DHE, Back-end Electronics

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Physik Department E18 - Technische Universität München

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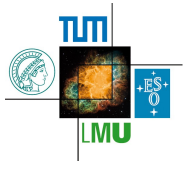
supported by:
Heinz Maier-Leibnitz Zentrum
Cluster of Excellence: Origin and Structure of the Universe,
BMBF



Bundesministerium
für Bildung
und Forschung

FRM II
Forschungs-Neutronenquelle
Heinz Maier-Leibnitz

Outline

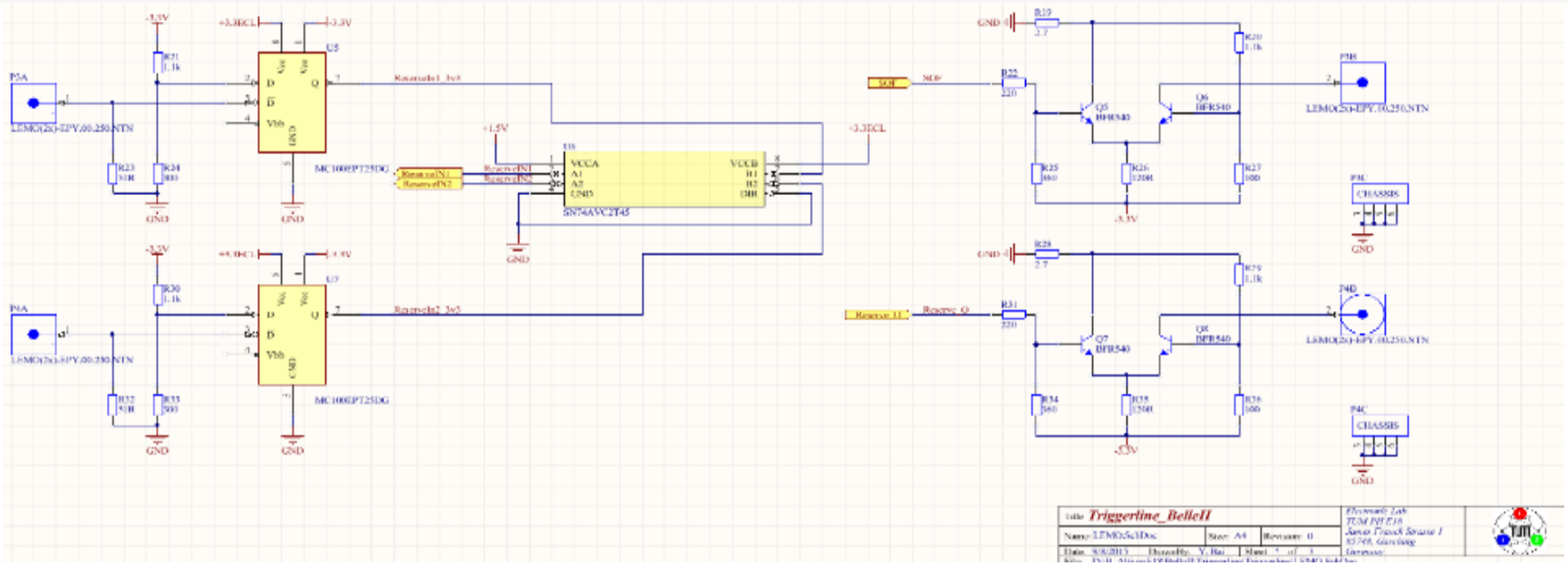
Gated Mode Test Preparation

Firmware and software

Hardware and Test

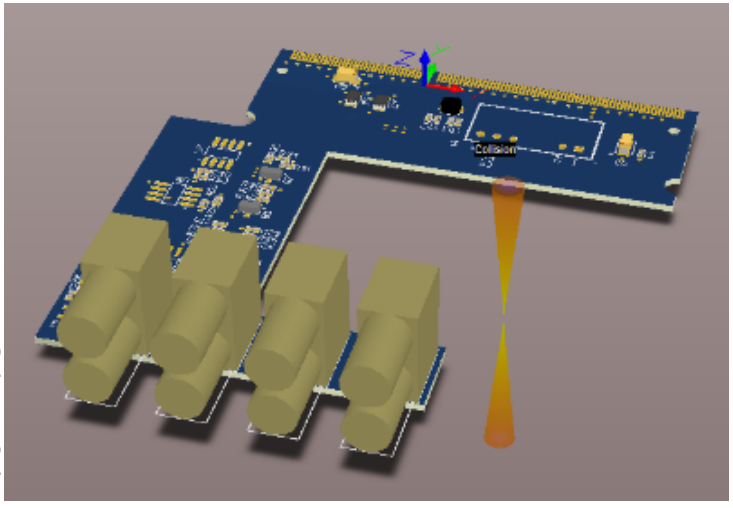
Summary

Adapter card



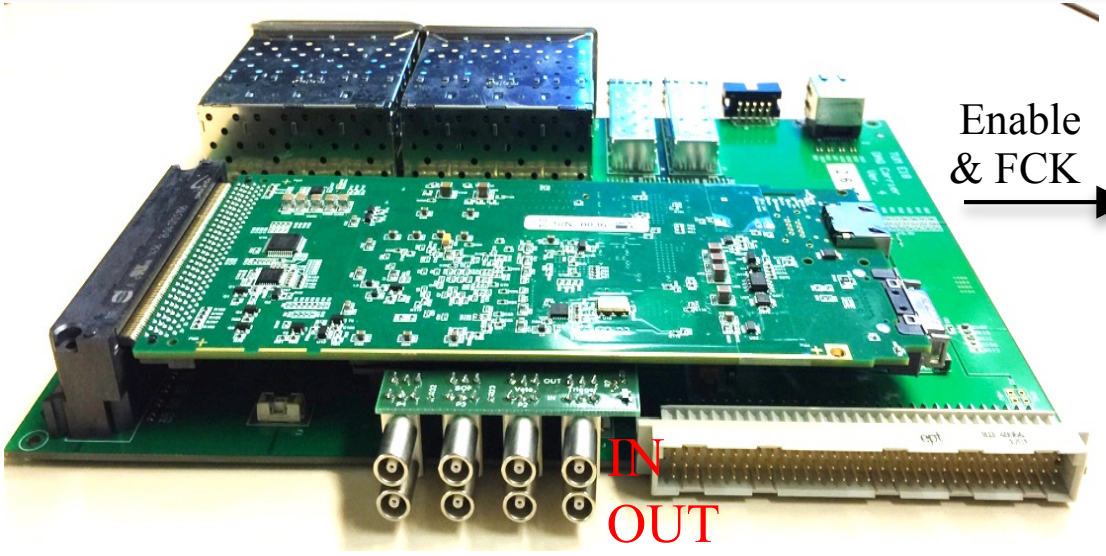
LEMO Connector

- 4 input, 4 output
- NIM standard, 16mA 50 Ohm terminated
- 0V means logic 0
- -0.8V means logic 1



76Yx78X mm

Setup



Enable & FCK

Memory Configuration

Trg Strobe	Trg	Veto	Laser
x	x	x	x
x	x	x	x
x	x	x	x
⋮	⋮	⋮	⋮

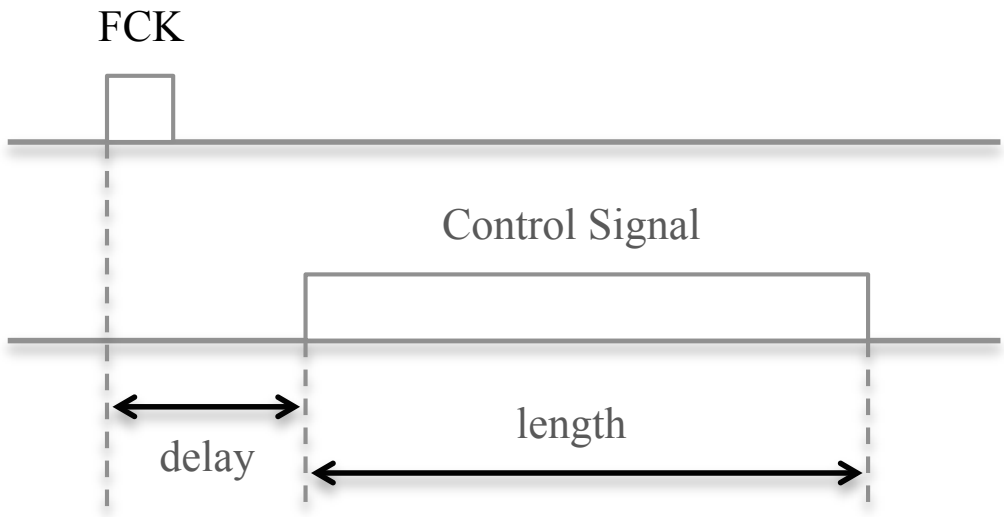
DHH DHPT Laser Control

Sequencer Memory Block

- Start signal from Lemo connector/TLU/IPbus
- x sequences configured via IPbus
- Trig, veto directly to DHPT
- Laser signal output via Lemo for controlling
- Further detail have to be discussed

Outline

Firmware Features for Lab Tests



1. Configurable control signal for DHPT
   - Memory dump, Veto, Trigger synchronized to FCK before Manchester encoding
   - All signals have configurable delay and length
   - Configured via IPbus

Firmware

1. Firmware

- DDR3 Memory has been included in the latest firmware version

  To buffer data before sending to UDP

  For DHPT stress tests

- Reading out of unique FPGA identifier (DNA, 56 bits)

  For DHH module identification

  Accessible via IPbus, EPICS PVs

- Dynamic reconfiguration of FPGA high speed serial link

  Switching of the DHPT data rate (full/half rate) without recompiling the FPGA program

  Accessible via IPbus, EPICS PVs

Software (by D.Levit)

2. Software

The functionality of the separate programs being moved to “devDHE” module(EPICS). The programs will not be maintained.

- Clock programming → PXD:H1032:clock_frequency:set
  Possible value: 62.5Mhz, 65Mhz, 67.84Mhz, 71.2Mhz, 76.23Mhz, 127.21Mhz

- Software trigger
  Enable Software Trigger → PXD:H1032:ipbus_trg_en:S:set
  1 = activate; 0 = deactivate

  Set Frequency → PXD:H1032:trg_ipbus_freq:VALUE:set

  Set Trigger Number → PXD:H1032:nr_of_ipbus_trg:VALUE:set
  0 = unlimited number of trigger

  Set Start Trigger Number → PXD:H1032:ipbus_trg_start_nr:VALUE:set

- Data rate on DHPT → PXD:H1032:half_rate:S:set
  0 = full rate; 1 = half rate

Outline

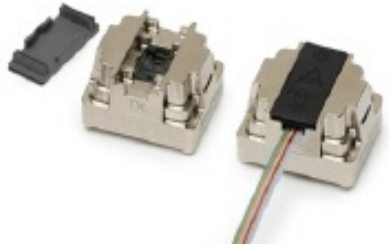
Optical Transmitters for Dock Box

1. Glenair 050-301-0X[1]

850nm, 100Mbps - 4.25Gbps
3.3V, 300mW Power consumption
Size 24x8x8 (mm)

2. Avago AFBR-811FN1Z[2]

12 channels, 850nm, 10Gbps per channel
3.3V, 2.5V; 100mW per channel
Size 22x19x15 (mm)

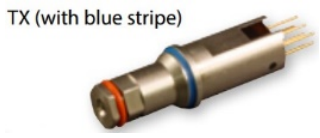


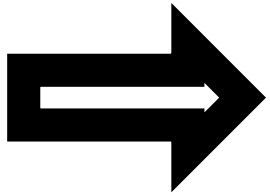
	Glenair	Avago
Neutron	Passed	Passed
Gamma	Passed 230krad	Failed @ 90krad (approx. 9 years dose in Belle II)

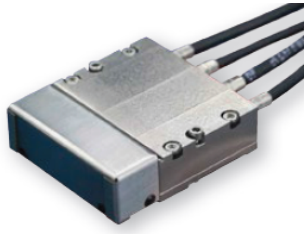
Glenair Optical Transmitters

- Meeting with Glenair on July 7-th

  Change of package from wall mounted to cost efficient PCB mounted
  Company has to integrate rad tolerant transmitters into new package
  Delivery time is 11 weeks







- Offer for 50 pcs + 20m of optical fiber cables: 50 k€
- Few details have to be clarified with company. We expect to order in 2 weeks.
- Repeat Gamma irradiation test

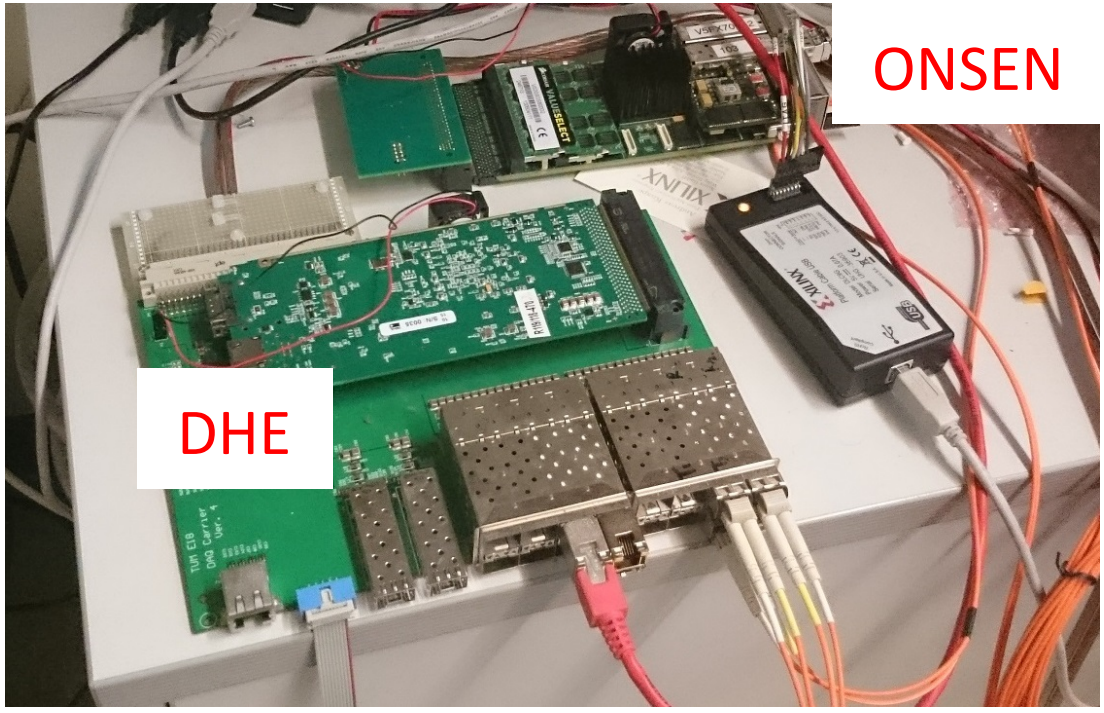
DHC for Pocket DAQ test at KEK

Activity in June 2015

- DHC module was installed in Tsukuba hall with dedicated PC
- All components are integrated in DAQ environment
  - Ethernet access
  - IPbus
  - B2TT
- System is fully controllable remotely
- Still to be connected and tested with ONSEN

DHC-ONSEN tests at TUM

- 6 Gbps Aurora link works stably but still requires more reset attempts then 3Gpbs => time out issues of Aurora protocol
- DHP/DHE/DHC data generator has been written to provide realistic system tests to check ONSEN data decoding and high rate event handling
- To be accomplished by end of September



Outline

Summary

New hardware for Gated mode ready

Firmware

- Gated mode developed, details to be discussed
- FPGA DNA support
- Dynamic reconfiguration of FPGA

Software

- Moving individual program functionality into EPICS
- Programming of the DHPT memory over EPICS array PV is under development

Pocket DAQ Tests

- DHC has been installed in KEK
- Test of DHC – ONSEN at TUM is in progress

Summary

Thank You for Your Attention!