WaveDAQ – The new data acquisition standard system at PSI

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MITP Seminar Room, Staudingerweg 9

Building 2413, Room 02.430 (2nd floor – West)

Driven by the MEG experiment searching for the forbidden decay $\mu \to e\gamma$, a new data acquisition system (DAQ) has been developed at PSI, Switzerland. It is based on the DRS4 switched waveform capacitor array capable of digitising signals with up to 5 GSPS and 12 bits of resolution. The WaveDREAM board contains two such chips to offer 16 input channels on an Euro card form factor. Variable amplification stages with integrated shaping offer gains between 0 and 40 db. In addition to the fast waveform digitising, the WaveDREAM board has 14 bit 80 MSPS ADCs running continuously for triggering. An integrated high voltage supply allows the efficient biasing of silicon photomultipliers (SiPM). The boards are hosted in a custom 3HE crate with integrated data concentrator, trigger concentrator and shelf manager. A dual star topology of gigabit links on the backplane allows for efficient triggering and data collection. The WaveDAQ system is used in several systems at PSI and beyond. The full MEG system will contain more than 9000 channels which allow for global triggering and global time measurements in the range of 10 pico seconds.

The seminar will show the design concepts, hurdles and successes of building your own DAQ and crate system from scratch. This will cover the electronics design, firmware concepts, software, and system aspects of this new system, and how to use it successfully in other experiments.

Stefan Ritt studied Physics at the University of Karlsruhe and achieved the PhD in 1993. From 1993 to 2000, he worked as Research Associate and Scientist at the University of Virginia. Since 2000, he is Research Scientist at the Paul-Scherrer-Institute (PSI) where he has worked in leading positions for the MEG, MEG II and Mu3e experiments. He developed and implemented DAQ hardware solutions and software packages, including the DRS fast waveform digitizing chip and ELOG. Since 2010, he is head of the Muon Physics group at PSI and co-spokesperson of Mu3e.

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