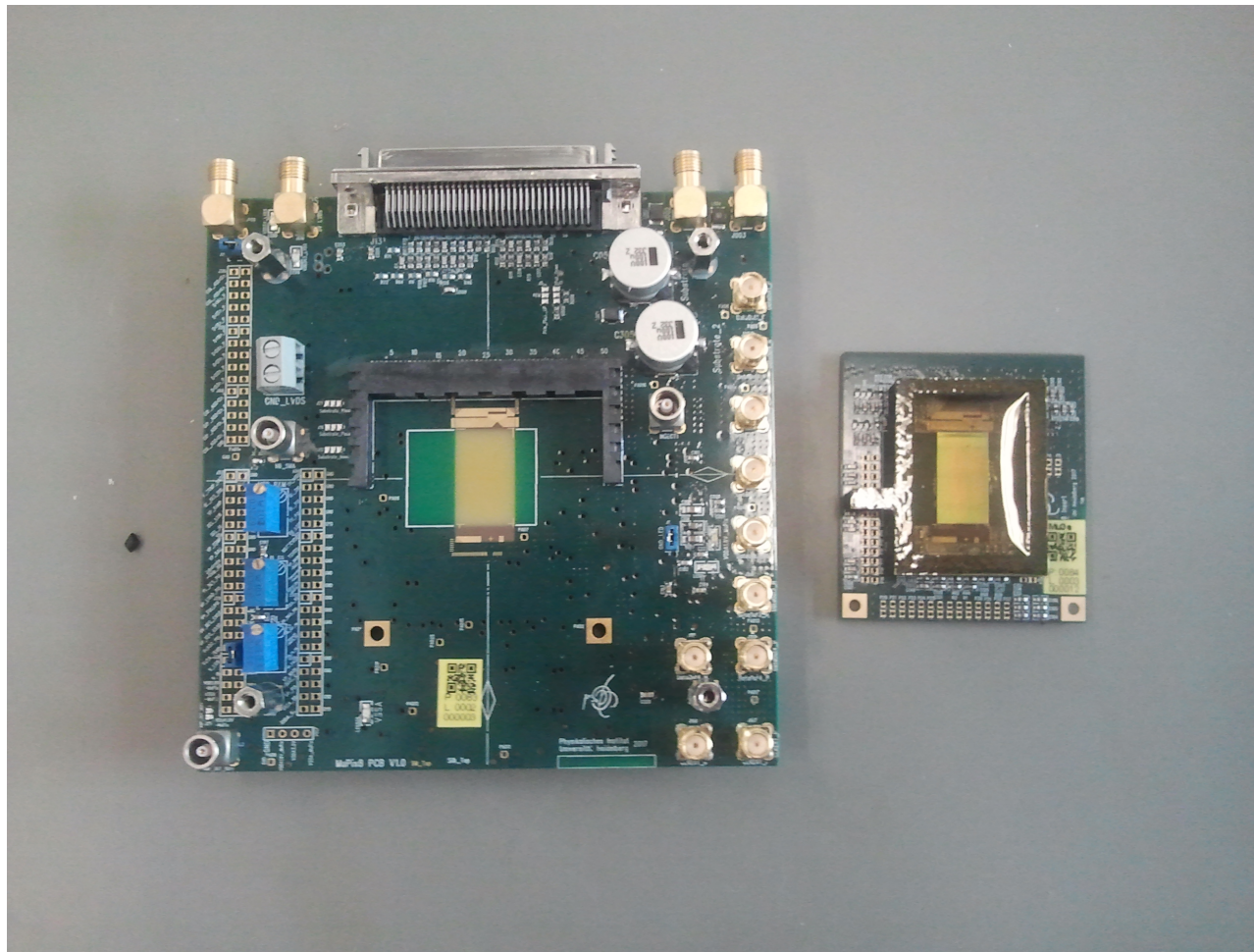


MuPix8: Current Status

**– PANDA Collaboration Meeting 2018/2 –
Luminosity Detector Session**

René Hagdorn
Stockholm, June 5, 2018

- Two MuPix8 Sensorboards and two chips
- Survived smoke testing
- Software to control Sensorboard is working



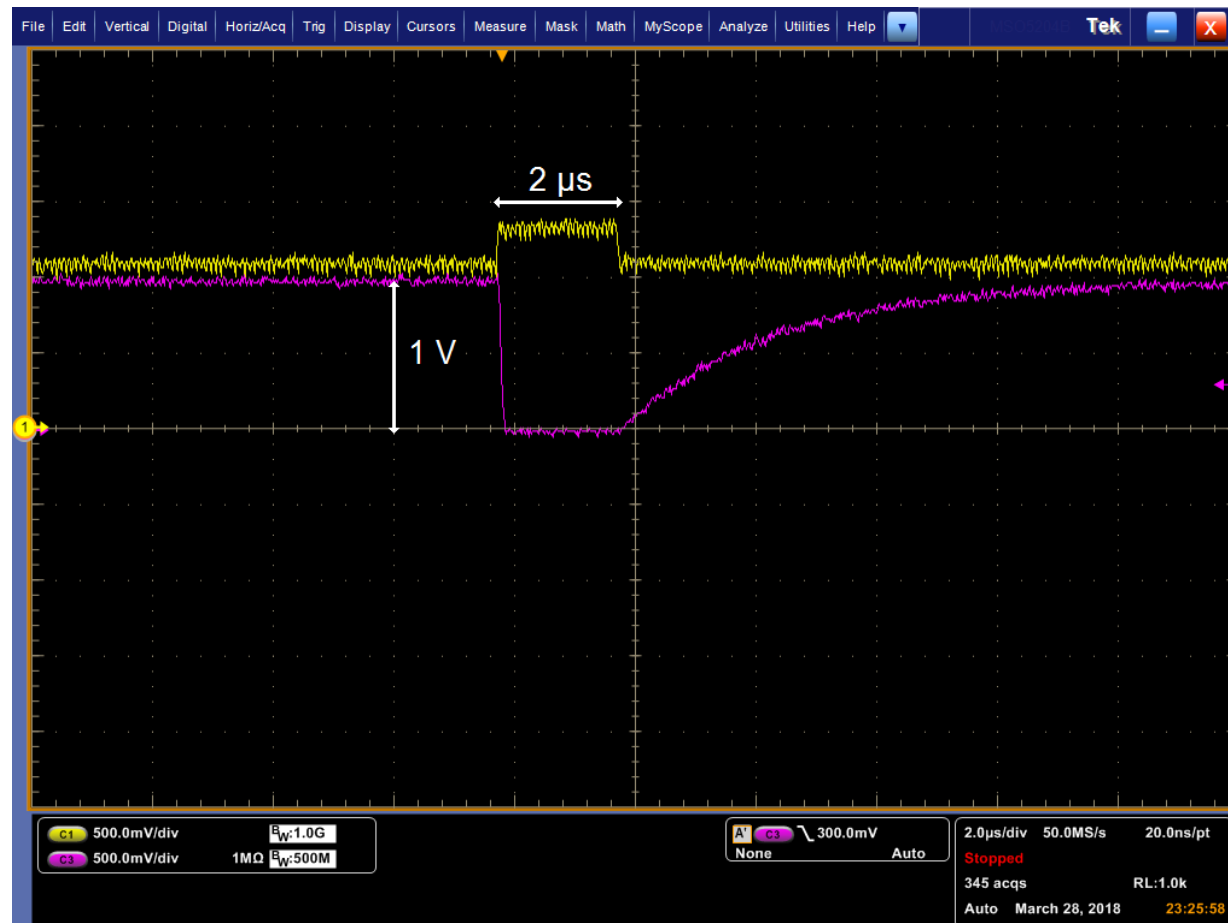
Reminder (Lumi Session 18/1 at GSI)

3

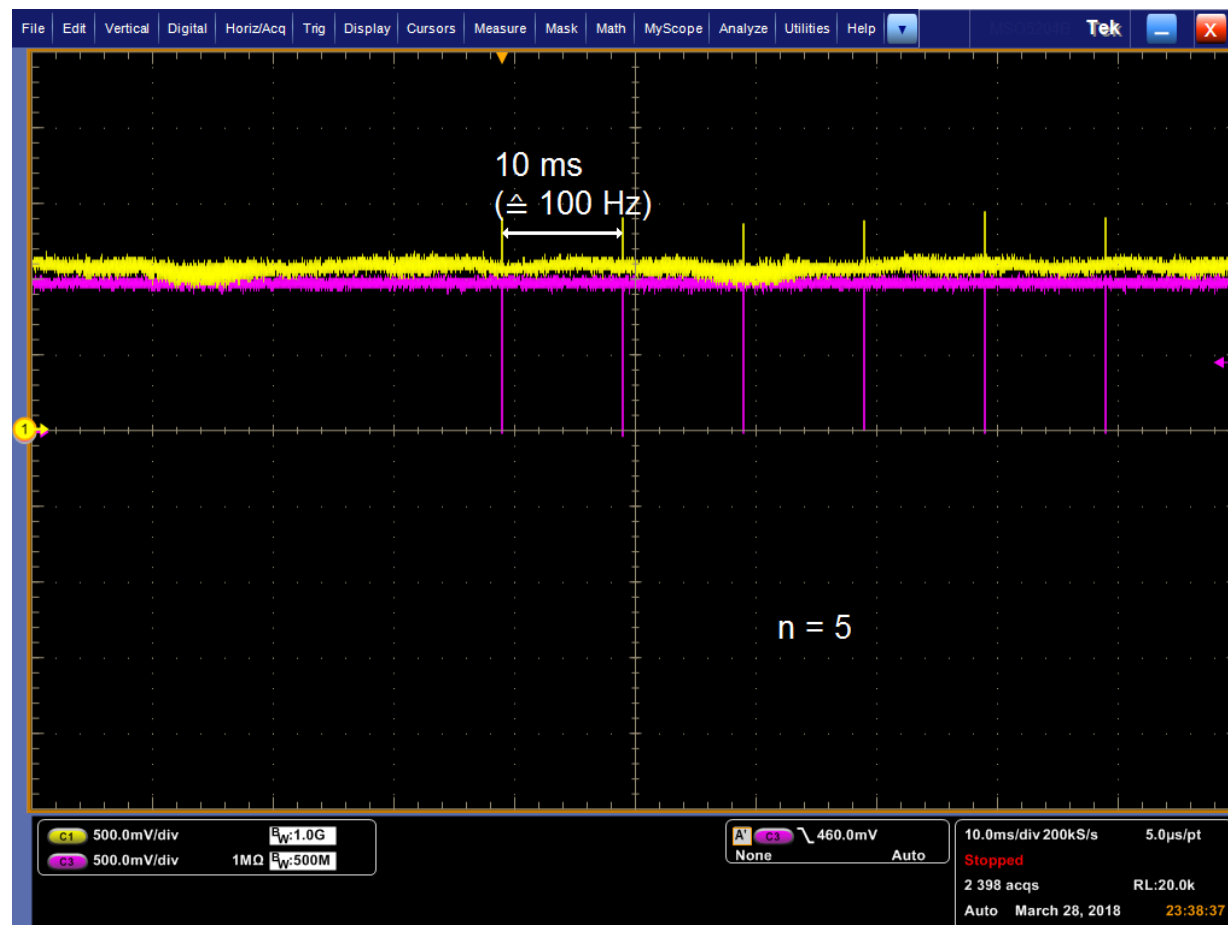
- Written in C++, Qt for GUI designs
- Sensorboard interface:
 - Thresholds
 - Injections
 - Addresses
- Currently working on ChipDAC interface

The screenshot shows a Qt-based GUI window titled "BoardDACs". At the top, there are two input fields for "TRB address" and "MuPix address", followed by two buttons: "Set MuPix address" and "Read back MuPix address". Below this, the interface is divided into two columns. The left column, titled "Threshold Settings", contains three input fields: "Thes low [mV]", "Thres high [mV]", and "Thres Pix [mV]". The right column, titled "Injection Settings", contains three input fields: "Amplitude [V]", "Duration [ns]", and "Frequency [Hz]". Below the injection settings, there is an "Injection Mode" section with two radio buttons: "Fixed Number" (unselected) and "Continuous" (selected). Below the radio buttons is an input field for "# of Injections". At the bottom of the window, there are four buttons: "Set Threshold DACs", "Set Injection DAC", "Set Board DACs", and "Start Injections".

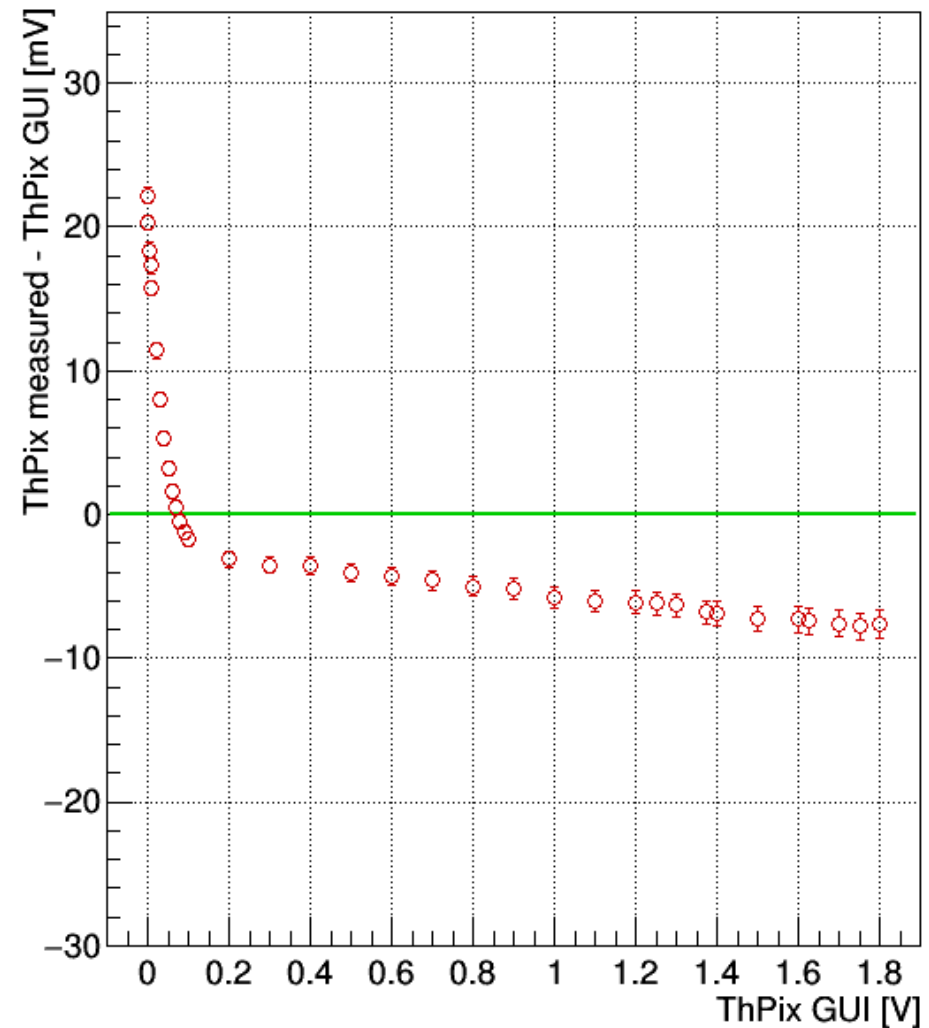
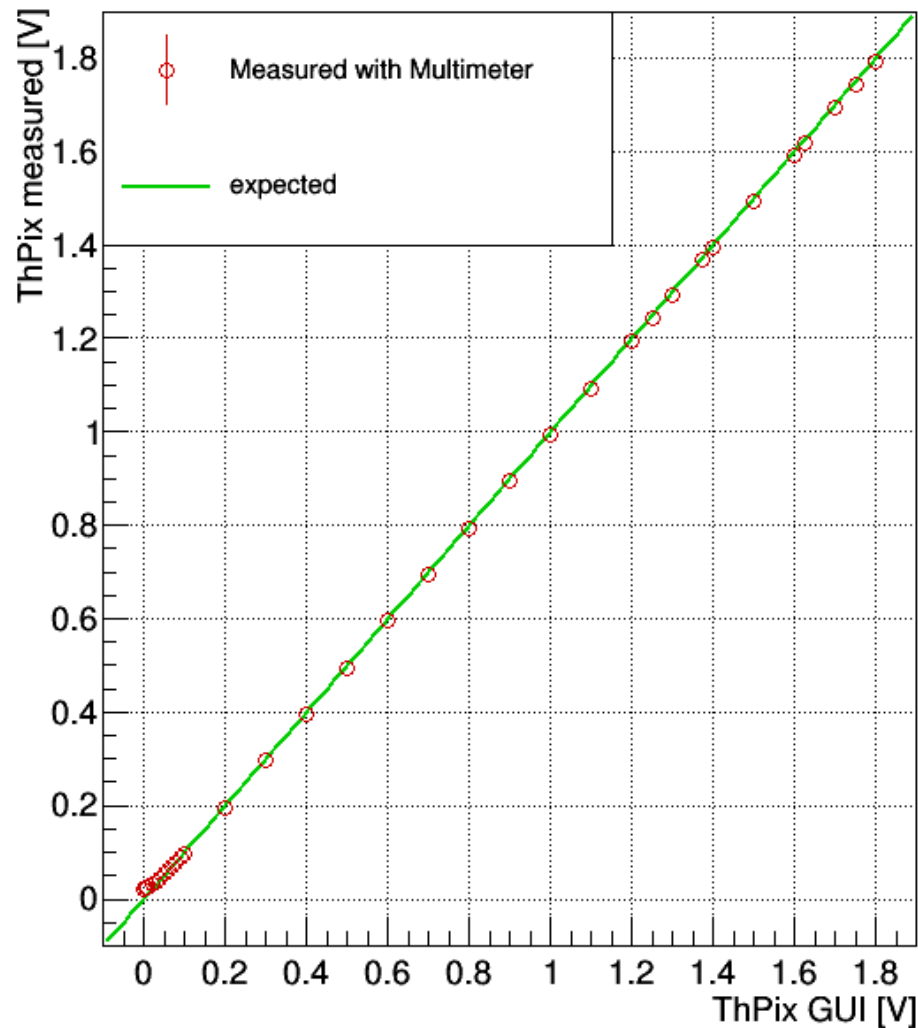
- DAC on Sensorboard to control injection voltage (0 – 1.8 V)
- Adjustable pulse width and frequency
- Continuous or fixed number mode



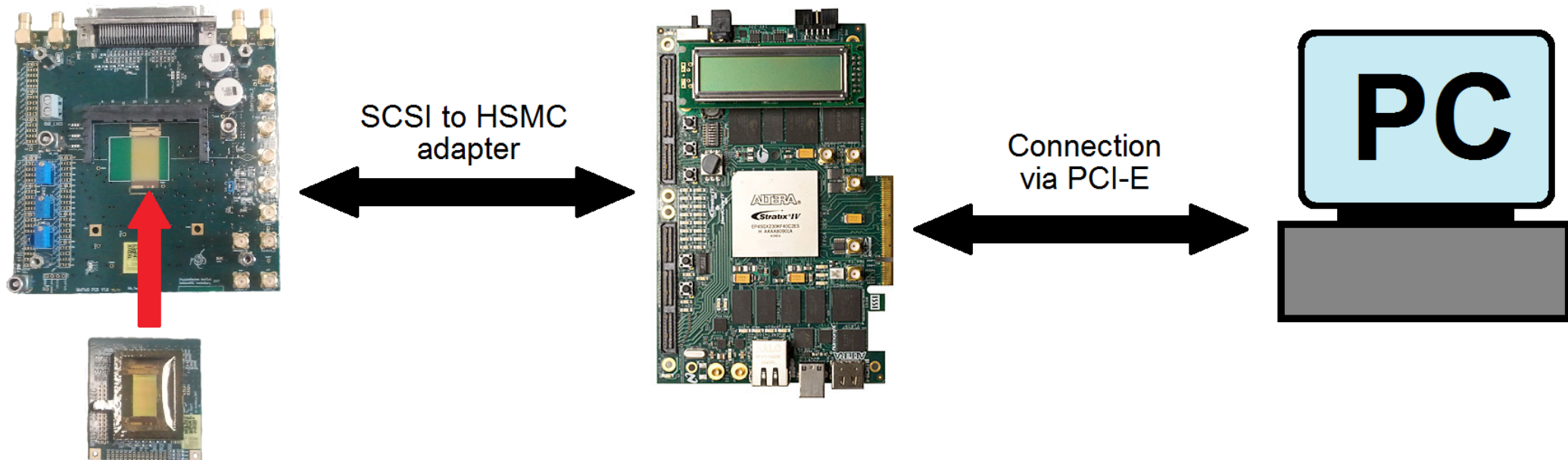
- DAC on Sensorboard to control injection voltage (0 – 1.8 V)
- Adjustable pulse width and frequency
- Continuous or fixed number mode

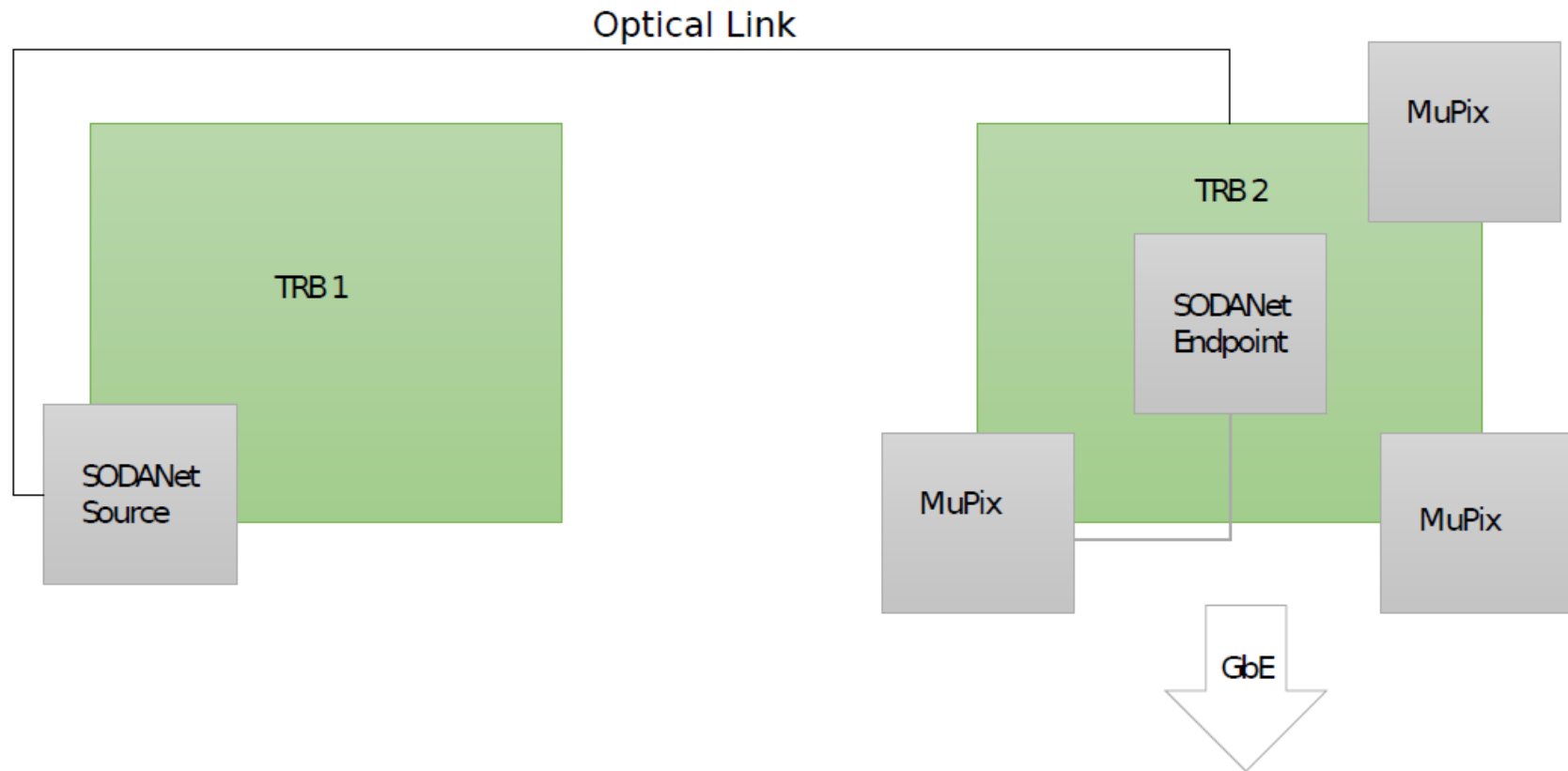


- 3 Threshold DACs on Sensorboard (0 – 1.8 V)
- Difference between GUI values and measured voltages on board

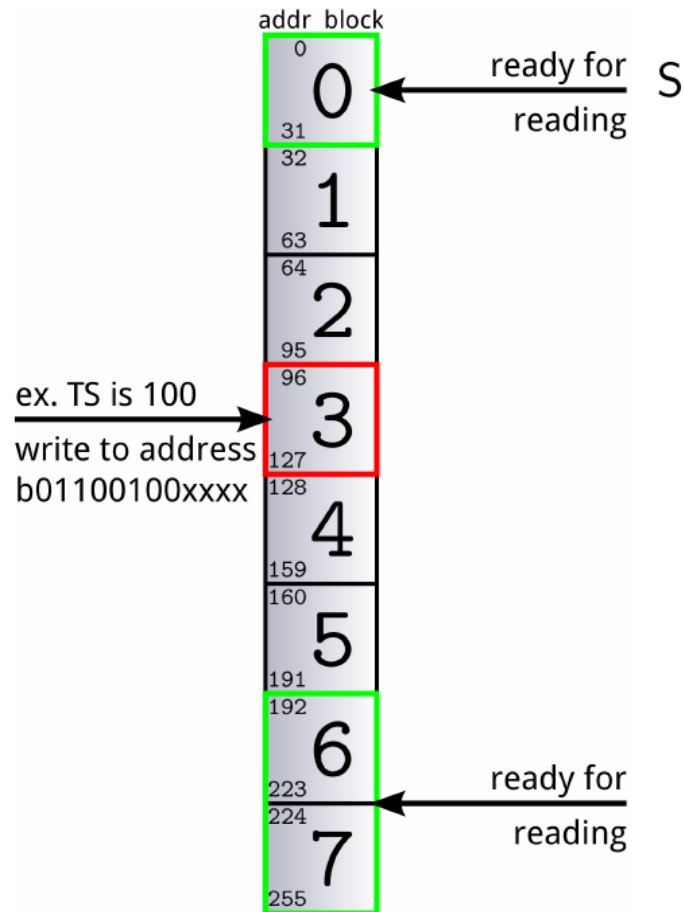


- Select hitbus and injection pixel, select AmpOut, set ChipDACs
- Two methods to send chip configuration
- Still in development
 - Use Heidelberg setup with StratixIV for first test measurements



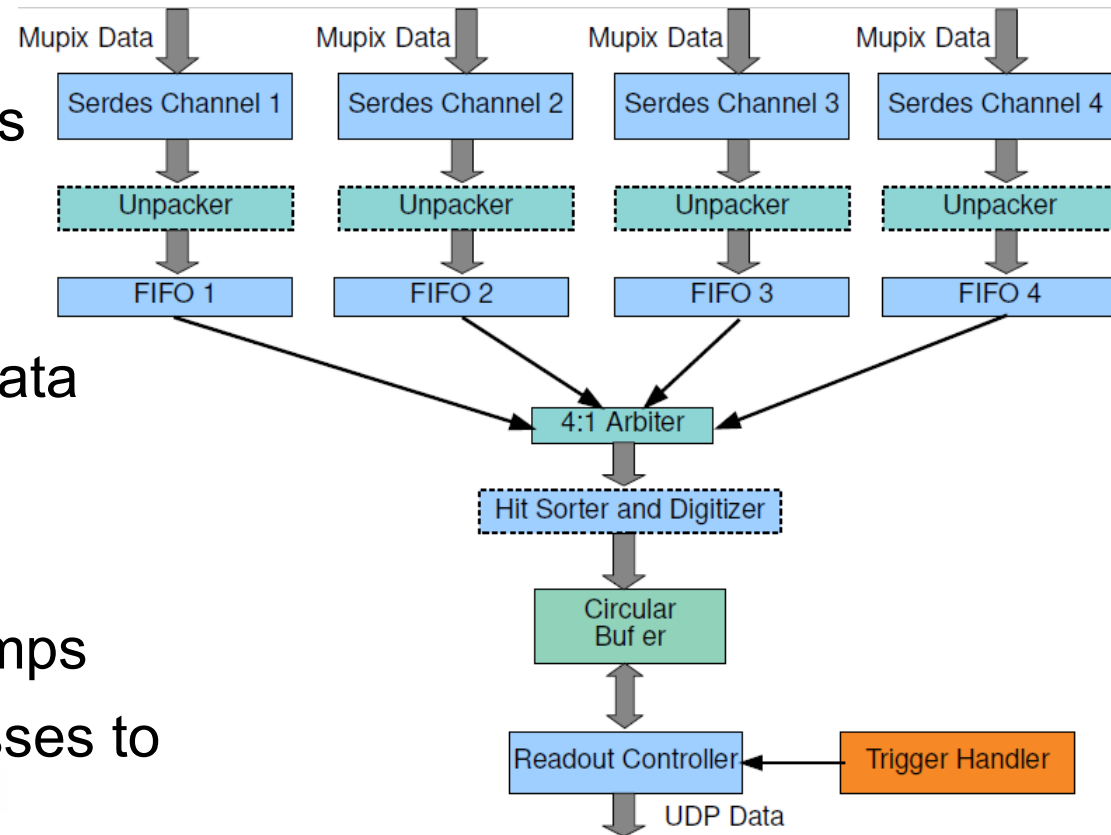


- Production of triggers and SODANet information on TRB1
- Connection via optical link to SODANet endpoint on TRB2
- Next step: Unpacker for SODANet data from GbE connection



- Sort hits by time on TRB
 - Usage of dual port RAM
 - Divided into segments to continuously write and read
 - Address is 8bit timestamp + 4bit counter → limit of 15bit per timestamp
- Investigation of VHDL by Ann-Kathrin finished
- Next step: Write test benches

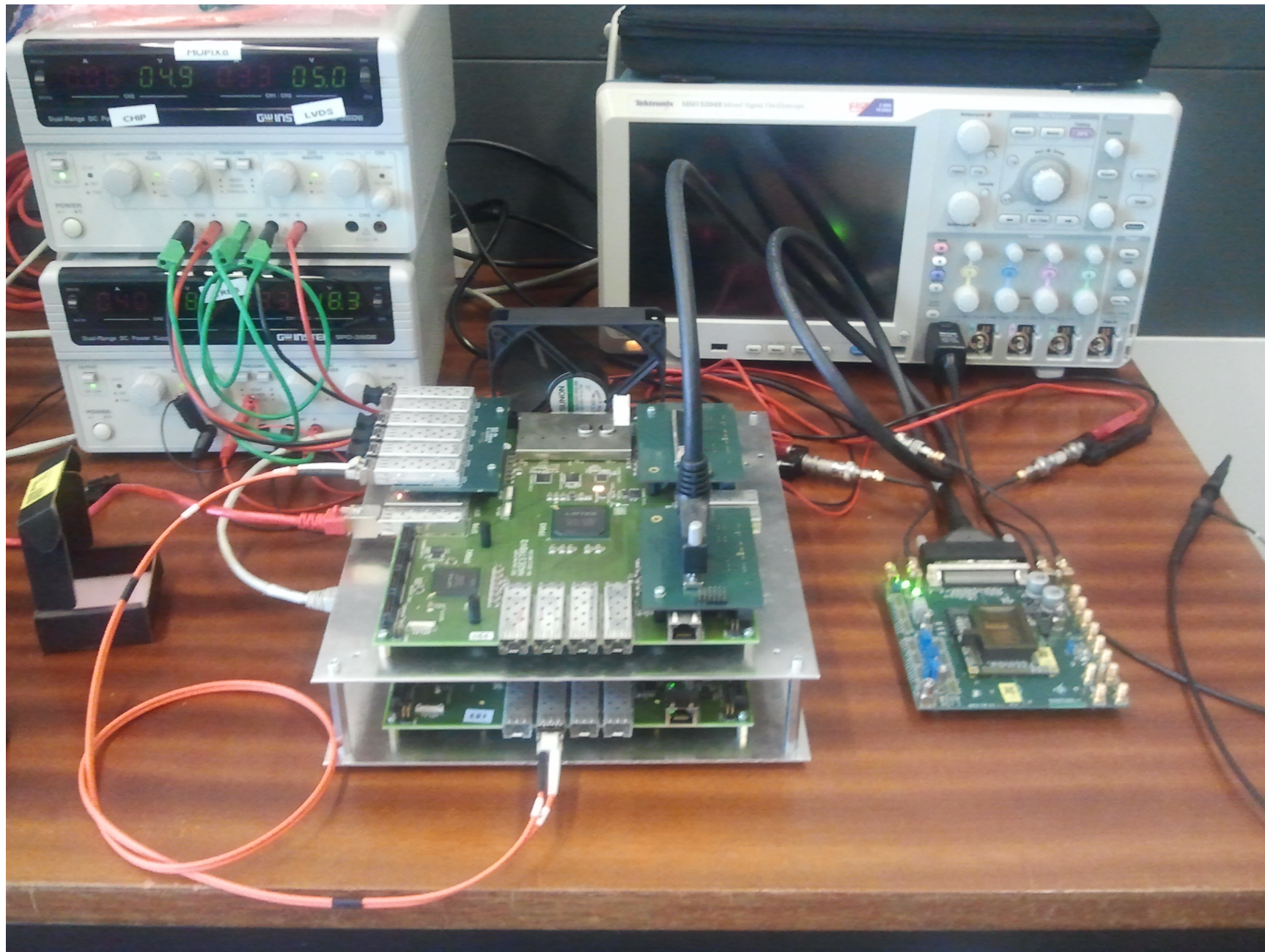
- Extensions to existing firmware
 - Link alignment to comma words in MuPix data stream
 - Unpacker
 - Sorting of hit and counter data
 - Removal of comma words
 - Hit sorter and digitizer
 - Sorting of hits with timestamps
 - Decoding of chip hit addresses to physical address



- Sensorboard functional, software to set thresholds and injections
→ Use Heidelberg setup to cross check
- SODAnet information distribution
- Time sorting of MuPix hit data on TRB
- Firmware extensions: Unpacker, data sorter

– Backup –

MuPix8 Setup with TRB



The MuPix8 Chip

- Physical size: $19.5 \times 10.8 \text{ mm}^2$
- Active area: $\sim 16.2 \times 10.2 \text{ mm}^2$
- Matrix: 200×128 Pixels
divided into 3 Submatrices
A: Source follower,
B & C: current driver
- Pixel: $80 \times 81 \text{ }\mu\text{m}^2$, single diode
- 4 LVDS links @ 1.25 Gbit/s
- Timewalk compensation by
two-stage comparator scheme
- Temperature diode
- *On chip state machine*
(works only if slowed down)

