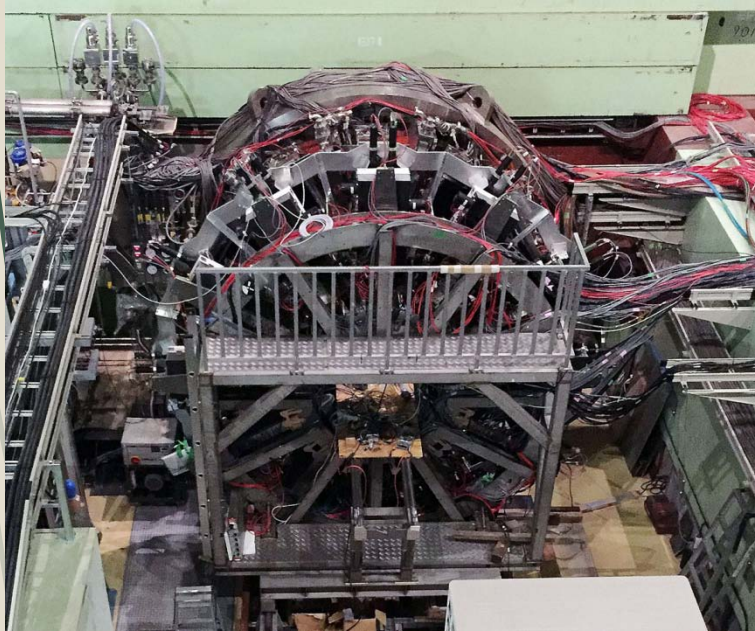# Data Acquisition System for J-PARC E36 Experiment

Y. Igarashi, H. Lu, and R. Tanuma

- J-PARC E36 experiment is a test of LFU using

$$R_K = \Gamma(K^+ \rightarrow e^+\nu) \, / \, \Gamma(K^+ \rightarrow \mu^+\nu) \, .$$

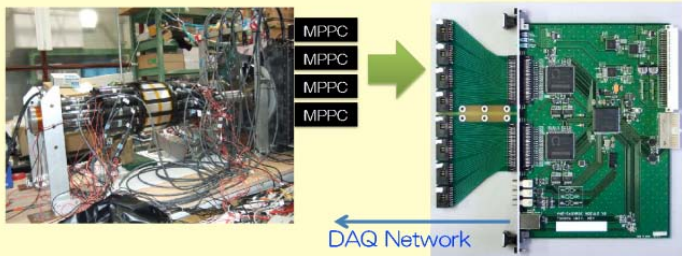- The aim of the measurement :

$$\Delta R_K / R_K \sim 0.0025$$

- The experiment was performed at J-PARC Hadron Hall.

- The experiment completed data taking in December 2015.

We developed a DAQ system for the experiment.

System integration
for multi-generational readout devices
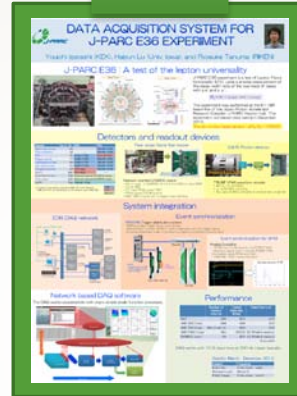
Special readout device

Fiber target/Spiral fiber tracker

MPPC
MPPC
MPPC
MPPC

DAQ Network

Network oriented EASIROC board
- 64-ch input : 2 EASIROC (A front-end ASIC to read SiPM)
- 10-bit ADC
- 0.7-nsec FPGA based TDC
- FPGA based TCP/IP engine
- KEK-VME module with a trigger/busy interface

Event synchronization

Event synchronization

MTM/RM Trigger distribution system
- MTM handles Trigger/Busy hand-shake.
- Global event number (EVENT TAG) is delivered with the trigger signal.
- It works effectively under multi event buffered sub-systems environment.

Repeater

MTM
- Unique event number
- Unique trigger source
- Busy handling

FADC

KEK-VME/VME RM

TKO RM
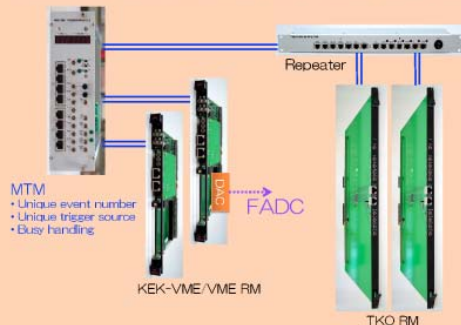
Event synchronization for VF48

Analog Encoding
- VF48 has no interface for the EVENT TAG
- Making a signal which includes EVENT TAG information using FPGA and DAC
- VME-RM + DAC mezzanine card

Trigger

Signal which has TAG number information

Sampled data by VF48

Poster

We had to use traditional devices and modern devices.

How did we integrate the historical readout devices and the modern readout devices?
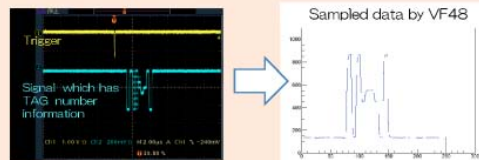
Integration by the common network

The DAQ works cooperatively with many simple single function processes.

Controller

Message Daemon (msgd, cmsgd)

Front-end

Event Builder

Event Distributor

Recorder

Online Display

Message flow

Data flow