



Characterization of small Scalable Readout System

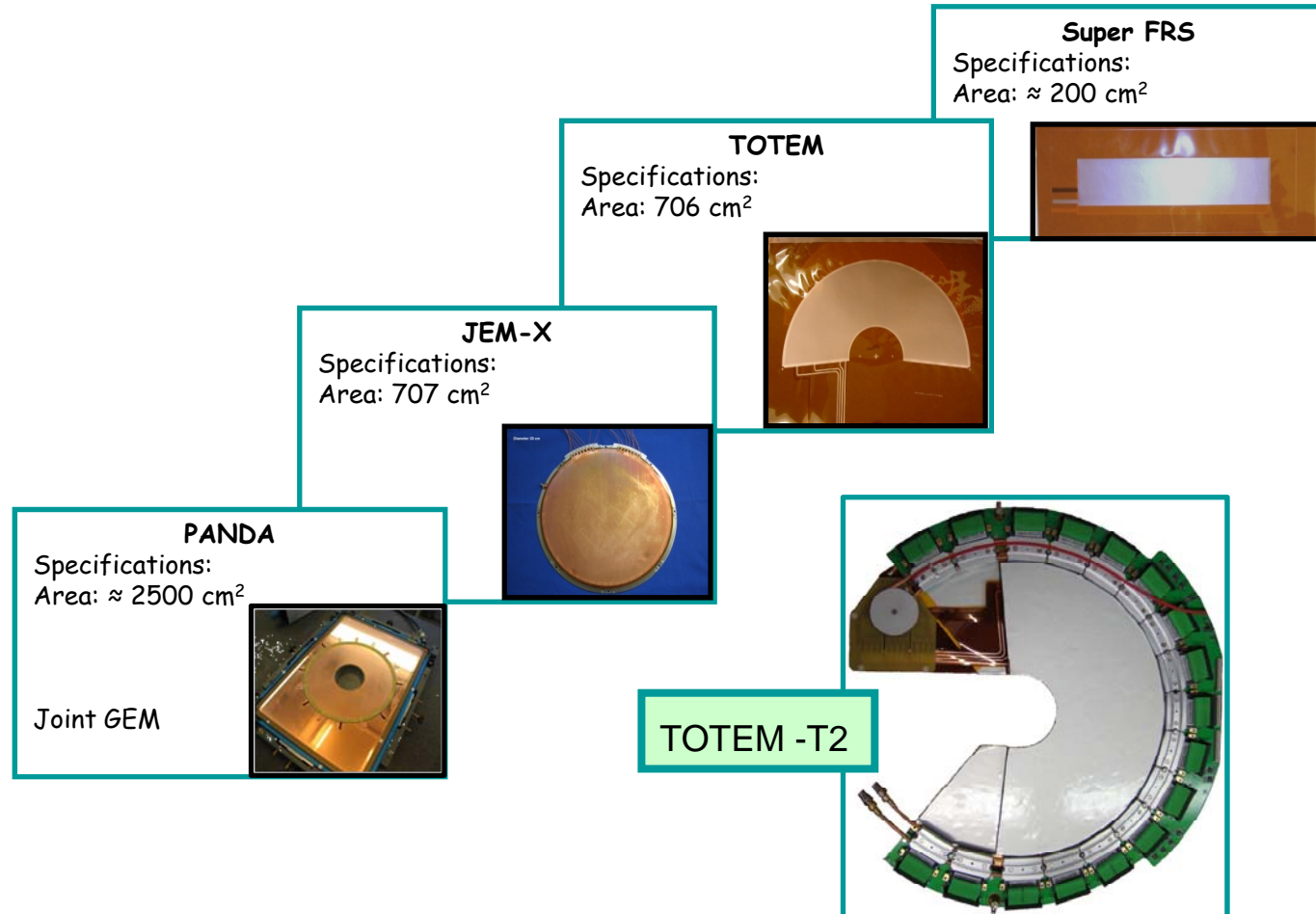


OUTLINE

- Introduction and Motivation
- Small Scalable Readout System
- Installation, Configuration and First Tests
- TODO List

INTRODUCTION

The Helsinki Institute of Physics is currently trying to develop a methodology for characterization of the GEM foils. This will include: hole uniformity studies, classification of defects and long term stability. This is a common effort together with CERN.

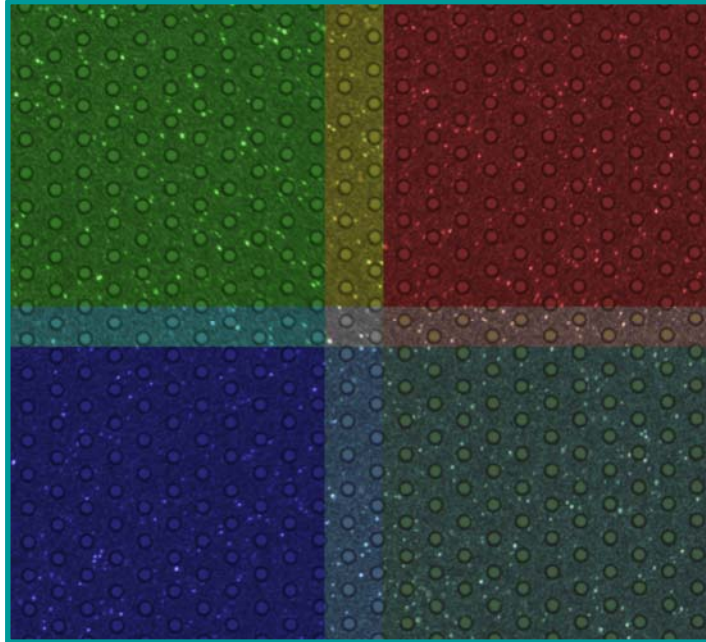




MOTIVATION

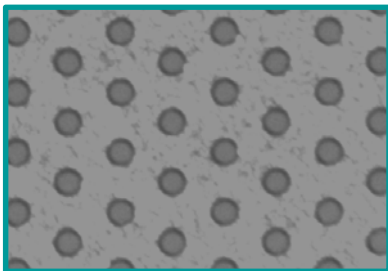
FOUR images Stitched

The overlapping
on these images
is of 245 μm
and 140 μm



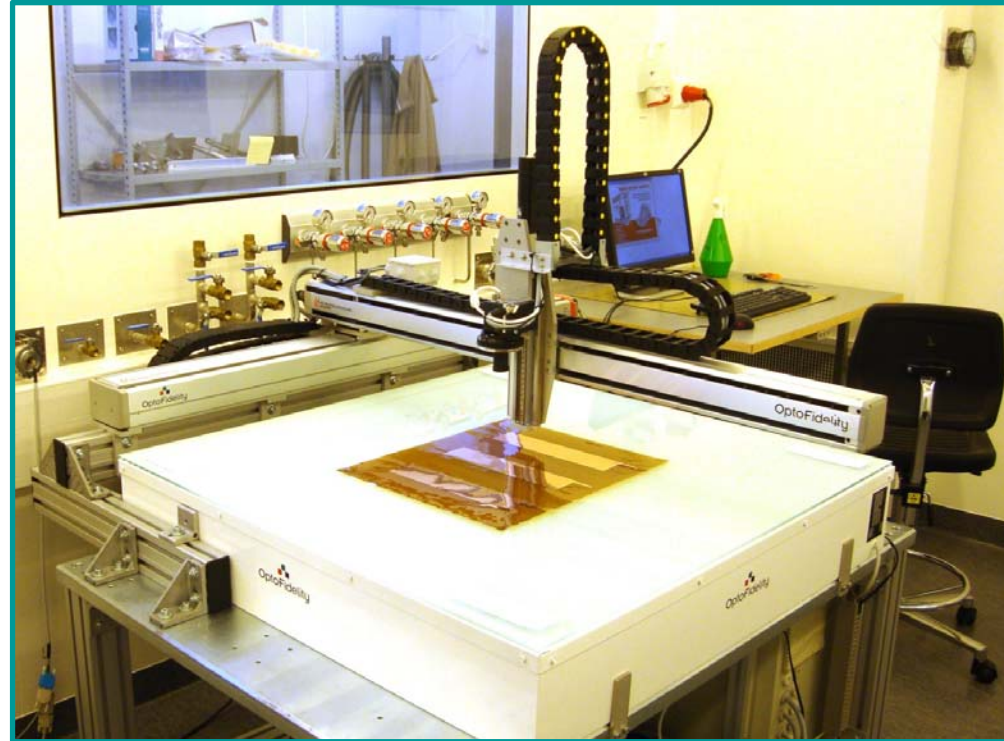
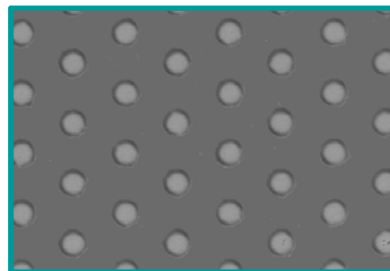
After Apply Red Filter

This procedure is used to find
defects and to find the outer
diameter of the holes



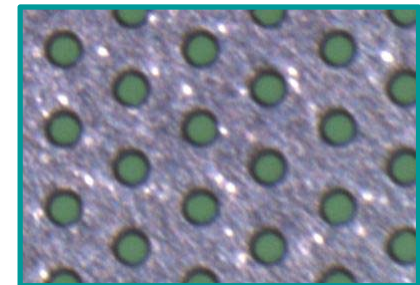
After Apply Green Filter

This procedure is used to find
blind holes and to measure the
inner diameter of the holes



New System

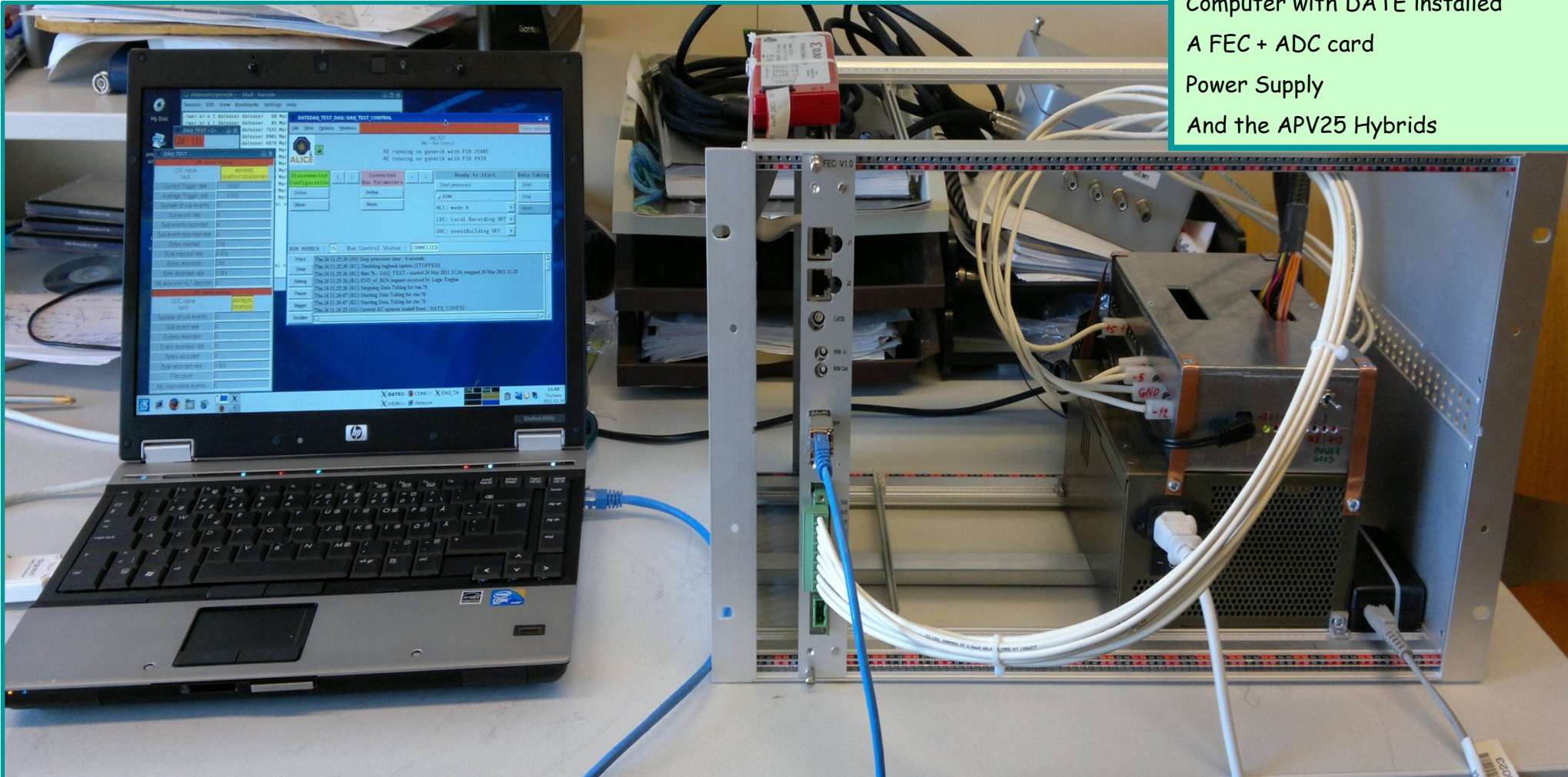
Based on 9 Mpix camera with
integrated telecentric optics for
this setup one pixel corresponds
to 1.7 x 1.7 microns





Small Scalable Readout System

The system consists of:
Computer with DATE installed
A FEC + ADC card
Power Supply
And the APV25 Hybrids





Installation, Configuration and First Tests

DATE installation and Slow Control by Filippo Costa → Learn how to run the DAQ and a setup configuration files.

AMORE installation by Kondo Gnanvo → Get some scripts for data visualization and analysis.

Electronics Configuration by Sorin Martoiu → APV25, FEC and ADC parameters.

DAQ_TEST <2>

GDC (1)

NOT_RUNNING
SYNCHRONOUS
STARTING
STARTING_PDSREC
STARTING_EVB
RUNNING
RUN
STC
STC
WAI
STC

DAQ_TEST

LDC status display

LDC name	aloneldc
host	localhost.localdomain
Current Trigger rate	0.000
Average Trigger rate	1724.138
Number of sub-events	50000
Sub-event rate	0
Sub-events recorded	50004
Sub-event recorded rate	0
Bytes injected	1007219376
Byte injected rate	0 B/s
Bytes recorded	1007219376
Byte recorded rate	0 B/s
Nb. evts w/o HLT decision	0

GDC status display

GDC name	alonedgc
host	localhost
Number of sub-events	0
Sub-event rate	0
Events recorded	0
Event recorded rate	0
Bytes recorded	0
Byte recorded rate	0 B/s
File count	0
Nb. incomplete events	0

DATEDAQ_TEST_DAQ::DAQ_TEST_CONTROL

File View Options Windows Status updated

DAQ_TEST
DAQ - Run Control

HI running on generik with PID 9700
RC running on generik with PID 9477

Disconnected Configuration < > **Connected Run Parameters** < > **Ready to start** **Data Taking**

Define Show Define Show

Start processes Start
 EDM Stop
HLT: mode A v Abort
LDC: Local Recording ON v
GDC: eventBuilding OFF v

RUN NUMBER : 229 Run Control Status : READY

Trace	Clear	Debug	Pause	Bigger	Smaller
Wed 06 13:36:59 (HI) Stop processes time : 5 seconds	Wed 06 13:36:58 (RC) Run stopped	Wed 06 13:36:58 (RC) Disabling logbook update (STOPPED)	Wed 06 13:36:54 (RC) Run 229 - DAQ_TEST - started 06 Apr 2011 13:36, stopped 06 Apr 2011 13:36	Wed 06 13:36:54 (RC) END_of_RUN request received by Logic Engine	Wed 06 13:36:53 (aloneldc) End of run requested from ALONELDC
		Wed 06 13:36:24 (RC) Starting Data Taking for run 229			Wed 06 13:36:23 (HI) Current RC options loaded from : DATE_CONFIG



Installation, Configuration and First Tests (cont.)

Tests were done without detector connected to the APV25s, the trigger scheme is internal and Data was not visualized.

LDC status display	
LDC name	aloneldc
host	localhost.localdomain
Current Trigger rate	0.000
Average Trigger rate	1724.138
Number of sub-events	50000
Sub-event rate	0
Sub-events recorded	50004
Sub-event recorded rate	0
Bytes injected	1007219376
Byte injected rate	0 B/s
Bytes recorded	1007219376
Byte recorded rate	0 B/s
Nb. evts w/o HLT decision	0

```
fec.txt - emacs@generik.hip.helsinki.fi
File Edit Options Buffers Tools Help

10.0.0.2
6039
80000000
00000000
aaaaffff
00000000
00000000
# BCLK MODE
00000004
00000001
# BCLK TRGBURST
00000003
00000002
# BCLK_FREQ
00000100
00000003
# BCLK TRGDELAY
00000100
00000004
# BCLK TPDELAY
00000080
00000005
# BCLK ROSYNC
0000012c
00000008
# EVBLD_CHMASK
0000000f
00000009
# EVBLD_DATALENGTH
000009c4
0000000a
00000000
0000000b
00000000
0000000c
# EVBLD_EVENTINFODATA = 0xAABB | Copy of EVBLD_DATALENGTH [15:0]
aabb09c4

fec.txt (Text)--L4--All--
```



Installation, Configuration and First Tests (cont.)

In both cases the file size increases linearly with the increasing of amount of triggers.

EVBL_CHMASK:

0000FFFF = ... 1111 1111 1111 1111 → All 16 APVs data

0000000F = ... 0000 0000 000 1111 → 4 APVs data

The File size remains the same, even when the triggers generated by the FEC increase

$$Tr = \frac{1}{(BCLK_FREQ * 64 * 25)}$$

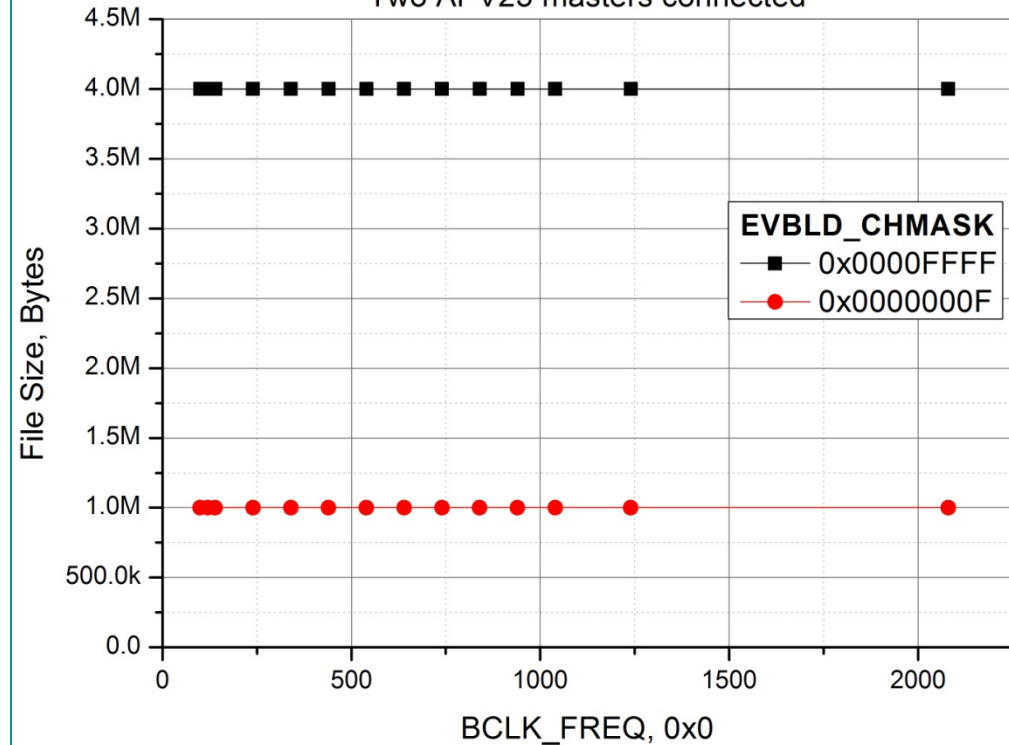
RAW DATA RECORDED

Two APV25 masters connected



RAW DATA RECORDED

Two APV25 masters connected



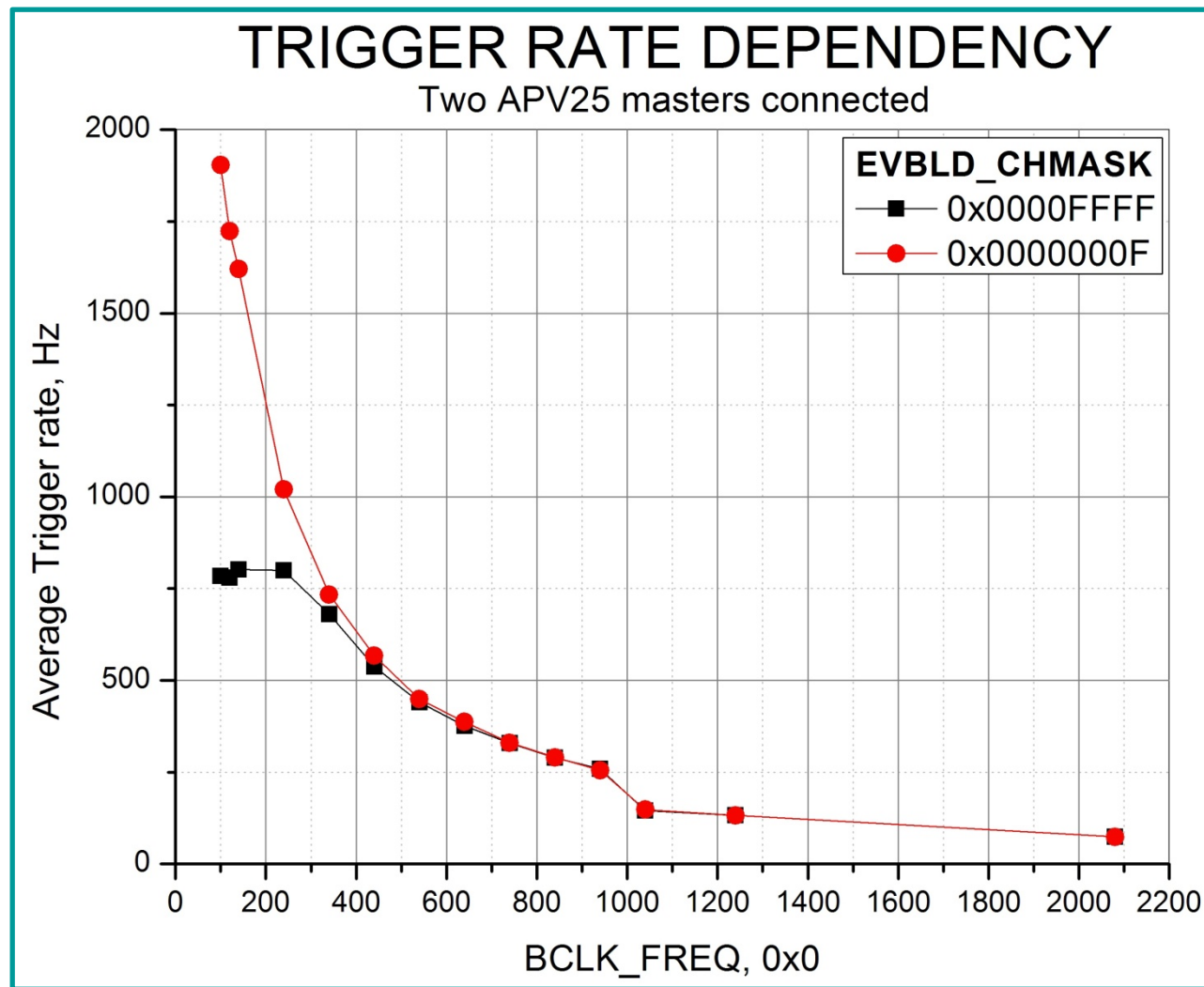


Installation, Configuration and First Tests (cont.)

This is the comparison of the average trigger rate for the two cases in study.

In black the configuration on the FEC was to read the data from 16 APV25 chips and in red was for only 4 APV25s.

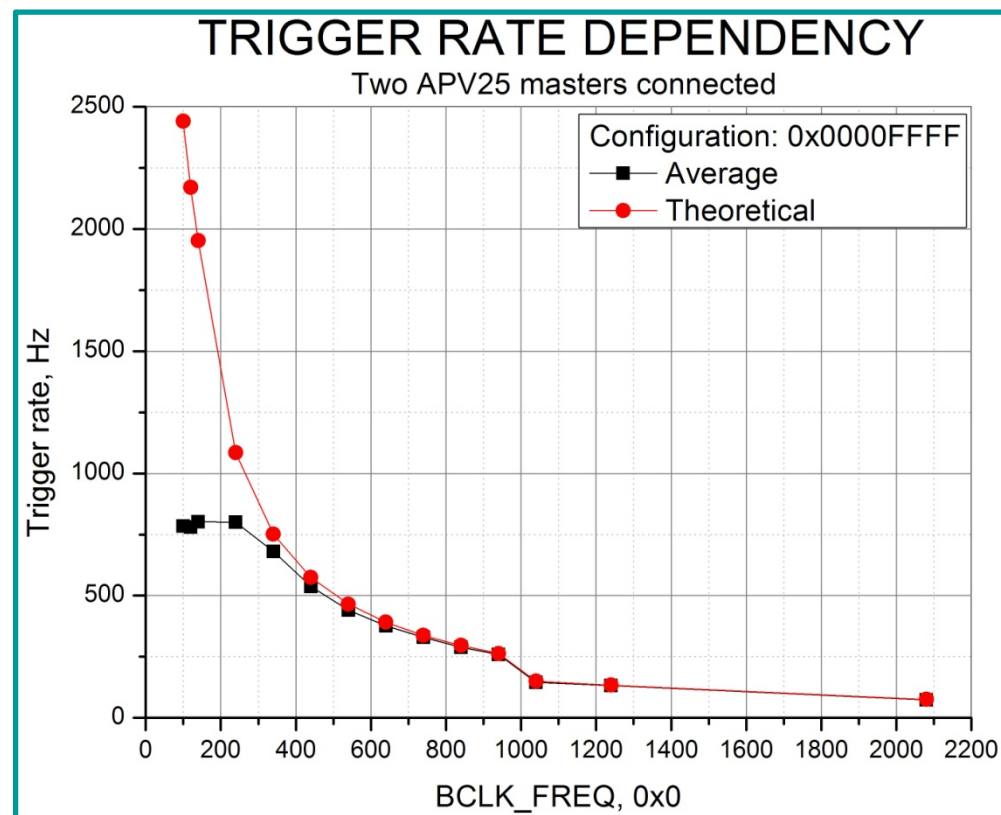
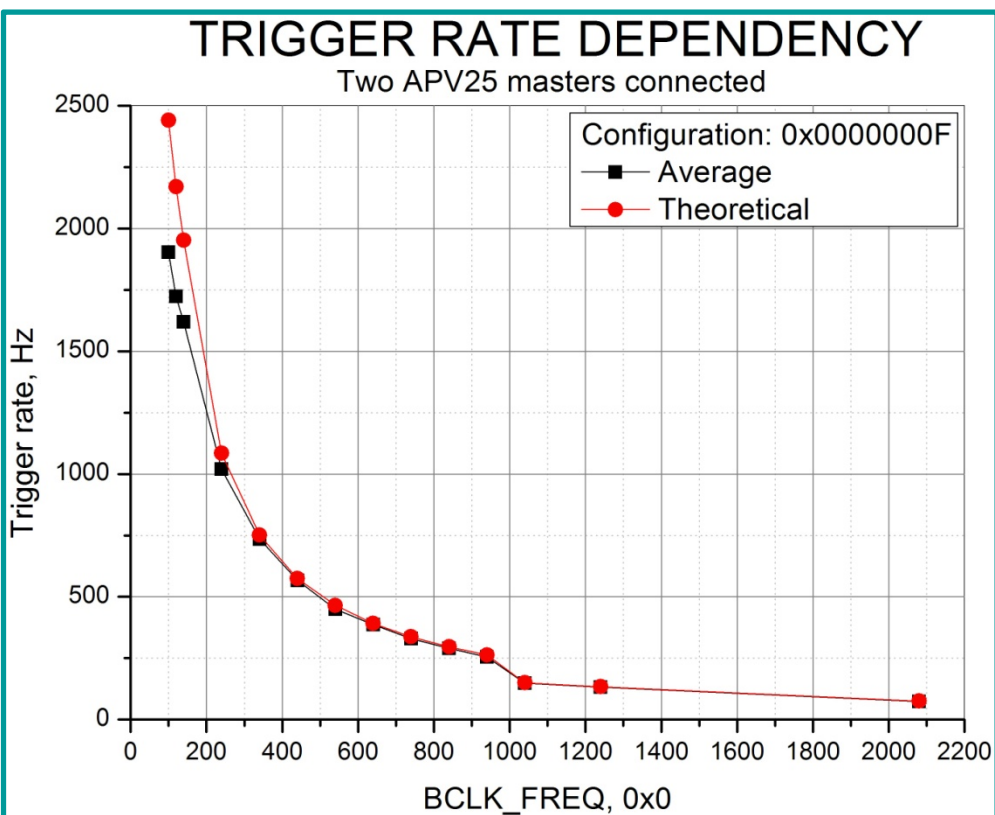
The maximum average trigger for the configuration of 4 APV25s was very close to 2 kHz in contrast for the case of 16 APV25s the maximum was reached at 784 Hz





Installation, Configuration and First Tests (cont.)

For the case of small quantity of APV25 chips connected to a FEC, the mean trigger rate is almost in complete agreement with the theoretical one. For the case of 16 APV25 chips, which is the maximum number of chips that one FEC can served, there is a saturation around 800 Hz, nevertheless in all cases no data losses were observed.





TODO

- Run Amore with the scripts provided by Kondo
- Compare file size and consistency of the data
- Customize all the parameters for my setup
- Investigate Common mode and pedestal corrections
- Work in the latency scan