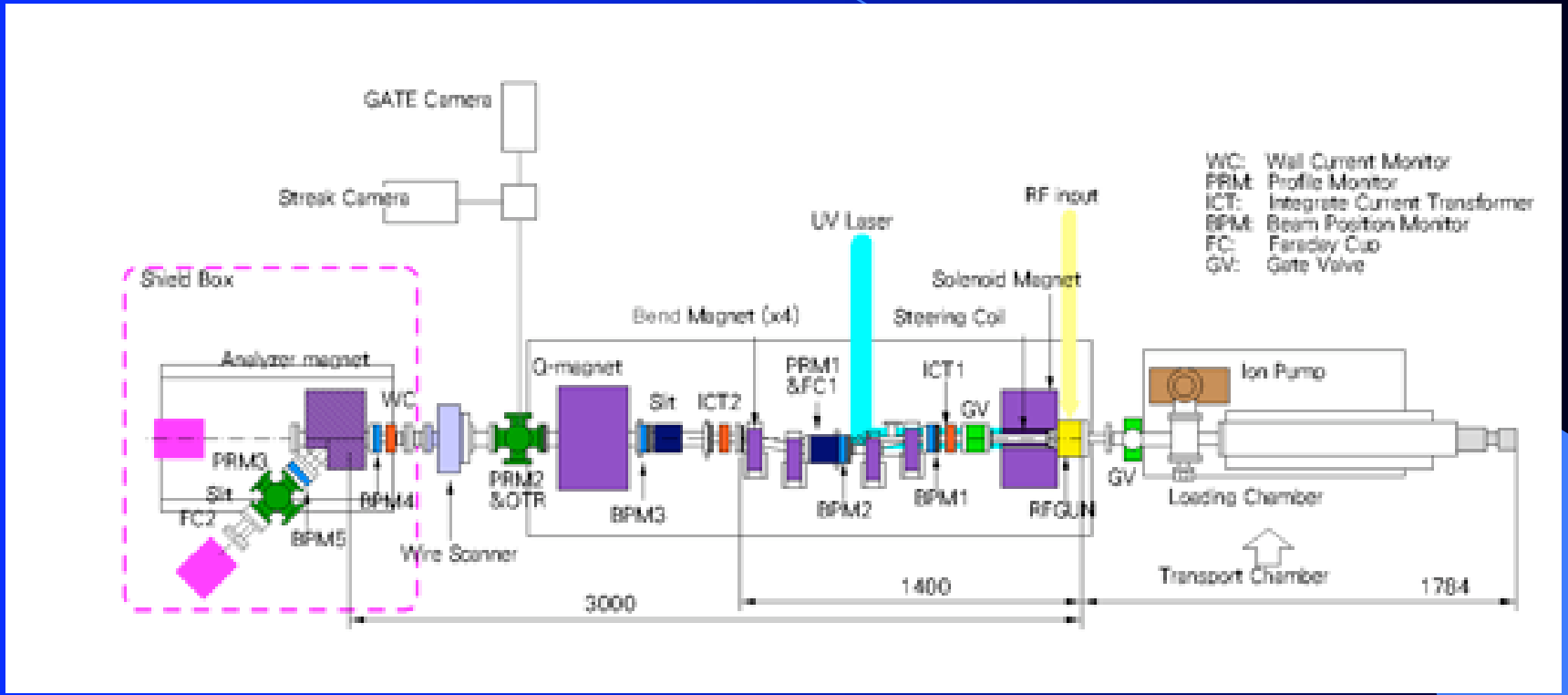
RF-Gun Test Bench (RFGTB)

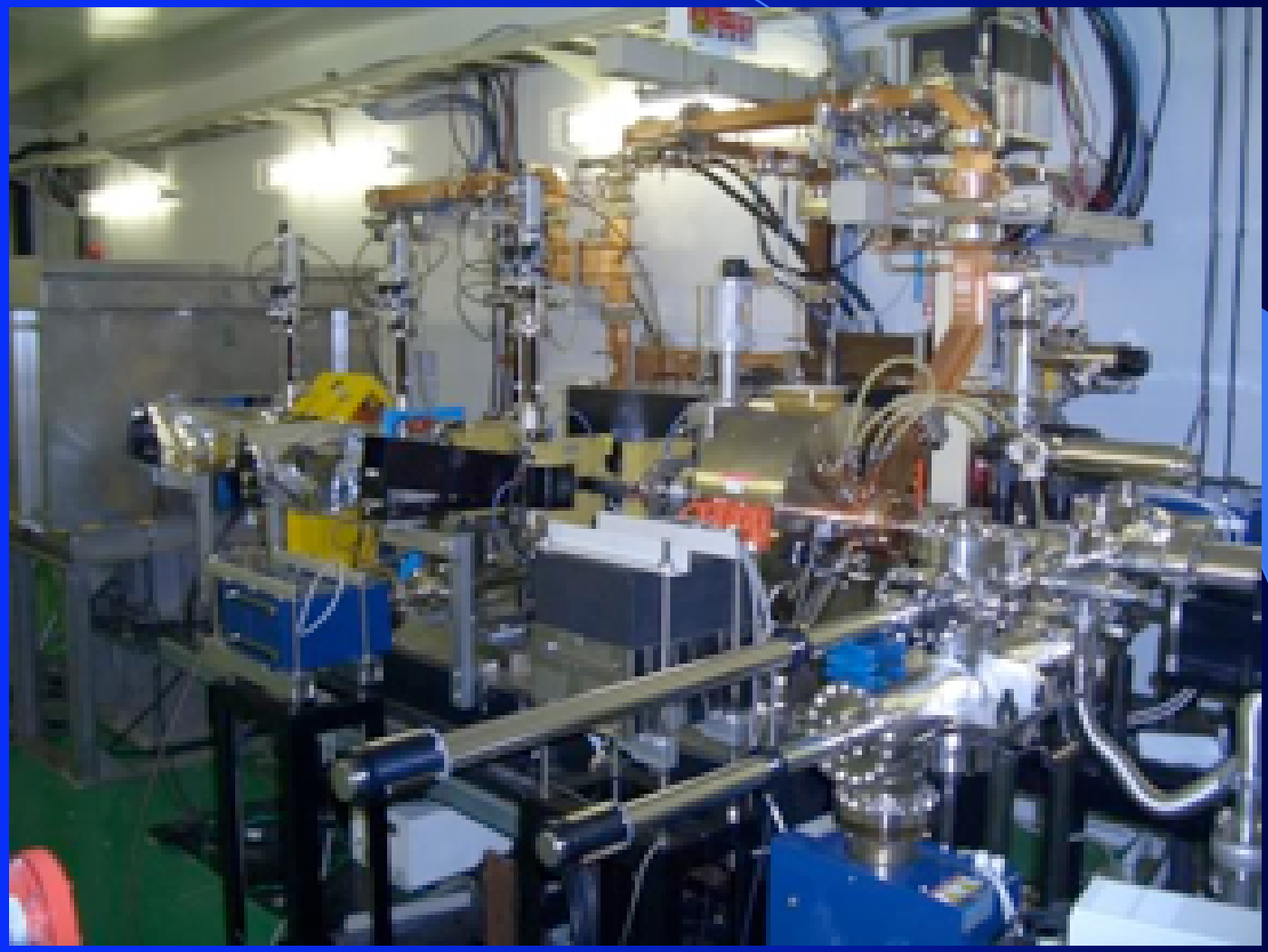
- The aim of RFGTB is to develop a n RF-Gun that produces a high flux x-ray by compton scattering of Laser light
- Joint project by National Institute of Radiological Science (NIRS) and KEK
- Multi-bunch photo-cathode RF-Gun
- Constructed in Assembly Hall at KEK

RF-Gun Test Bench (RFGTB)

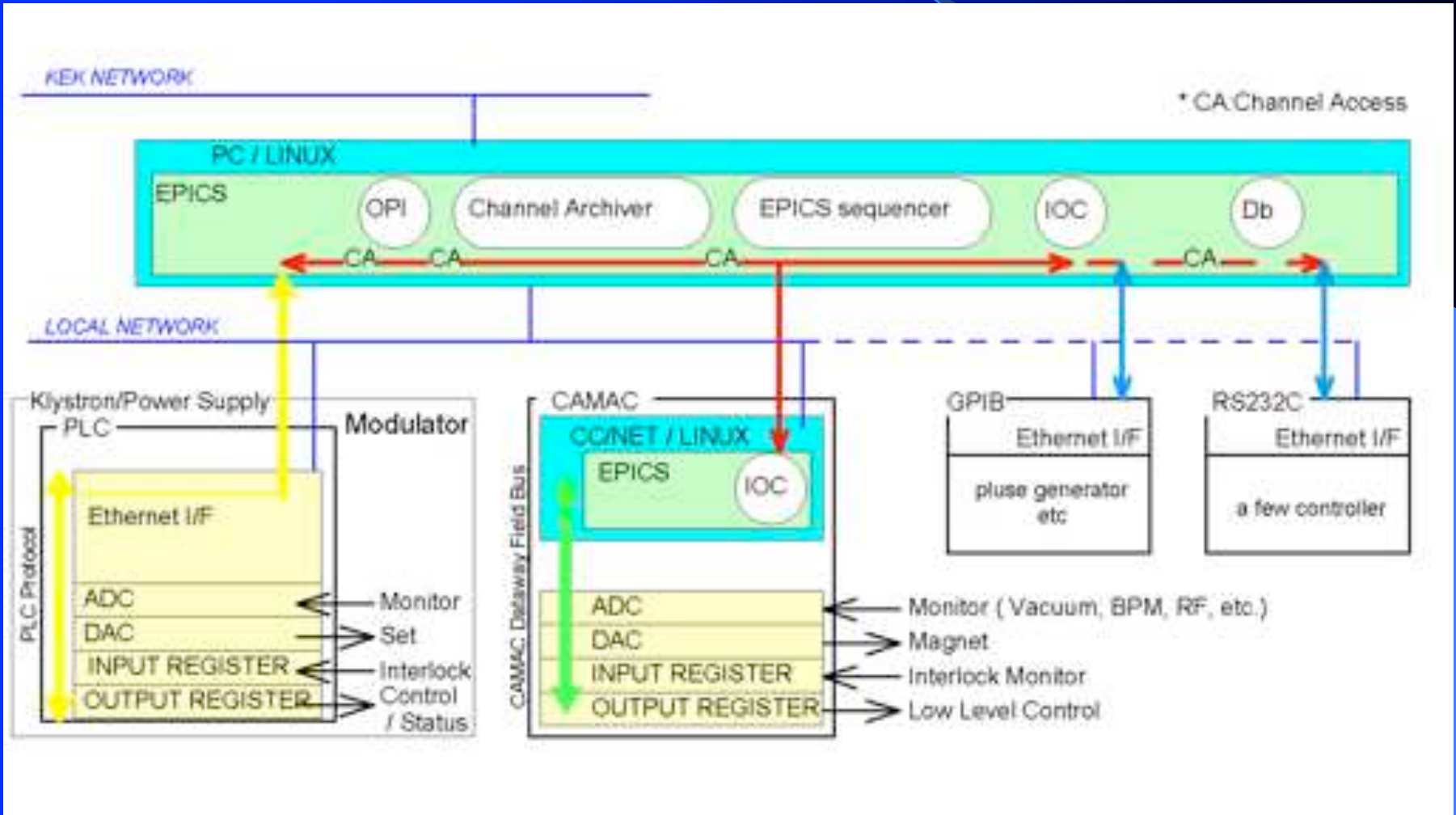


- Beam energy (max) : 7 MeV
- Beam charge (max) : 5 nC/bunch
- Number of benches (max) : 100 /pulse
- RF frequency : 2856 MHz
- Laser wavelength : 266 nm
- Solenoid magnetic field (max) : 3.2 kGauss

RF-Gun in RFGTB



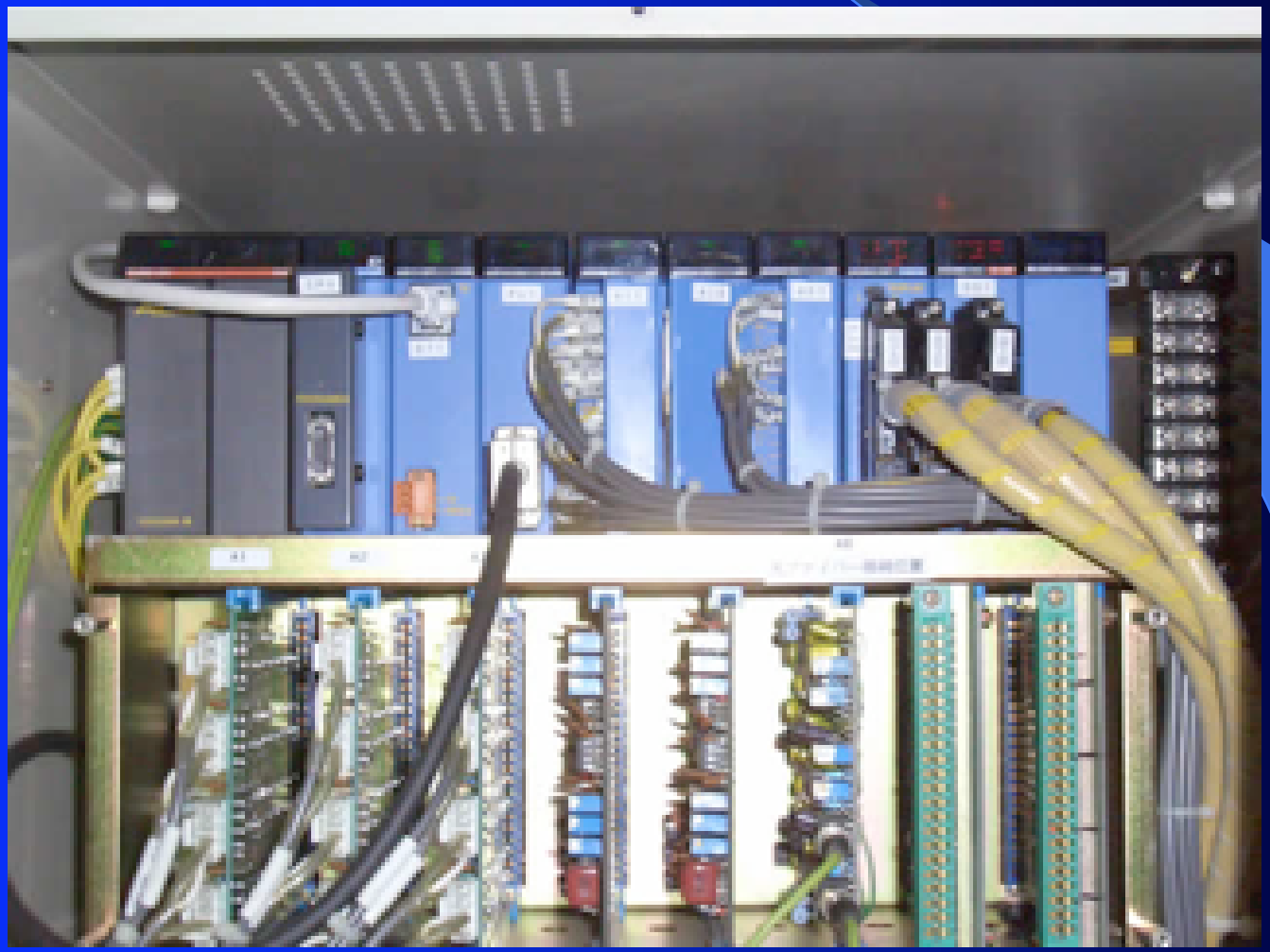
Schematic Diagram of the Control System



PC/Linux running IOC core and OPI tools

Control Room of RFGTB

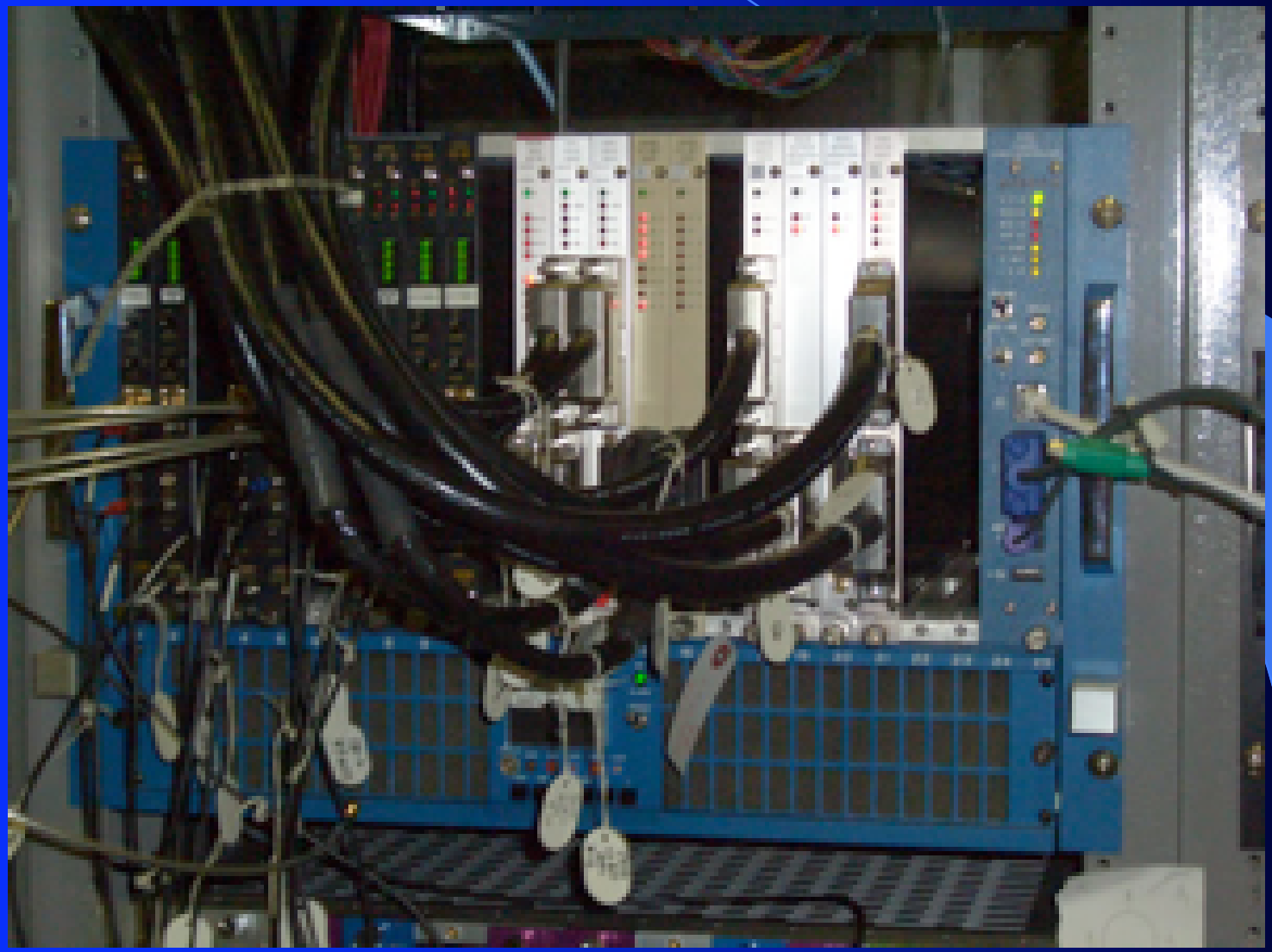
FA-M3 connected to the PC/Linux IOC



CC/NET

- Pipeline operation of CAMAC cycle
  - Designed for DAQ application
  - Very high transfer rate (up to 3 MB/sec)
- PC/104-Plus SBC embedded
  - Linux (kernel 2.4)
  - Comes with Kernel level driver & user level library
- Can work as an IOC

CC/NET in operation as an IOC

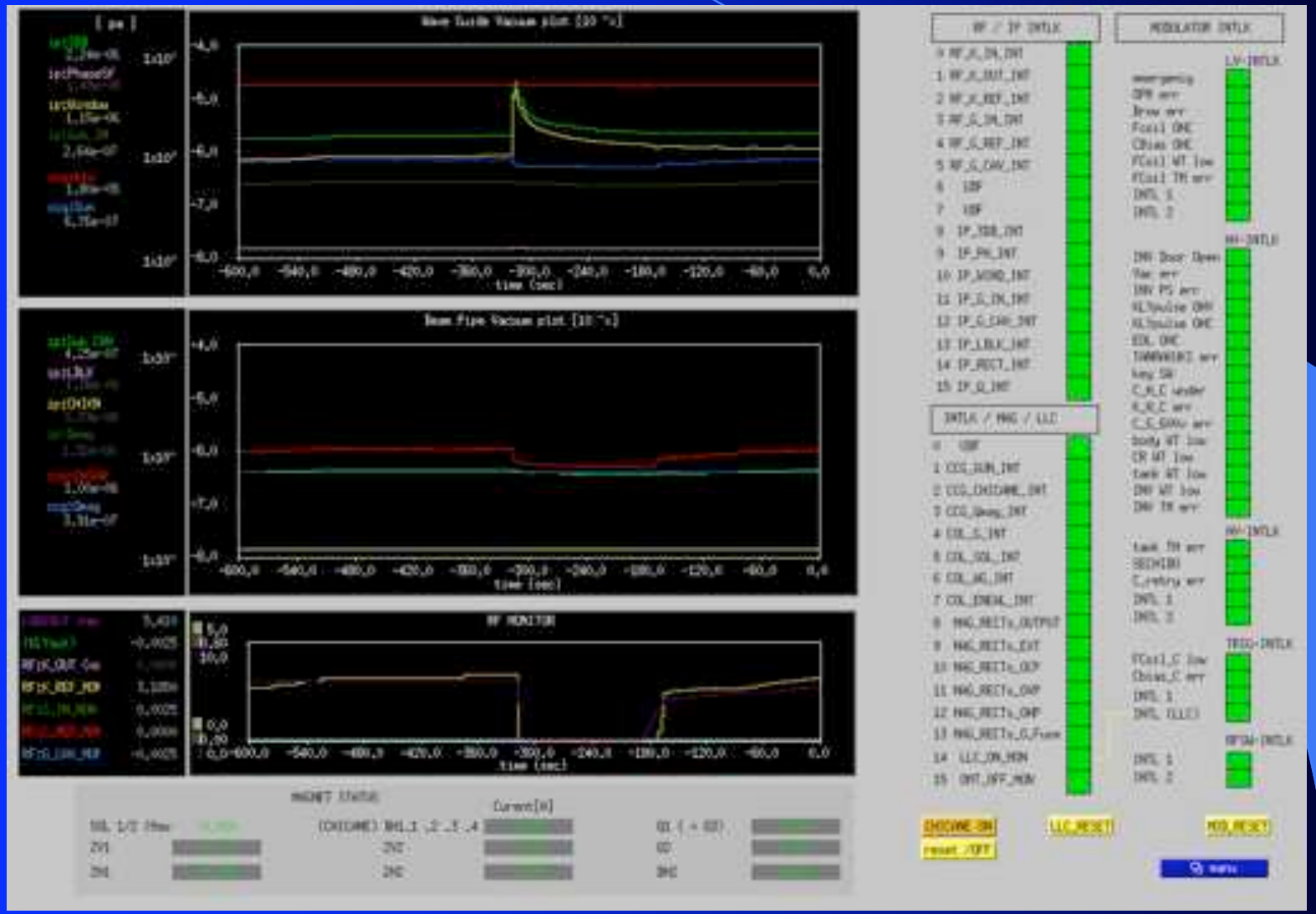


Sequencer Logic for RF-conditioning

- Main purpose:
  - automatic control of the aging procedure
- We developed:
  - sequencer programs using SNL
  - control panel using MEDM

Control Panel (MEDM)

Status Panel (MEDM)



Pros and Cons (Pros)

- PC/Linux-based system with EPICS gives us:
  - Cost-effective solution on both HW and SW
  - Easy way to integrate control subsystems on CA over the Ethernet connection
  - Rapid debugging cycle, since booting up an IOC-program is just a snap
  - Lots of templates of application software from existing other large-scaled accelerator control systems

Pros and Cons (Cons)

- EPICS takes up some time from new comers:
  - To get familiar with the environment for IOC application development
  - To install OPI tools, since it requires some skills on Unix, and can be a hustle in some cases
  - To choose appropriate tools from many options
- A packaged distribution with minimum tool kits for beginners will be highly appreciated by new comers

Conclusions

- We have built a fully-PC/Linux-based control system with EPICS for RFGTB operation
- Conditioning of the RF-Gun is being carried out with the control system successfully
- The system uses most of the essential tools of EPICS, such as IOCs, a display tool, and a channel archiving tool
- Something in order to ease new comers into EPICS is required

Thanks for your attention!

ARAKI, Sakae