# A novel VME based $\mu$SR data acquisition system at PSI

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A new data acquisition system (DAQ) for bulk $\mu$SR and low-energy $\mu$SR (LE-$\mu$SR) has been developed at PSI. It is based on commercial and in-house VME modules, and the Midas DAQ software library[1]. The system is able to cope with the different needs of the various PSI $\mu$SR spectrometers, which was not possible with the existing CAMAC and pTA-clock based DAQ systems.

The VME clock is a 64-channel CAEN V1190 TDC, using the CERN HPTDC chip, with programmable time resolution from 25 to 800 ps. During data acquisition the TDC onboard memory is continuously read through the VME bus by standard PC's or dedicated servers, using a 1-Gbit SIS3100/1100 VME-PCI interface. Detector rates are independently monitored using a 32-channel SIS3820 scaler module. In-house developed modules comprise an 8-channel constant fraction discriminator CFD950, a CD950 clock divider, an 8-channel linear fan-out SP950, and a 16-channel NIM-ECL level converter LC950. A programmable coincidence module is under construction. All modules feature a superior performance compared to commercially available devices which allows their use also in the planned high-field $\mu$SR spectrometer where a time resolution of about 100 ps is envisaged.

All event logic is now implemented in a Midas frontend code. A special external hardware logic is no longer required, since the system can deal with a rate total of 5 MHz which is sufficient for $\mu$SR spectrometers with high event rate in their active veto-systems. Midas slow control frontends and special device drivers enable the complete remote control of all important experiment parameters. Autorun sequences allow the automatic control of the experiment. A new autorun concept for the LE-$\mu$SR experiment with XML schema validation offers more safety and flexibility for the needs of the more complex LE-$\mu$SR apparatus.

[1] Midas: *Maximum integrated data acquisition system*, developed by S. Ritt (PSI) and members of the TRIUMF Data Acquisition Group, see also http://midas.psi.ch or http://midas.triumf.ca.