Performance evaluation of new parallel VME readout system for unstable nuclear physics

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Outline

• **MPV** (MOCO with parallelized VME)

• Purpose

• Experiment

• Result

• Summary
Collaborators

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MPV (MOCO with parallelized VME)

MPV is a readout system that shortened dead time by reading VME module in parallel.

Dead time is about 15 us.

Max 400Mbps

Max 160Mbps
New readout system for VME

• Conventional system:
  CAMAC (computer automated measurement and control) → dead time is about **150 us**

• New system:
  MPV (MOCO with parallelized VME) → dead time is about **15 us**

By using VME-MPV+MOCO system, the efficiency of DAQ system has been improved to be about **10 times**.

Purpose

Data accuracy is more than 99.99% (counting loss << 0.01%) for MPV system in accelerator experiments
Facility

Fig. 2: HIMAC accelerator and SB2 beam line

S. Yamaki et al., NIMB 317, 774 (2013).
Modules of CAMAC and VME

VME
- TDC(CAEN V1290)
- QDC(Mesytec MQDC32)
- ADC(Mesytec MADC32)

CAMAC
- TDC(REPIC RPC180)
- QDC(TEchnoland CQV715)
- ADC(TEchnoland CTM405)

redundantly acquired

We compared ADC of these.

Fig.3: Photograph of Mesytec MADC32
Results

- Experimental conditions
  - Primary beam: $^{136}$Xe, 400 MeV/u
  - Production target: none
  - Beam intensity: 1 kppp
  - Duration: 500 ms
  - Beam interval: 3.3 s

- Missed data counts
  - Missed data of CAMAC = 58 counts
  - Missed data of MPV = 23 counts

Fig. 4: CAMAC vs MPV
Results

• MPV accuracy is

\[ \frac{673464 - 673441}{673464} = 0.99997 \]

(counting loss is 0.003%)

• CAMAC accuracy is

\[ \frac{673464 - 673406}{673464} = 0.99991 \]

(counting loss is 0.009%)
Results

• The fluctuation of difference between MPV and CAMAC is $1.3\text{ch (1.3mV)}$.

Data accuracy is reasonable.
Prospects for the future

• We will compare MPV with CAMAC as the accuracy test in experimental values with QDCs and TDCs.

• Measurement of cross section using MPV.
Summary

• By using VME-MPV+MOCO system, the efficiency of DAQ system has been improved to be about 10 times.

• We compared MPV with CAMAC as the accuracy test in experimental value.

• MPV accuracy achieves 99.996% in experimental values with MADC.

• The fluctuation of difference between MPV and CAMAC is 1.29ch (1.2 mV)