

Minutes of the STT Readout Meeting (ezuze) on May-15th, 2017

Participants: Lars Schmitt, Tassos Belias, Holger Flemming, Piotr Salabura, Jerzy Smyrski, Greg Korcyl, Marcin Kajetanowicz, Marek Idzik, Krzysztof Pysz, Paola Gianotti, Mario Bragadireanu, Johan Messchendorp, Alex Apostolou, Solmaz Vejdani, Jim Ritman, Peter Wintz, Michael Kunkel, Andreas Erven, Ljuba Jokhovets

Meeting web page with program and presentation slides: <https://indico.gsi.de/conferenceDisplay.py?confId=5970>

At first Holger Flemming was welcomed for joining the group for the readout decision process. Michael Kunkel was welcomed as a new STT group member, he is Postdoc in Jülich with further activities in the CLAS experiment at Jefferson Lab. We congratulate Pawel Strzempek who finished his Ph.D. with a successful defense at the Jagiellonian University Krakow last week.

First topic was the approval of the minutes of the last readout meeting (held in Krakow). Next the decision process organization was re-presented, discussed and approved. A so-called “Decision Panel” is now formally established by this meeting to control the readout decision process. The panel consists of one person per involved STT group and further experts. Members are: Lars, Tassos, Holger, Peter, Piotr, Paola, Marek, Jim, Krzysztof, Mario, Johan and Ljuba. Paola remarked the special INFN situation concerning PANDA, but it was appreciated that she offered her willingness to join the panel and brings in her STT expertise.

The timelines towards the decision were discussed. Lars pointed out a decision within Q2/2018 seems tight and might be rather Q3 to have sufficient time for the beamtest data analysis. Beamtime still has to be requested (this week) and approved by the COSY CBAC meeting (in June). We plan with a first beam test in March 2018, since readout HW (ADC) is available earliest for Q4 this year. Extended cosmic tests are planned prior to the beam time. Similar to 2016 we will ask for proton and deuteron beams (1+1 week) at COSY to cover a high signal dynamical range of dE/dx from ~5-50 keV/cm.

Next the organization of the work packages with contact persons was presented and approved. In general the manpower situation is critical and will remain critical. Therefore the decision process must focus on the main important issues. Synergies will be exploited, for instance by merging the data analysis for both readouts, i.e. same/similar ROOT-based event data structure, SW program, calibration & tracking algorithms. The latter also helps for a direct comparison of both systems.

DAQ rates for the tests were discussed. Limiting factor are straw space charge effects leading to signal distortions which start at single channel beam intensities of $\sim 1.5 \times 10^4 \text{ cm}^{-2} \text{ s}^{-1}$. This intensity limit yields about 20 MB/s data rate per single readout board (100 straws in 3cm beam spot, 5 byte data word size). Higher DAQ rates on the order of ~100 MB/s are possible for short time periods and accepting some distortions. The rates meet the expected rates in phase-1 for the STT with about 20-50 MB/s per single readout board. At PANDA full luminosity ($2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$) the DAQ rates expected from event simulations are about a factor 20 higher.

The decision dedicated test systems and measurements were discussed and approved. Details of all technical specifications, requirements and tests will be set up as an official document and further iterated within the panel and during the next meeting.

Specific ASIC/TRB readout remarks:

Greg Korcyl pointed out that SODANet will be implemented in the next planned bigger TRB3 system setup for the time synchronization of multiple readout boards. Such systems are already running in Krakow, hardware is available and needs only FPGA re-programming.

Peter reported about the submitted next ASIC production and planned new PCB layout and order for the front-end boards. The ASIC design will be unchanged (=PASTTRECv1), no needs for any design change from the 2016 beam test results. Part of the orders will be used for the phase-0 straw setups at HADES.

Specific ADC-based readout remarks:

The timelines for the HW (ADC signal processing unit) production were presented by Andreas. Aim is to have the readout system available in October, but a 3-month redesign timeslot is added for safety. A discussion about the ADC processing (full waveform sampling) and additional output data started. It will be rediscussed at the next meeting.

The ADC crate layout has implemented time synchronization for each board. SODANet will be not used for the beam test, but has to be considered in the layout scheme of the final system. Holger pointed to the general high jitter susceptibility of ADCs which might be an issue for the later PANDA-DAQ/SODANet system implementation.