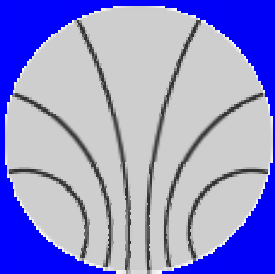# Analogue Inputs and Software for MCM Tests

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Overview

- A quick review of H.Stenzel's work
- Current Hardware Setup
- Existing Software
- First pictures
- Results and Conclusions
- Outlook

Review of H. Stenzel's work

- Test beam setups included
  - EM Barrel
  - HEC
  - Tile Calorimeter
- About 350 pulses were measured
- Documentation and pulses are available at www.kip.uni-heidelberg.de/atlas/DATA/pulselib/

Current Hardware Setup

- standard PC with one dual-head graphics card (Matrox Millennium G450 DualHead)

- Tektronix Oscilloscope (same one as used for the test beam measurements) and three probes for voltage measurements

- High Quality monitor cable

- Selfmade adapter for voltage measurements at the end of the monitor cable

Hardware Setup
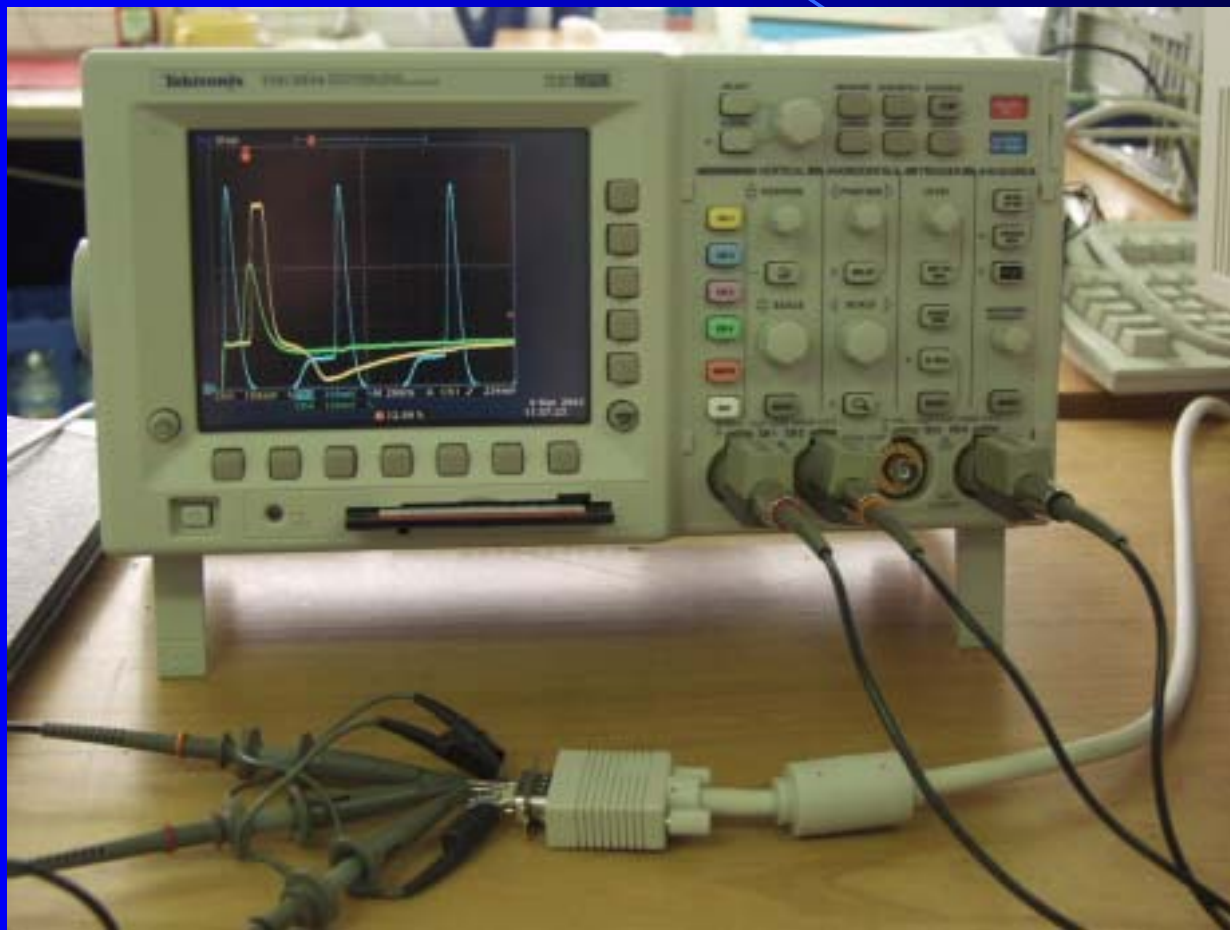
Facts on Output

- Output voltage for each colour: 0V - 0.7V

- At a resolution of 1280x1024 Pixel and a refresh rate of 75 Hz each Pixel is addressed for about 10 ns

- A pulse containing 400 measurements (thus 400 Pixels long) should take about 4 µs to appear on screen

- Pulse has 10 measurements on rising edge

Software Status

- Developed using Qt 2.3.1
- Output can be examined on screen or with an oscilloscope
- Three different cases can be simulated
  - Analytical function provided by K. Mahboubi
  - Sawtooth voltages on one or all colour outputs (for linearity checks)
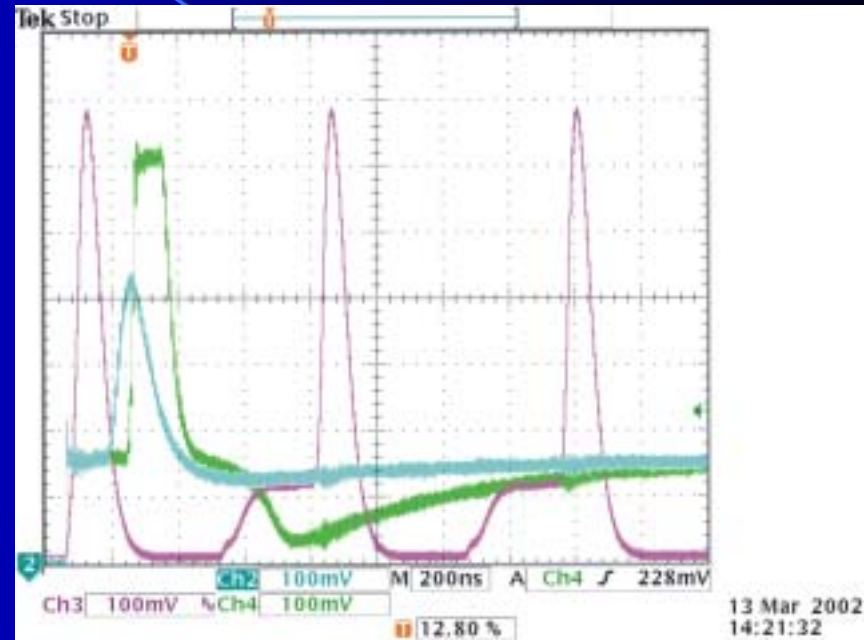 - Data taken from H. Stenzel's library

How does the software work?

- Open a preformatted ASCII file from a set of pulses (time resolution was reduced from originally 200ps to 5ns)

- Mapping voltages on colours, e.g.
  -1V corresponding to black
  +4V corresponding to red (max. intensity)

- Display results
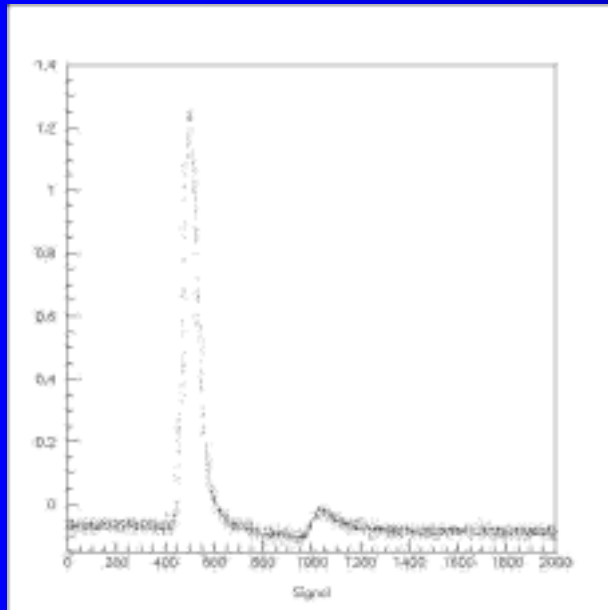
Some Results
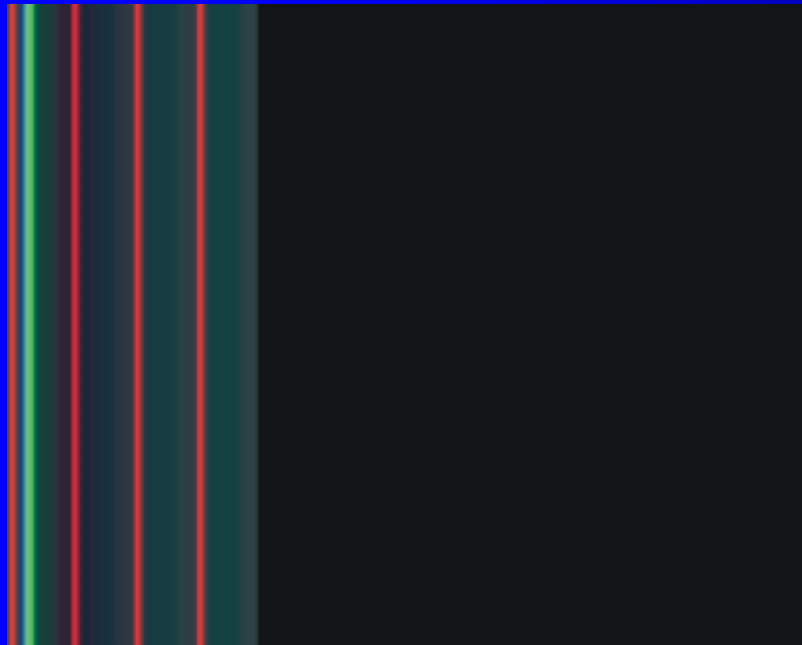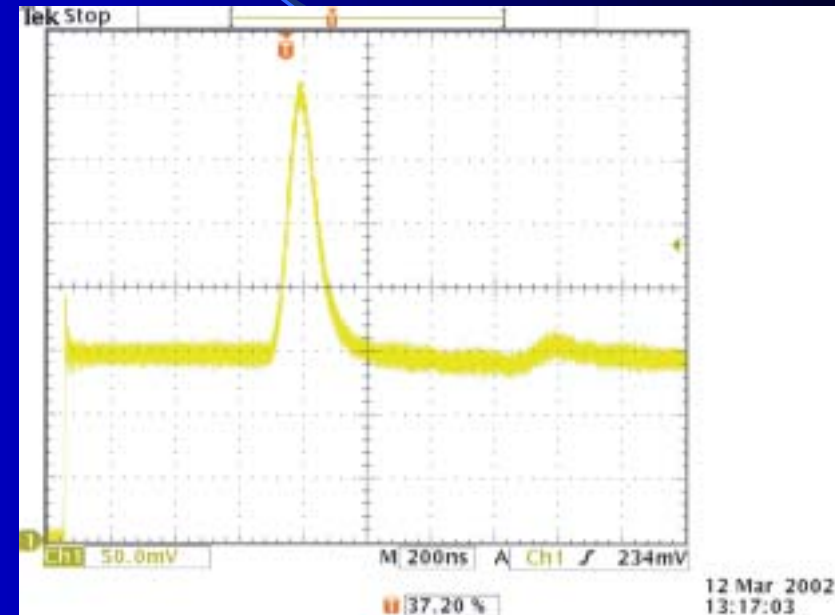

Result on screen

Blue: analytical function
Yellow: HEC saturated
Green: HEC 148 GeV e

Comparing Data

Plot measured by
H. Stenzel at test beam
site (PAW histogram)

Plot from the same test setup
(TILE), data reformatted, output
via graphics card, measured
again with the oscilloscope

Problems and Difficulties

- MultiMonitor is not yet supported by Qt
- Modelines have to be changed manually in order to obtain a driving rate of 5ns/Pixel
- Synchronisation of more than one head per graphics card will be difficult
- Synchronisation of more than one graphics card is probably feasible
- Program not included in HDMC yet

Results and Conclusions

- Results look good

- Linearity is guaranteed (within 2%)

- some visible crosstalk between RGB

- Noise is manageable (lowpass filter)

$\Rightarrow$ Software can be used as input for the MCM Test

Outlook

- Working on Firmware for three needed FPGAs for the MCM test

- Oliver is implementing VME drivers into HDMC in order to enable VME access to the FPGAs