

Introduction to USBPix

Christian Gallrapp

SOFTWARE INSTALLATION

Software Installation

- USBPix:
 - <http://icwiki.physik.uni-bonn.de/twiki/bin/view/Systems/UsbPix>
- SVN:
 - FE-I3: <http://icwiki.physik.uni-bonn.de/svn/USBPix/host/>
 - FE-I4: <http://icwiki.physik.uni-bonn.de/svn/USBpixI4/host/>
- Software:
 - STControl:
 - <http://icwiki.physik.uni-bonn.de/twiki/bin/view/Systems/STcontrolUserGuide>
 - ModuleAnalysis:
 - <http://icwiki.physik.uni-bonn.de/twiki/bin/view/Systems/ModuleAnalysis>

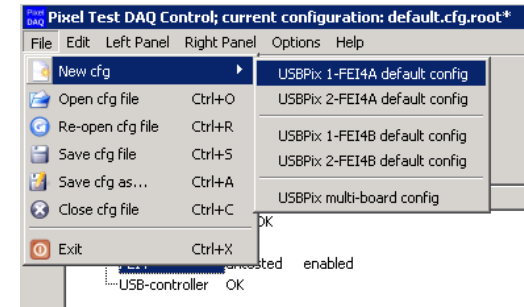
BASIC USBPIX HANDLING

FE-Tuning Procedure

- **Config preparation**
 - Global register setup
 - Calibration values
- **Tuning procedure**
 1. **IF_TUNE**
 2. **GDAC_TUNE**
 3. **TDAC_TUNE**
 4. **FDAC_TUNE**
 5. **TDAC_TUNE**

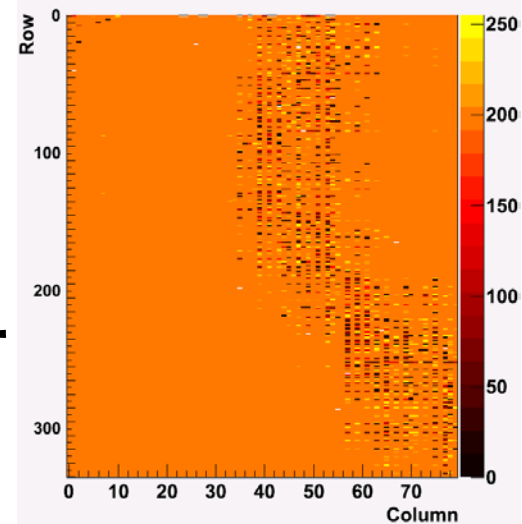
Config Preparation

- **Global register setup**
 - **Generate default config: File->New cfg->...**
 - **Check Global Register:**
 - Amp2Vbpf (13 for unirradiated and 40+ for irradiated samples)
 - EfuseCref (default 15 – check for pattern in DIGITAL-TEST)
 - FdacVbn (15 seems to work)
 - TdacVbp (192 seems to work)
 - Vthin_AltCoarse (most of the time 0, very very rarely 1)
- **Calibration values**
 - VCAL gradient
 - VCAL offset



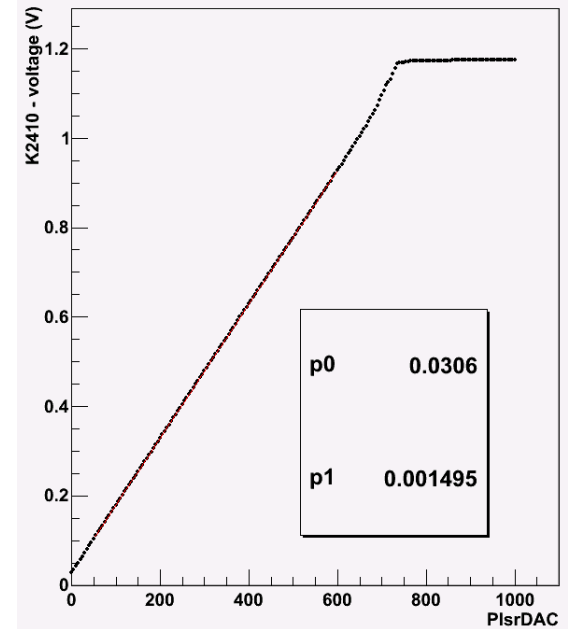
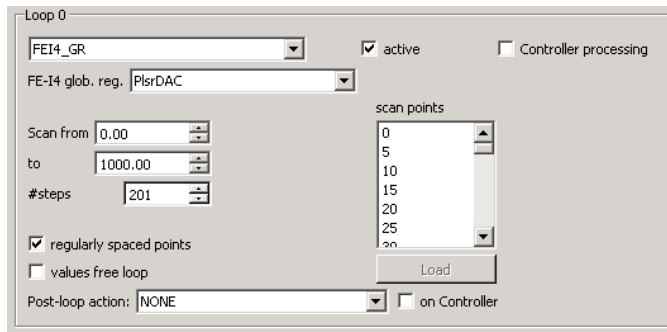
Check Global Register

- **Amp2Vbpf**
 - Get rid of dead pixel after irradiation
- **EfuseCref**
 - Get rid of the pattern in **DIGITAL TEST**
- **FdacVbn**
 - Control the width of the **FDAC** distribution
- **TdacVbp**
 - Control the width of the **TDAC** distribution
- **Vthin_AltCoarse**
 - Coarse control the threshold

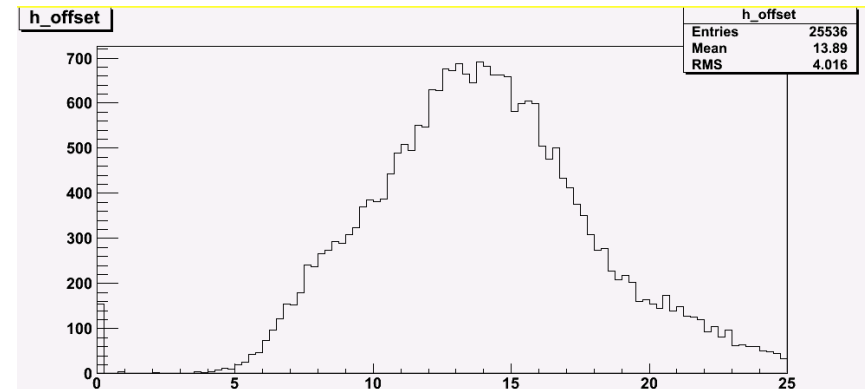


Calibration values

- VCAL gradient
 - DAC scan (PlsrDAC from 0 – 1000)
 - Linear Fit: $p1 = V_{cal} \text{ grad}$



- VCAL offset
 - [Root script form Lea](#)
 - Mean = VCAL offset
 - INJ_CALIB (not tested)



Tuning procedure

1. IF_TUNE

- PrmpVbpf: Set global feedback current register

2. GDAC_TUNE

- Vthin_AltFine: Set global threshold register

3. TDAC_TUNE

- TDAC: Set register for pixel threshold

4. FDAC_TUNE

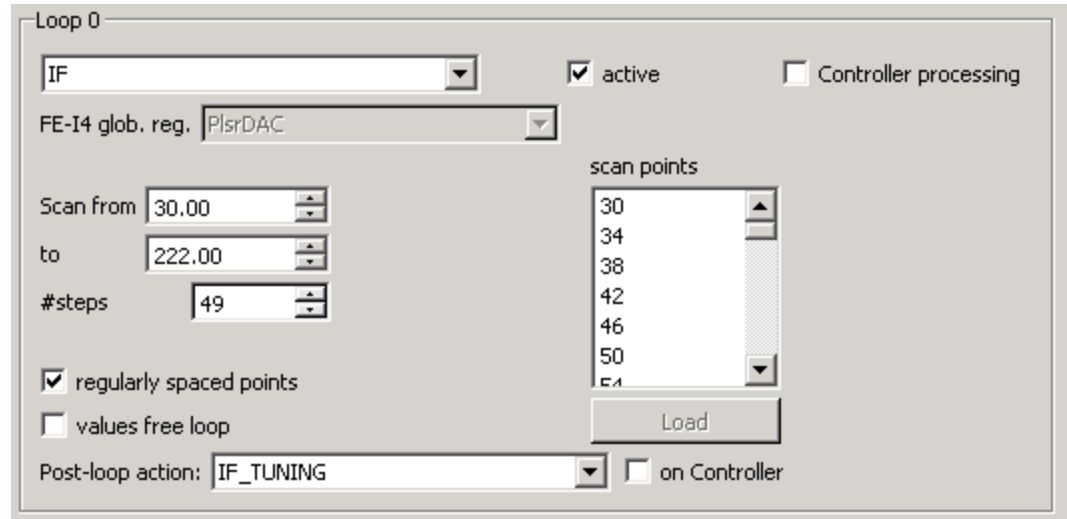
- FDAC: Set register for pixel feedback current

5. TDAC_TUNE

- TDAC: re-Set register for pixel threshold

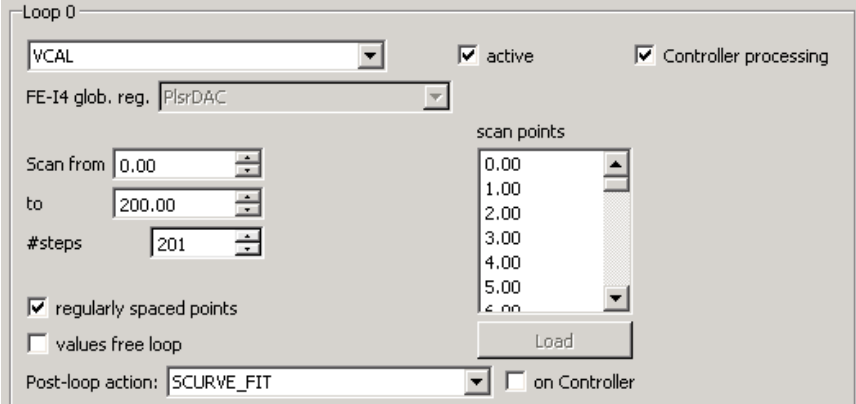
IF_TUNE

- PrmpVbpf: Set global feedback current register
 - Only loop 0
 - PrmpVbpf > 30
 - Start scan with 30 avoids values <30
 - Step size = 4 is sufficient
- Don't forget to set the “Tuning parameters”



GDAC_TUNE

- **Vthin_AltFine: Set global threshold register**
 - Loop level 0 and 1
 - 0: Threshold Scan
 - 1: Loop over different GDAC values
 - Don't forget to set the “Tuning parameters”



Loop 0

VCAL active Controller processing

FE-14 glob. reg. PlsrDAC

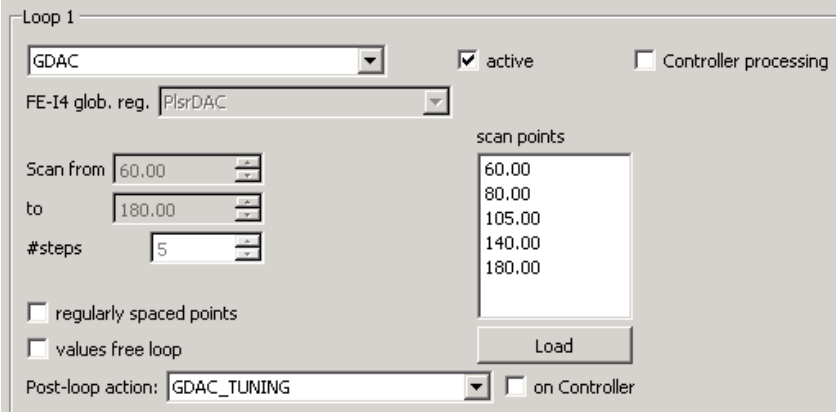
Scan from 0.00 to 200.00 #steps 201

regularly spaced points
 values free loop

scan points: 0.00, 1.00, 2.00, 3.00, 4.00, 5.00, 6.00

Post-loop action: SCURVE_FIT on Controller

Load



Loop 1

GDAC active Controller processing

FE-14 glob. reg. PlsrDAC

Scan from 60.00 to 180.00 #steps 5

regularly spaced points
 values free loop

scan points: 60.00, 80.00, 105.00, 140.00, 180.00

Post-loop action: GDAC_TUNING on Controller

Load

TDAC_TUNE

- TDAC: Set and re-Set register for pixel threshold
 - Loop level 0 and 1
 - 0: Threshold Scan
 - 1: Loop over different TDAC values
 - Set register: use default scan points
 - re-Set register: use custom scan points ([file](#))
 - Don't forget to set the “Tuning parameters”

Loop 0

VCAL active Controller processing

FE-14 glob. reg. PlsrDAC

Scan from 0.00 to 200.00 #steps 201

scan points: 0.00, 1.00, 2.00, 3.00, 4.00, 5.00, 6.00

regularly spaced points
 values free loop

Post-loop action: SCURVE_FIT on Controller

Load

Loop 1

TDACS active Controller processing

FE-14 glob. reg. PlsrDAC

Scan from 1.00 to 16.00 #steps 6

scan points: 16.00, 8.00, 4.00, 2.00, 1.00, 1.00

regularly spaced points
 values free loop

Post-loop action: TDAC_TUNING on Controller

Load

FDAC_TUNE

- FDAC: Set register for pixel feedback current
 - Only loop 0
 - Loop over different FDAC values

The screenshot shows the 'Loop 0' configuration window. It includes a dropdown menu for 'FDACS' set to 'FDACS', a checked 'active' checkbox, and an unchecked 'Controller processing' checkbox. Below this is a dropdown for 'FE-I4 glob. reg.' set to 'PlsrDAC'. The 'Scan from' field is '0.00', 'to' is '15.00', and '#steps' is '16'. A 'scan points' list contains values from 0.00 to 6.00. There are checkboxes for 'regularly spaced points' (checked) and 'values free loop' (unchecked). A 'Load' button is present. At the bottom, 'Post-loop action' is set to 'FDAC_TUNING' and 'on Controller' is unchecked.

- Don't forget to set the “Tuning parameters”

ADDITIONAL INFORMATION

Additional Information

- FE-I4 testing mailing list: atlas-ibl-fei4-testing@cern.ch
- Join the Monday-Meeting!

- J. Jentsch - [Diploma Thesis](#)
- J. Janssen - [Low Threshold Tuning](#)
- S. Altenheiner - [Dead Pixel Investigation Status Report](#)
- C. Gallrapp - [FE-I3 tuning introduction with TurboDAQ](#)
- M. Backhaus - [Characterization of FdacVbn and PrmpVbpf](#)
- Meeting - [USBPix & FE-I3/I4 Tutorial](#)