

AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Preparation of Testbeam Equipment (in Krakow)

Jonathan Aguilar, Tomasz Fiutowski, Marek Idzik, Szymon Kulis, Krzysztof Świentek, Dominik Przyborowski

Faculty of Physics and Applied Computer Science AGH University of Science and Technology

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Agenda

- Testbeam PCB assembly status
- Test setup
- First results
- Deconvolution idea
- Summary



Board assembly status

- Biasing & power blocks \checkmark
- Output bufers (line drivers)
- 5 chips bonded
- Sensor & fanout glued
- 8 sensors pads bonded (not tested yet)



All essential components mounted

(first test show that they are working)



Setup configuration

- Sampling ADC
 - Up to 100Msps / 14bit
- Arbitrary waveform generator AFG3102



V1724



Simple DAQ software was prepared → allows to read out data from CAEN Sampling ADC v1724

- Sampling rate up to 100 Msps
- 14bit resolution
- Up to 2Msaples per channel
- Data transfers up to 3MB/s
 → should work with event rate up to ~ 1k event per second (not tested yet)
- Data are stored to files for further analyses
- Post processing scripts written in Python







- All 8 channels work
- Pulses shapes consistent with previous measurements and simulations
- "cross talks" < 5%

700

700

 Detailed noise parametrization needed



New approach to data taking & analyses





New approach to data taking & analyses

Oversampling is needed !



- **Pulse finding algorithms** have to be developed

 - Pulse fitting
 - Taking maximum \rightarrow requires high oversampling ratio
 - Deconvolution idea \rightarrow good performance, quiet simple
 - \rightarrow "complex" computation



Deconvolution idea



- Deconvolution algorithm can be realized as FIR filter (weighted sum of subsequent samples – for CR-RC only 3 smp!)
- Amplitude info is obtained from the sum of blue samples and timing info from their ratio (for both lookup tables needed)
- Quiet simple \rightarrow maybe realized in hardware (FPGA)



CR-RC deconvolution (MC simulations)



- Optimum sampling time to shaping time ratio ~=1 (in our case fsmp = 1/60ns ~16Msps)
- Time recovery error is a few % of sampling time (depends on SNR)
- S/N at the input transfers to output

→ fsmp ~=15Mhz for our shaper



Measurements results for SNR = 25





- Board with sensors ready to systematic tests and measurements
- Simple DAQ based on CAEN v1724 sampling ADC prepared
- Work on deconvolution pulse finding algorithms has started





Fanout Measurements

