

Minutes of the STT Readout Meeting (ezeuce) on October 25th, 2017

Participants: Alexandros Apostolou, Tassos Belias, Andreas Erven, Holger Fleming, Paola Gianotti, Ljuba Jokhovets, Marcin Kajetanowicz, Greg Koreyl, Piotr Salabura, Solmaz Vejdani, Peter Wintz.

Meeting web page with program and presentation slides: <https://indico.gsi.de/conferenceDisplay.py?confId=6543>

The meeting started with general information. The minutes of the last STT RO meeting (July 11th) were approved. The upcoming, allocated beam time at COSY takes place in March 2018 (12th – 25th), one week proton followed by one week deuteron beam. Proposal for further beamtime (presumably) in Q4/2018 has to be decided within the group till next spring. Peter reported on general issues for the STT readout tasks which are discussed within the PANDA computing and simulation groups, concerning STT internal hit timing and multi-hit capability (e.g. in case of curling tracks).

Greg presented the ASIC/TRB readout system status and discussed a HW scheme for the hit burst building network which adds one Zynq switch (ZCU102 platform) after the TRBs for the high level hit processing. This low-cost HW is commercially available. A processing scheme for a track candidate hits association based on 250ns wide timebins within one Superburst time window (32 μ s/128) was proposed. A proof-of-concept system has been set up for the J-PET project at JU in Krakow and is in operation (20 μ s time window here). It was discussed and supported that such a HW scheme for the burst building stage with link to the compute nodes should be set up for the STT ASIC/TRB3 testsystem.

Andreas presented the status of the ADC-based readout system. Some delays towards the final HW production occurred, in particular the layout of the front module containing the ADCs and FPGA needed longer clarification times with the external provider. Finally the production is expected in December. Crate and rear transmission module should be available by December. The plan is to have all HW available in January for first operation tests at the ZEA-2. The set up of the readout at the test straw system should then happen in February.

Peter reported about the results of the 2016 beam test data analysis for the ASIC/TRB system. Finally a spatial resolution in the range from 130 to 142 μ m (mean isochrone residuals) was reached for the deuteron beams at different momenta and cosmic-ray data taking. A clear dE/dx separation by the time-over-threshold measurement could be demonstrated. The measurements cover a wide dE/dx range from about 5 keV/cm (cosmic, MIP) to 50 keV/cm (750 MeV/c deuteron), which also marks the signal dynamical range of the STT later at PANDA. With these results the PASTTRECv1 – ASIC design can be considered as finally verified. No further design iteration is foreseen.

Next he showed a method to extract the event time (t_0) from the STT TDC raw hits alone. The method uses both the leading and trailing edge signal times for a track candidate hit association. For the t_0 extraction a summation of the candidate hits is sufficient and no time-consuming trackfit is needed. For the deuteron beam datasets a t_0 resolution of about 6 ns was reached and 10ns for cosmic rays (larger polar track angles but only 2D-tracking done). Further studies of the method are ongoing.