# DHH

Igor Konorov
TUM Physics Department E18

10-th VXD workshop
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Santander

Overview:

- Irradiation test of GLENAIR transmitters
- GLENAIR transmitters and magnetic field
- Status of optical components orders
- Display Port
- Plans

# Irradiation of Glenair Transmitter

- 2015 irradiation campaign

<u>Glenair 050-301</u>
850 nm, 2 Gbps
Power consumption 300mW/channel
Size 20x10x10 mm

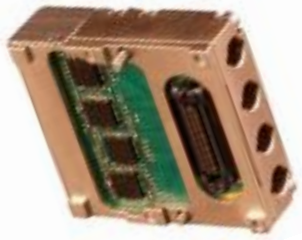
Neutron : 2.5 $10^{12}$
Gamma : 230 kRad

TX (with blue stripe)

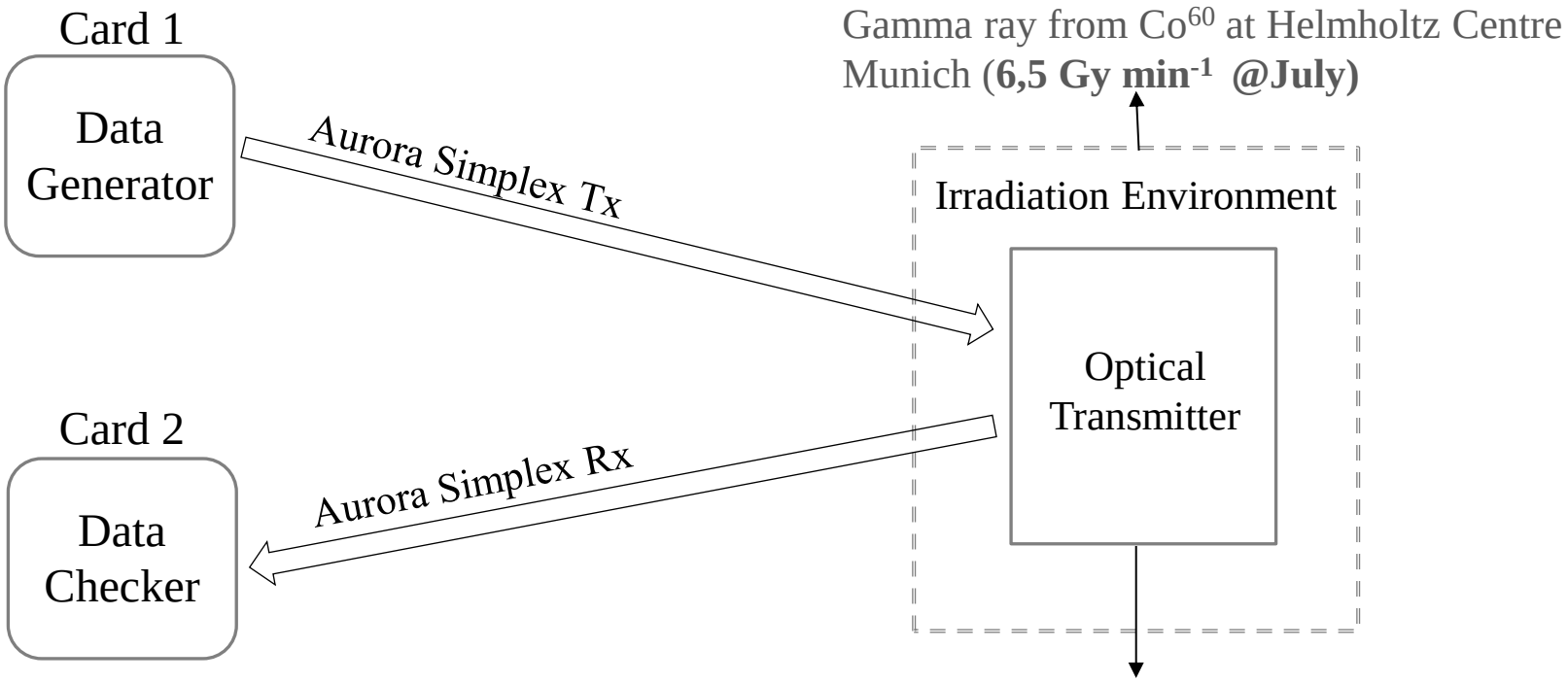
- 2016 irradiation campaign

**Glenair 050-363**

Only Gamma irradiation



## Setup Diagram



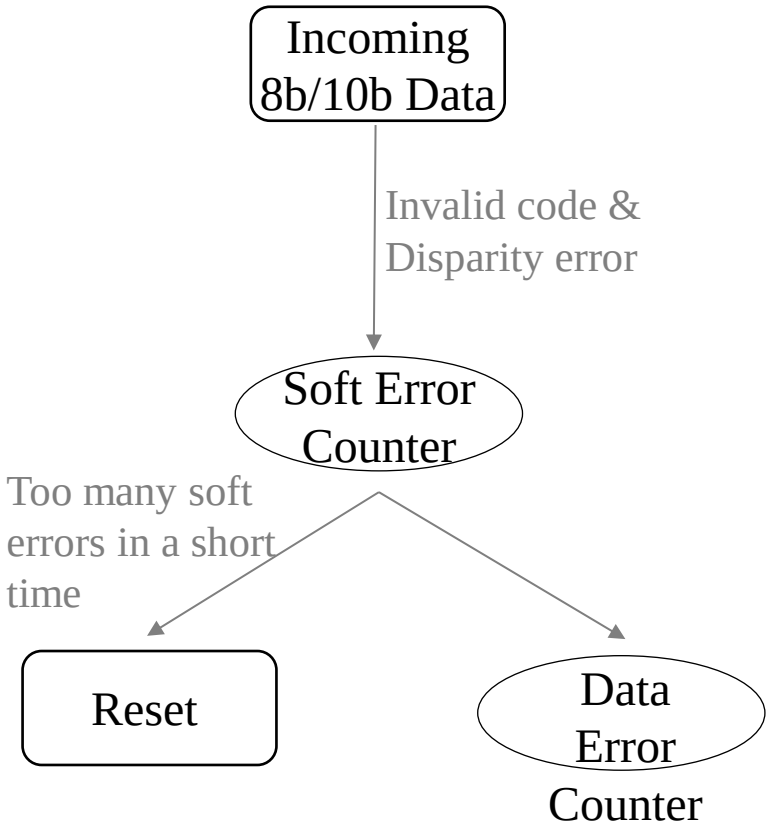
## 1. Aurora Simplex Protocol

- 125Mhz reference clock
- 2 Gbps with 8b10b encoding
- Continuous data stream

## 2. Error detection

- Soft error counter (protocol level)
  1) Corrupted data is not valid in 8b/10b table
  2) Corrupted data is in the table but has the disparity error
- Data error counter by checking data content

  :if received /= expected then cnt = cnt++



# Control and Monitor

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## 1. Data read and write via IPBus

Rx

Tx


## 2. Error information is recorded in the file by a script

# Results



- Gammacell rate
  Rate = **6,5 Gy/min = 655 Rad/min**

⇒ Exposure time = 380 min or 250kRad

**Results:**

- 4 channels were exposed simultaneously
- Device worked stably, not a single error detected
- Slight change of power consumption below 1%

# Remaining questions about optical transmitter

# Last remark about Transmitters

Yutaka question : do we have enough safety margin?

To answer direct measurement has to be performed at Belle in 2017

Radiation monitor:

CERN developed radiation monitor which can be considered for such measurements. No for free.

Should we discuss it next time?

# Magnetic Materials

## Kovar

- Used for the sub-mounts in aser and photodiode hermetic TO packages
- Matches thermal expansion coefficient with glass which seals laser
- Electro-magnetic properties do no play a role for device operation
- Transmitter functionality has been tested @0.5T
- It's planed to test @1.2T

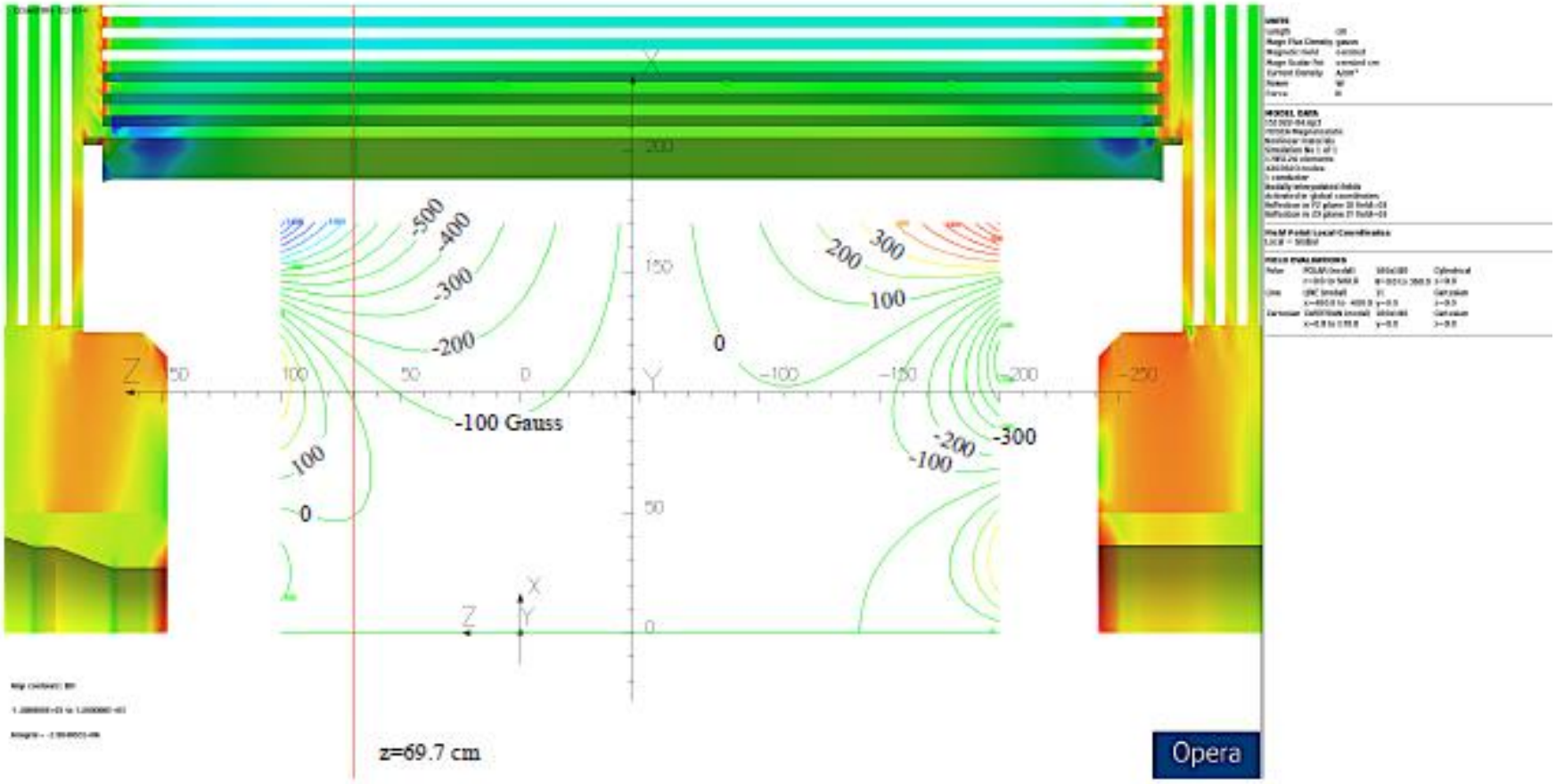
## Problem of magnetic forces to be investigated

- Dock Box coordinates
  - FW  z 1645÷2060 mm; r 300÷403 mm
  - BW  z -995÷-1410 mm; r 344÷446 mm
- More probably there is no field map in this region
- In contact with Yasushi Arimoto
- To perform measurement is advisable
- Forces on Transmitter along PCB, Transmitter screwed to PCB but still forces may propagate to connector
- Reinforcement to keep transmitter at place needed !!!

# Magnetic Field, Br

## I. $B_r$ Component

### A. Br component on z-x plane.



# Status of Optical Components

- 20 Transmitters delivered + 25 ordered
- All optical LSHF cables ordered , delivered this year

# Display Port Cable

Single cable for everything:

- TRG/GCLK
- JTAG
- Current source
- DHP sense voltages VSS, VDD
- Power for optical transmitter

# Problems

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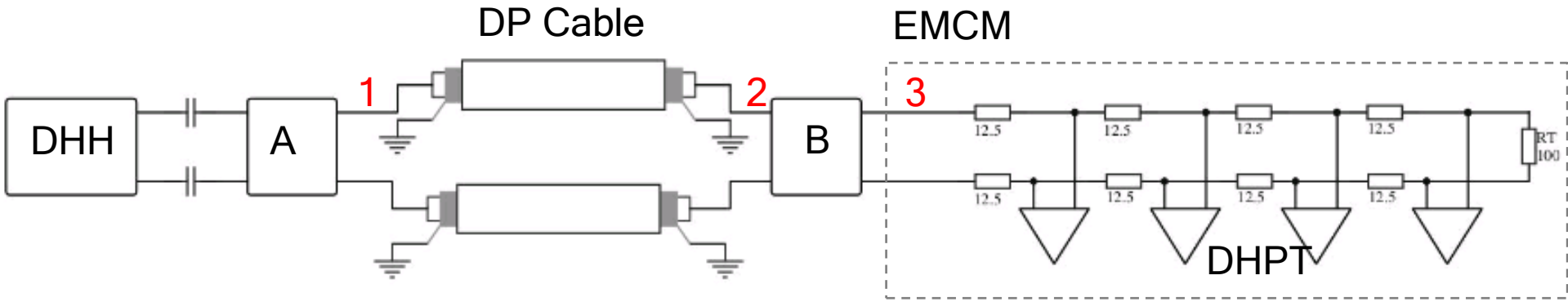
1. Display Port Cable 9mm
   - Diameter: 9mm
   - Length: 15 meter
   - High speed link between EMCM and DHH

   → **Correct DHPT command through**

2. Display Port Cable 7mm
   - Diameter: 7 mm
   - Length: 20 meter
   - **NO** high speed link between EMCM and DHH

   → **DHPT command ??**

# Test Setup Diagram: Structure I




- 7mm DP cable

  *HP link → No,*
  *Reflections.*

- 9mm DP cable

  *HP link → Yes,*
  *Reflections.*

# Test Setup Diagram

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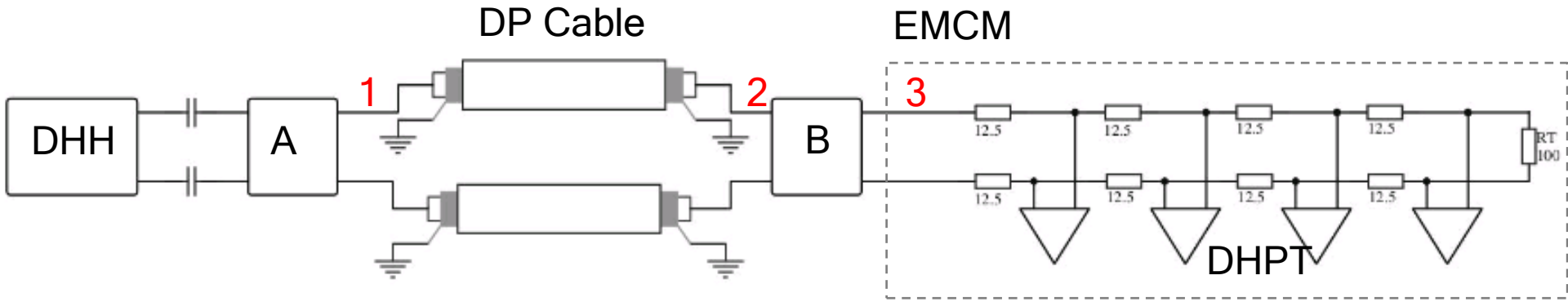


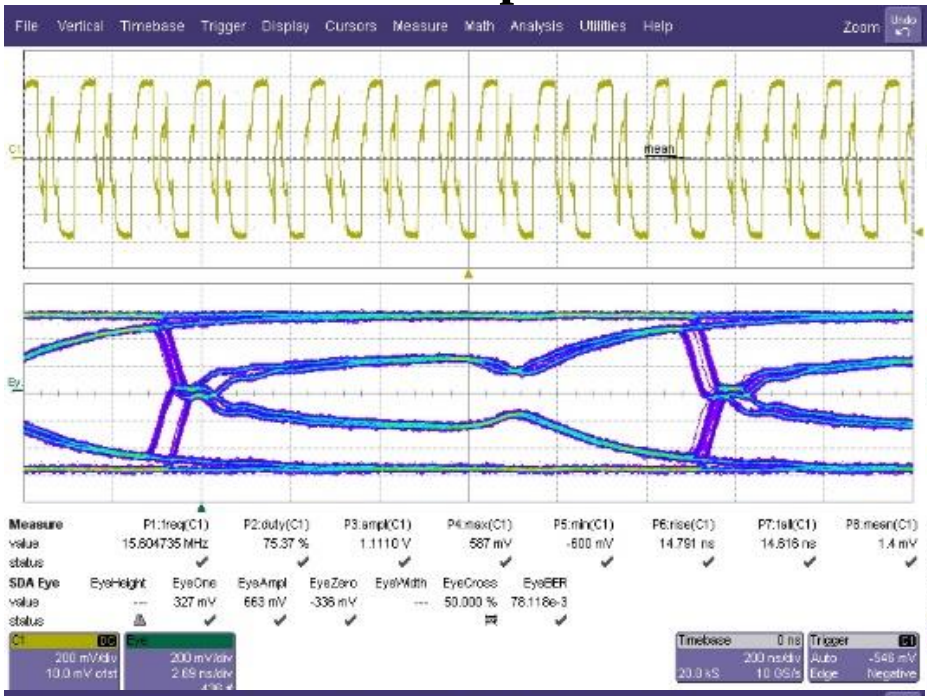

- A, B are transition cards between Infiniband, RJ45 and DP connectors
- Measure Point 1: input of the DP cable
- Measure Point 2: output of the DP cable
- Measure Point 3: input of the EMCM

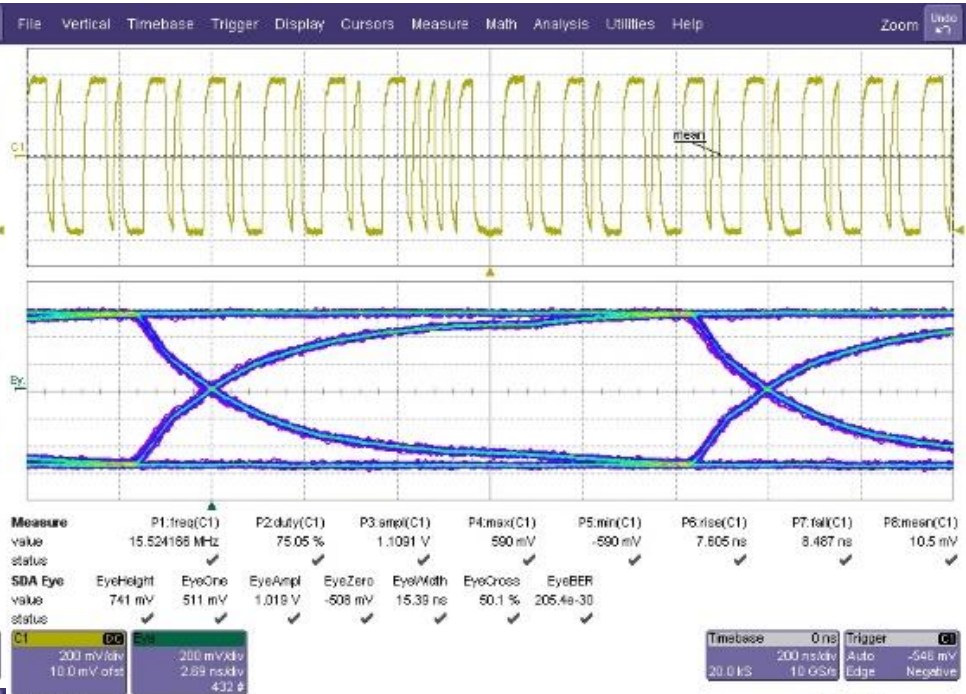
**Observation 1** : input impedance 200 Ohm instead of 100 Ohm due to alu wire resistance on EMCM

# DP Output

# EMCM in

9

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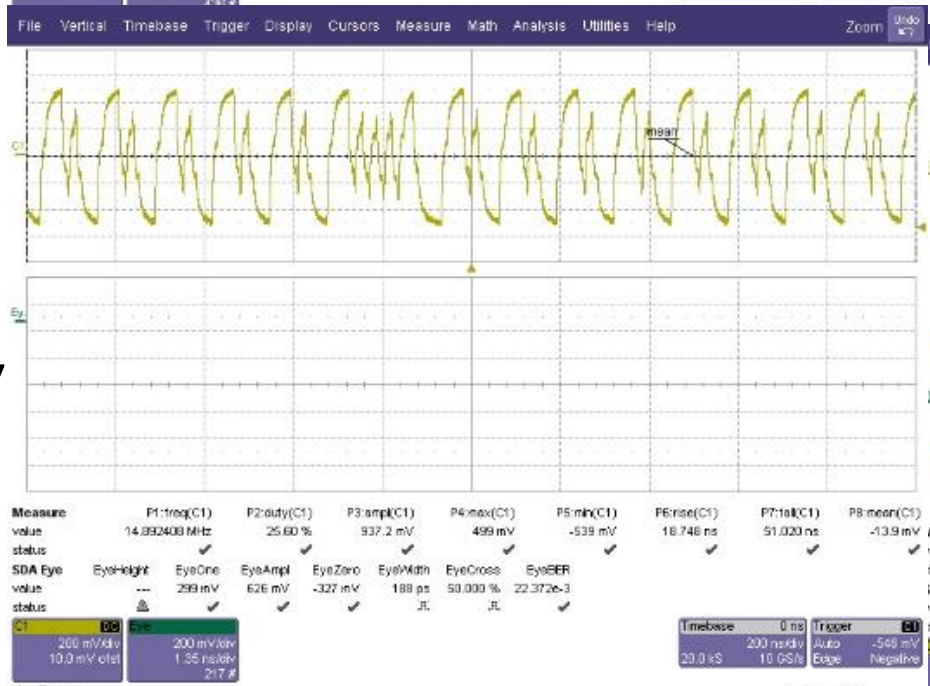
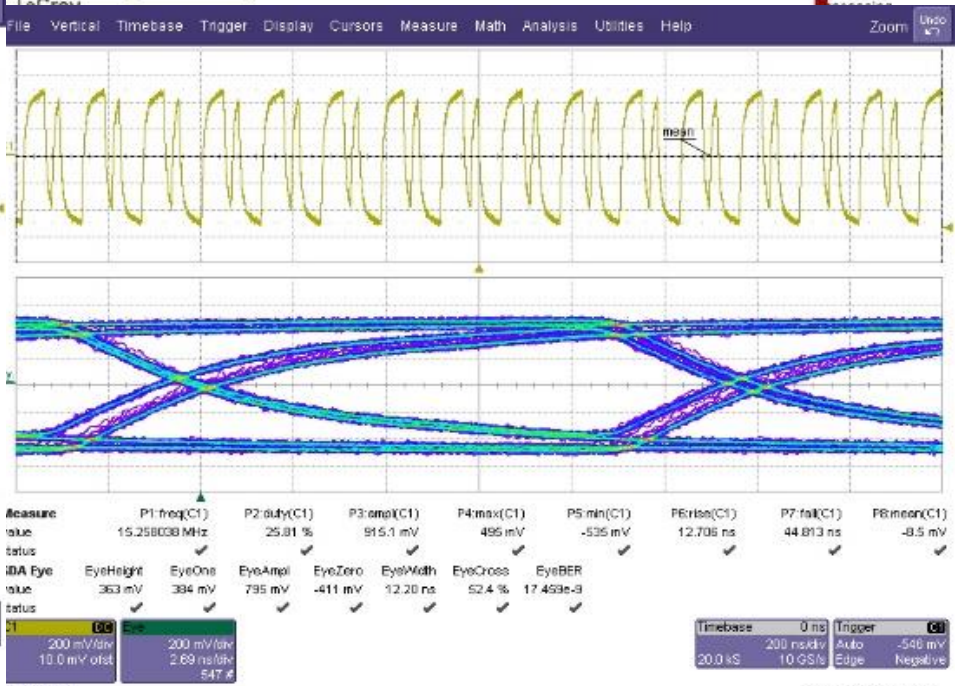
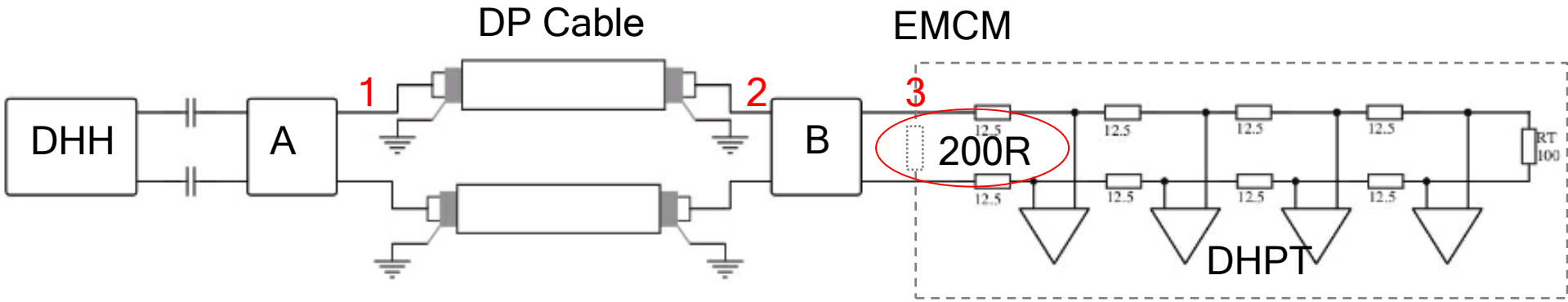


# Test Setup Diagram: Structure II




- Because of reflections, 200 Ohm resistor is in parallel

  → *links **can not** be established even with 9mm DP cable*

**Observation 2 : DC level of TRG/CLK signals at 50-80 mV**

**After introducing 800 mV biasing links can be established with both cables, with and wo 200 Ohm =>**

**Most probable reason for synchronization problems in April**

# Display Port Cable

Powering of optical Transmitter

- No sense wires
- 7mm cable voltage drop 1.9 V
- 9mm cable voltage drop 0.5 V => reliable powering conditions

Proposal:

Employ 9 mm Display Port Cable

Availability:

15 m LSHF DP cables of 9 mm diameter from a shelf

Required length : 30 cables of 15 m and 10 cables of 17 m

# DHH activities for DESY TB

## Tests:

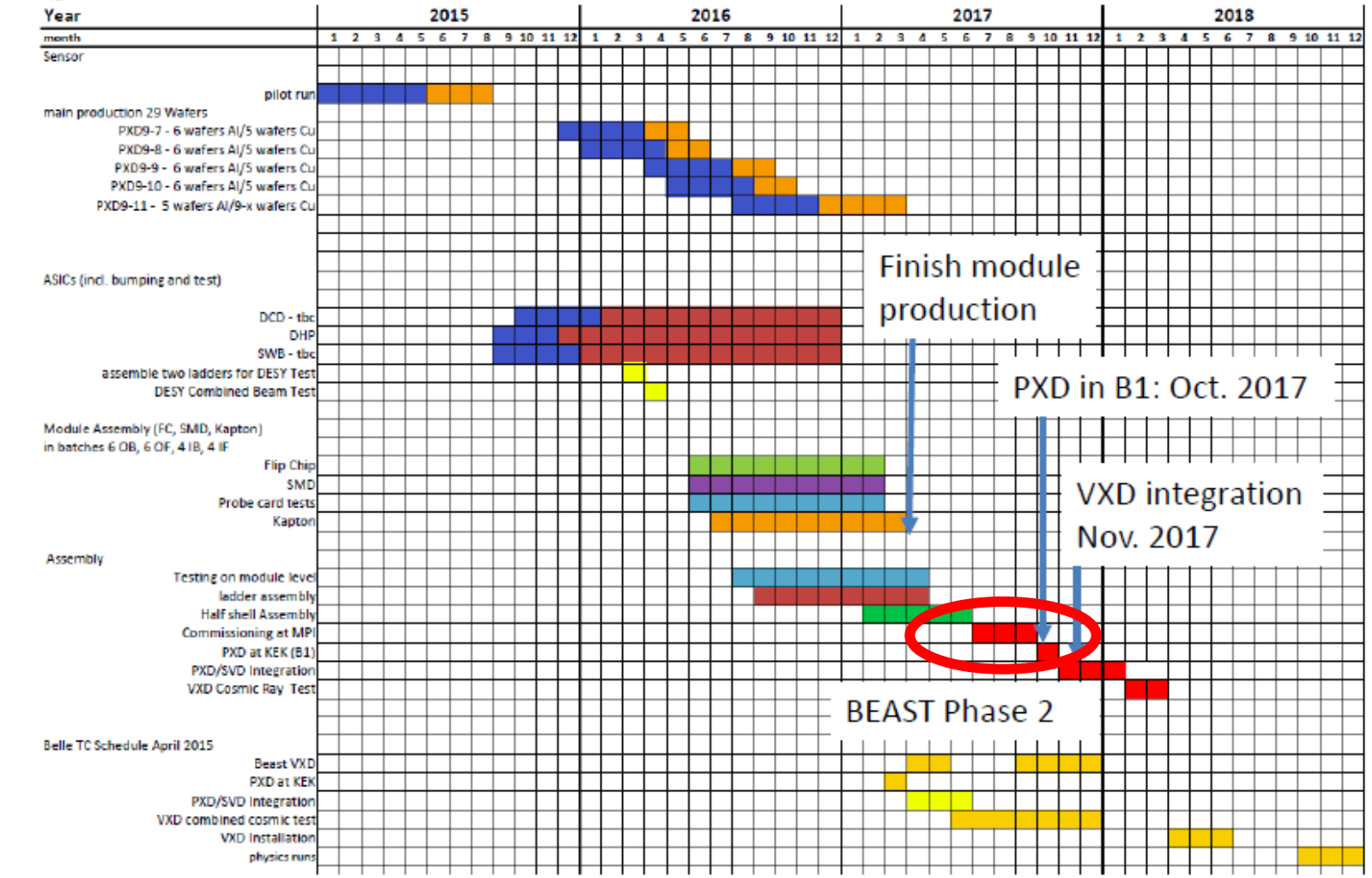
- EMCM with optical cables and 20m DP cable – done;
- PXD9 with short(2m) and long(15 m) Infiniband cable to co – in preparation ;
- New B2TT firmware version 0.46, in April DHH was running with 0.46 firmware while SVD worked with 0.45 - done;

## Readiness for DESY:

- Start with April setup to confirm synch problem – ready;
- B2TT event number mismatch – tested;
- Switch to UCF (single fiber interface DHC-DHE) - being tested now
- Firmware handling overlapping triggers – next to be tested
- Remapping, waiting for VHDL code from Giessen
- RTM and ATCA CC for optical interface – prototype to be available in November (critical)

# Remarks about Planning

## Updated PXD Production Schedule




C. Kiesling, BPAC VXD Review, KEK, Oct. 24-26, 2015

# Milestones for Planning

1. 5 final(!) detectors + 5xDHE + 1xDHC + 1ONSEN – tests and debugging – 6 month

2. 20 detectors + 24xDHE + 4 x ONSEN – 3 month

3. Complete PXD detector – 3 month

THANK YOU