System Development for COSY Experiments

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The data acquisition system EMS which was installed at TOF last year was modified to use the newly available VME/PCI interface developed by the ZEL in a cooperation with "Struck Innovative Systeme", Hamburg. The integration of the coupling contained extensive software work, in particular the development of a generic Linux/BSD driver. Thus the average dead time could be reduced from about 600μs to 200μs. The stability of the system was impressively proven in a 6-week beam time.

The new experiment PISA was equipped with EMS, too. This required software adjustments for new VME modules. Also ANKE data acquisition was substantially optimized by software modification.

The introduction of emerging data processing technologies will lead to a further increase of the productivity of the COSY experiments (increase of the eventrate with simultaneous increase of the data volume). A substantial reduction of the dead time per event (so far 50..100μs; goal: $< 20\mu s$) is not possible by incremental optimization of the existing system. Therefore a new "third generation" (3G) DAQ system was designed to improve the efficient integration of different detectors (straw chambers, MWPC, silicon strips) on a uniform basis, and allows the storage and preprocessing (selection) of the data in front-end without the use of software. This year we started the development of individual components in particular of freely programmable hardware and advanced communication technologies.

Also for slow control applications an important technological progress could be achieved by the consequent use of industrial control technology, leading to cost efficient solutions with improved robustness, standardisation, scalability and long term availability. Here the work concentrated on the control system for the ABS (atomic beam source), a polarized gas target for ANKE. The ABS control system was extended by a further functional unit, the RF transitions. For the RF transitions an additional PLC, controlling several power supplies and function generators, was introduced. The control system for the Lambshift polarimeter, a complex diagnostic for the ABS measuring the degree of polarization, was designed and the necessary hardware was assembled and installed.

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