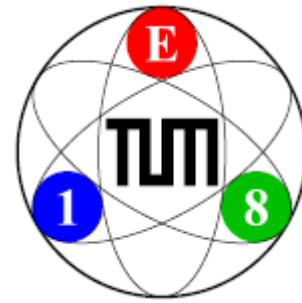
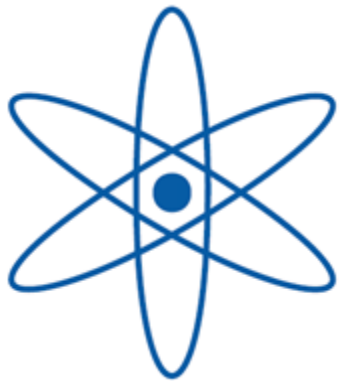




DHH Status

Igor Konorov

TUM Physics Department E18

DEPFET Lab meeting

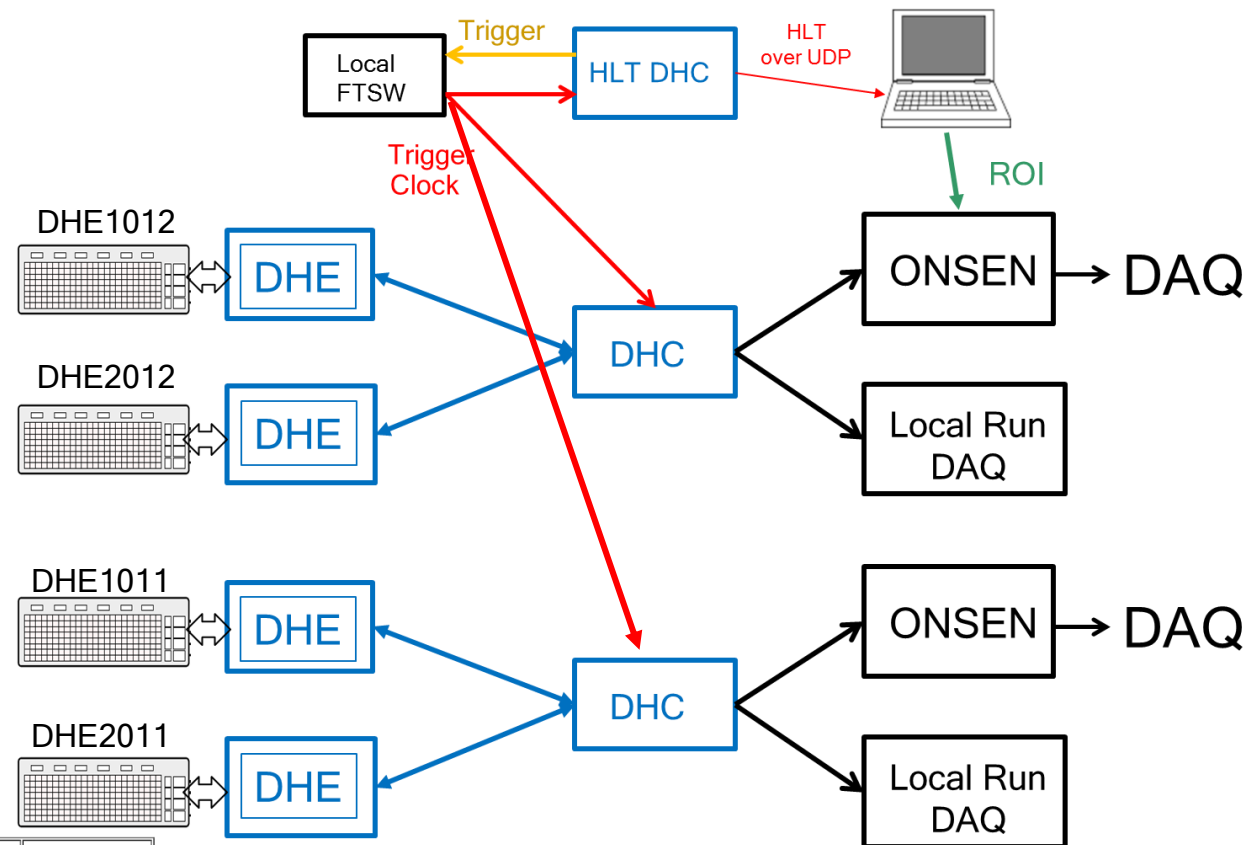
May 29-th 2017

Ringberg

Overview:

- DHH in Test Beam
- Dockbox PCBs' test results and Camera Link Cable
- DHCC, DHRTM and DHI hardware status
- Firmware status
- Summary

DHH @Test Beam in 2017



Module ID	Carrier Card	Lable	Serial #
DHE1012	14.3		74
DHE2012	2.6.15		34
DHE1011	16.15		66
DHE2011	16.18		21
DHC1	no lable		72
DHC2	16.17		33
DHC HLT	2016.03		48

- Four detector modules were read out via Optical Links + 10 m of Infiniband cable for GCK and TRG
- DHH system is very stable with known trigger rate limitations
- Main issue : unstable HS links
- Issue with Synchronization of DHH and ONSSEN reset
 - DHH reset manual or by Run Control
 - Next version : B2TT reset will be used for DHH reset
 - FE reset => LONG RESET
 - Start of run reset => SHORT RESET
- No UDP data in Bonn-DAQ after reset
 - Independent reset for UDP

- 4 cards : DB_PCB_05 – DB_PCB_08
- RJ45 connector has wrong pin assignment, JTAG should be connected directly to PP or using special JTAG adapter card. All components were tested successfully.
- POWER –OK
- Power of Optical transmitter OK
- Holes for fixation of optical transmitter should be increased to 2.5mm
- High speed serial links OK

- This card shall be used only in PERSY
 - Limited number of spares GLENAIR transmitters and fibers

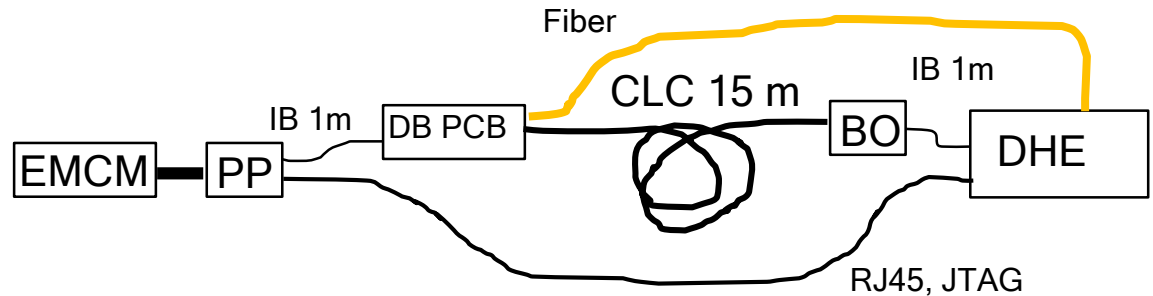
Camera Link Cable Test

Camera Link Cable

- AWG28
- 15 M long
- GCK, TRG

High Speed Link

- Infiniband AWG26
- 1M

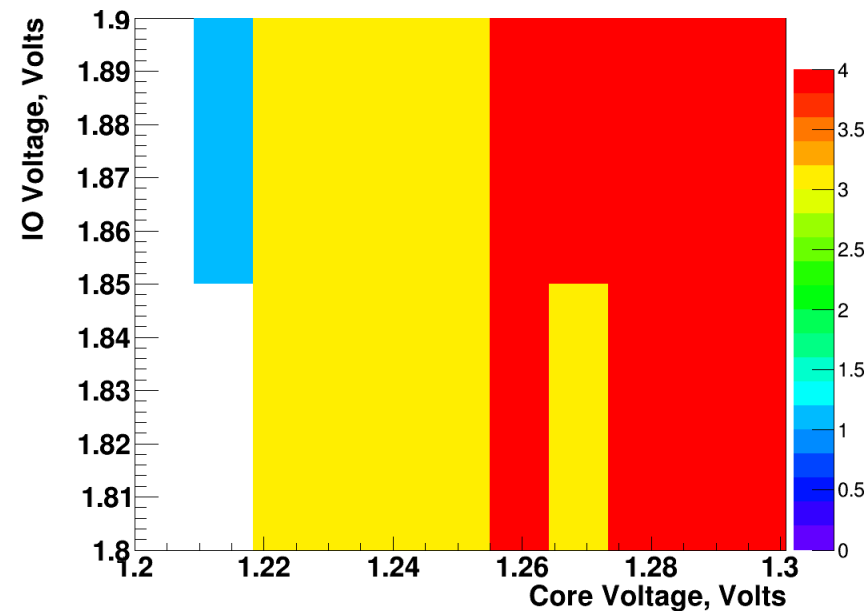


- DHPT High Speed serial parameters

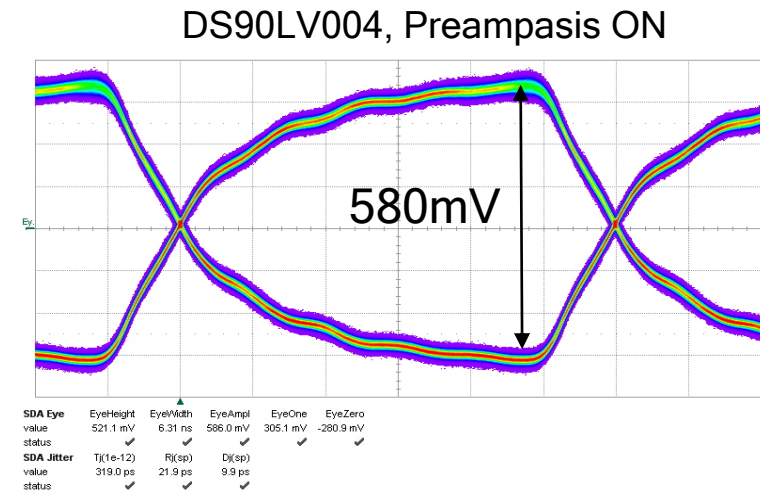
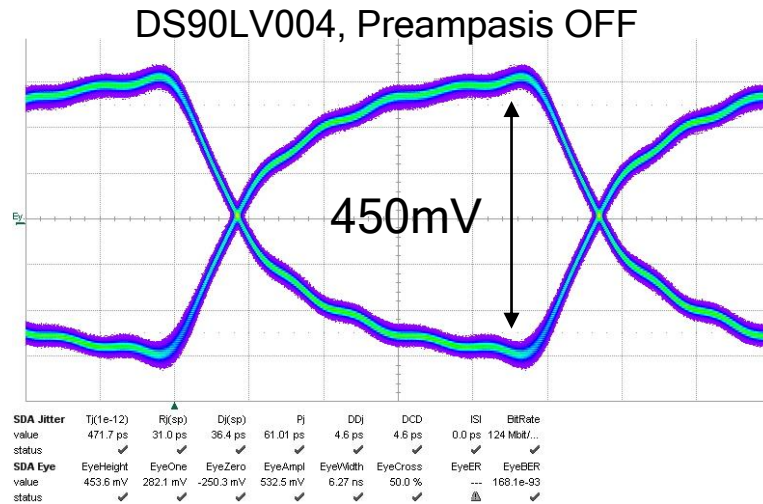
Bias D, Bias B, Bias Delay have small influence on link stability

- LinkUp dependence on CORE and VCCIO voltages @76MHz,

Link UP does not means that the link is stable. It may go OFF state after certain period of time

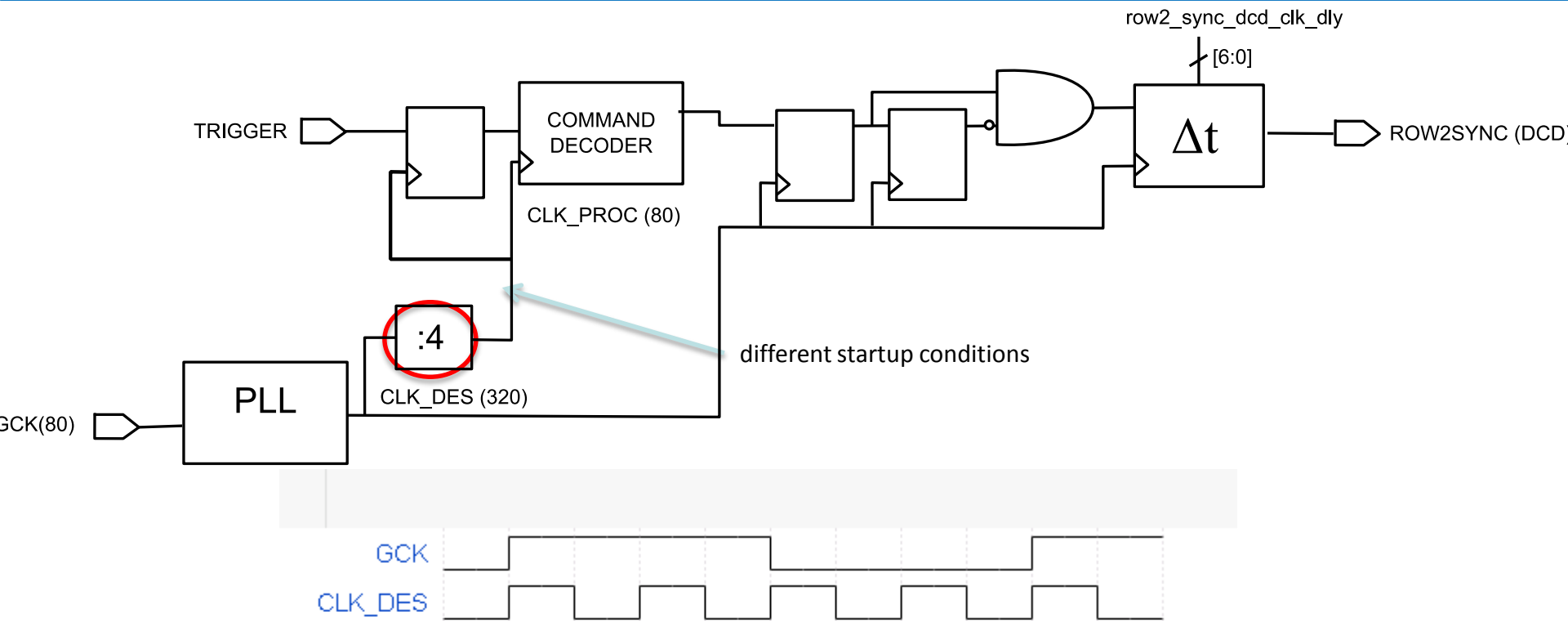


- GCK 76MHz after 15 m cable, 100 Ohm termination



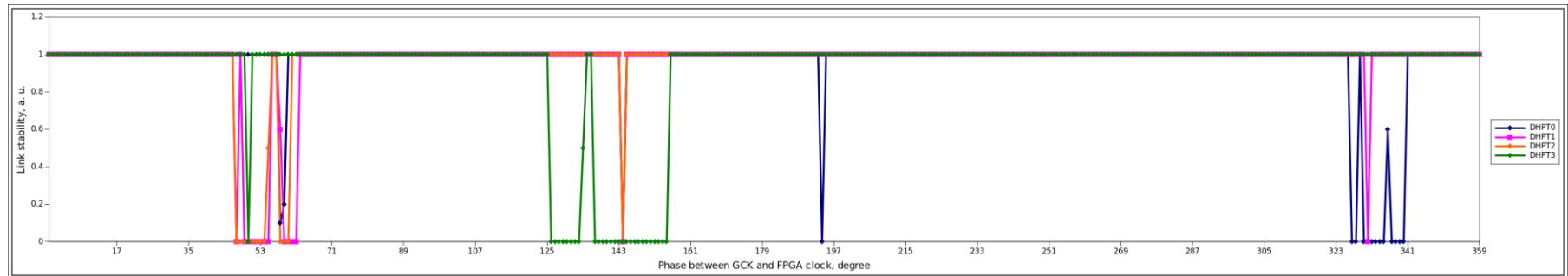
- Preamphasis has no visible impact on link stability

Test of GCK and TRG Phase Relation



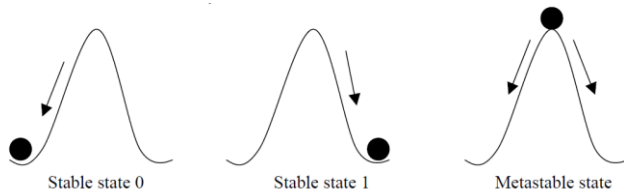
Measurement :

- Setting GCK phase with, one step is 35ps
- Link Up – 1, Link Down – 0



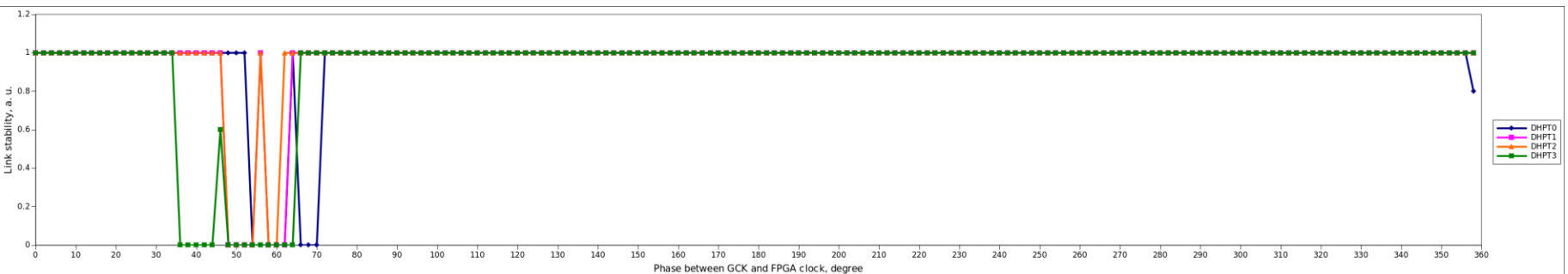
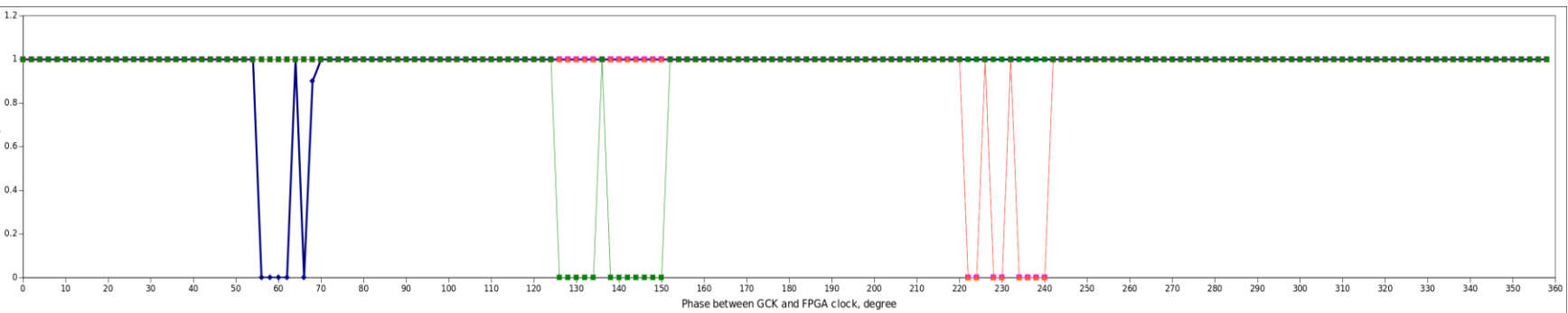
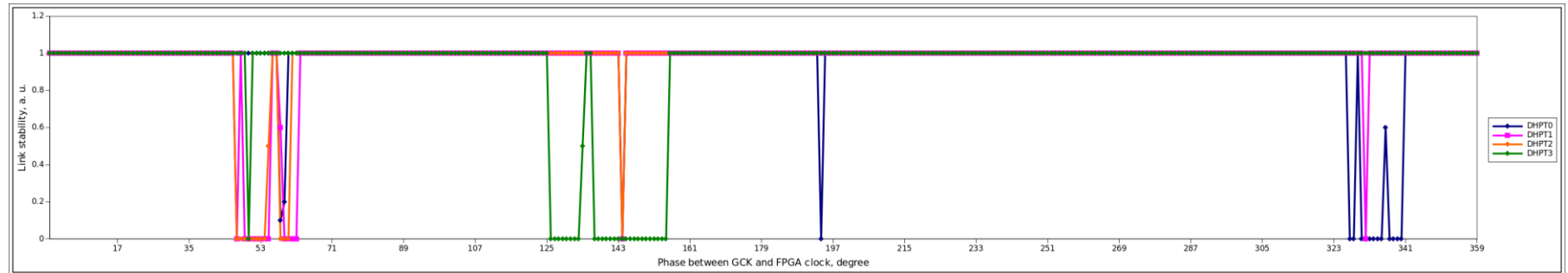
Two effects cause failure :

- GCK vs TRG jitter
- Flip-Flop metastability in DHPT

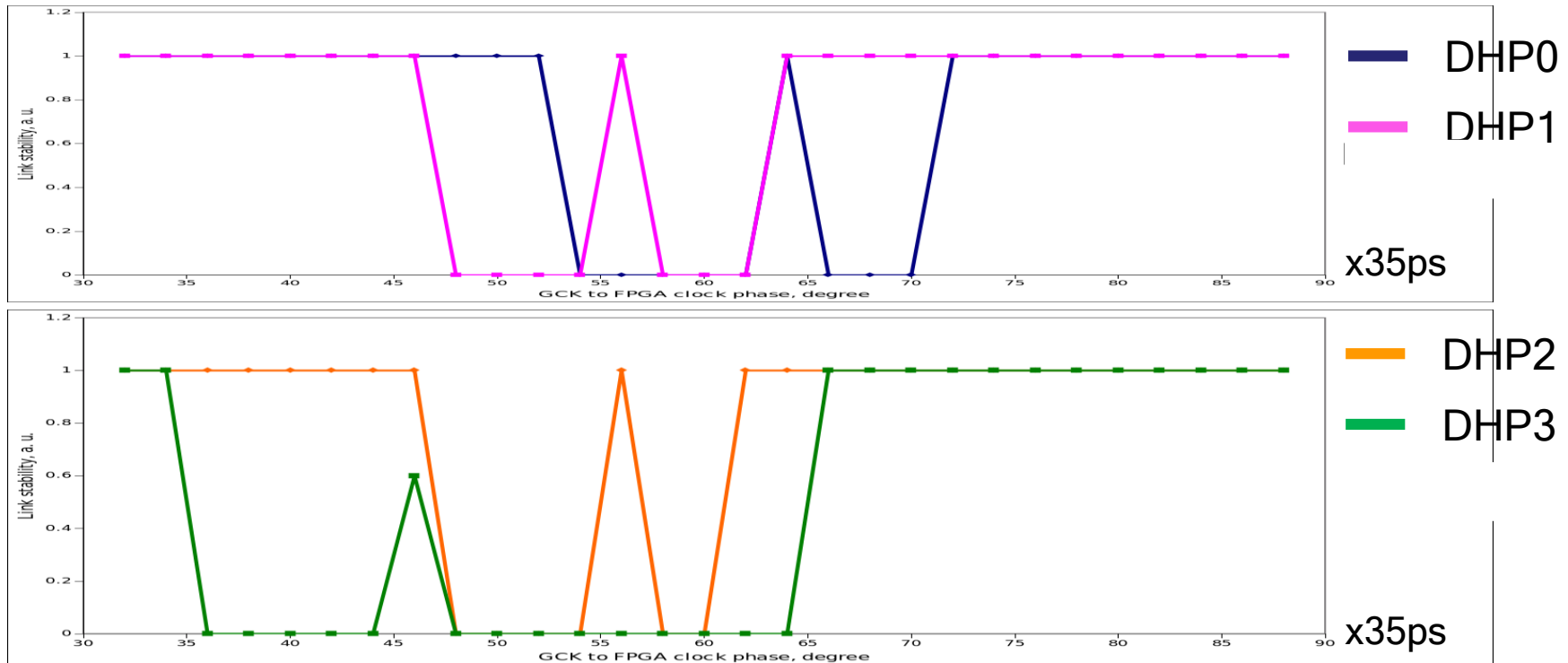


GCK Phase Scan

After Power Up picture Changes due to uncertain initial phase of $\frac{1}{4}$ divider



Zoom in of GCK Scan



- Full width when link is down: DHP0 – 315ps; DHP1,2 – 210ps; DHP3 – 425 ps
- DHP1 and DHP2 are synchronous => GCK and TRG lines between DHP1 and DHP2 in the middle are equal length
- In opposite DHP0–DHP1 and DHP2–DHP3 are not equal
- Link goes Up within not working region. Why ? Reflection ?
- Effects are stable in time and reproducible => jitter is low

- Camera Cable Link AWG28 of 15 m tested
- GCK and TRG signals have expected signal quality
 - 550mV signal swing
 - 20-30 ps jitter
- Problems observed with link stability are not related to the cable
- Two more tests
 - read DHPT test board to check link stability
 - Include LVDS buffer in DockBox PCB

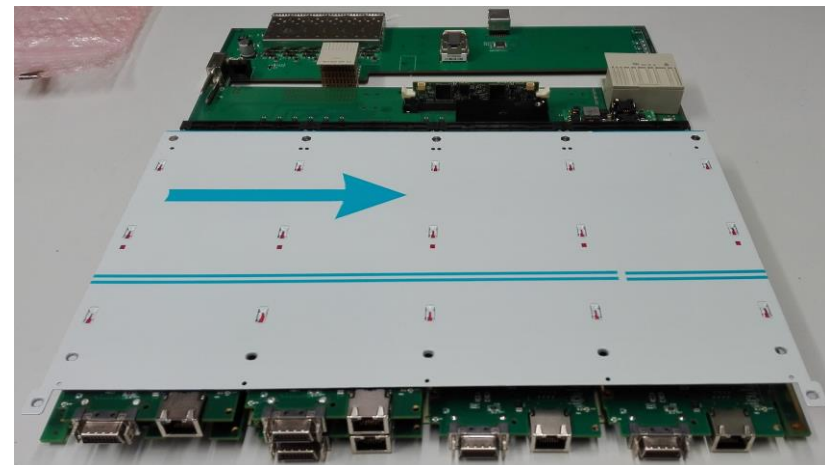
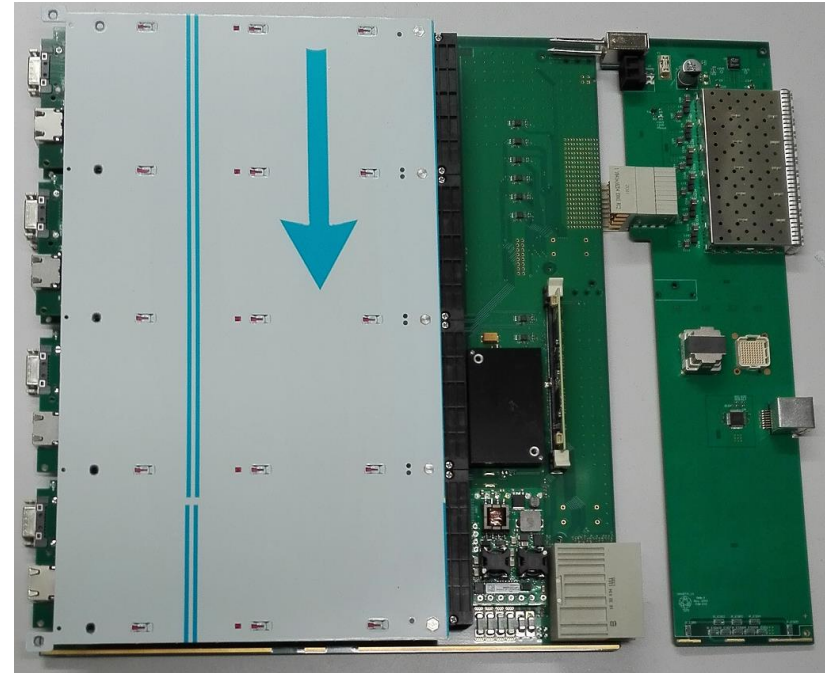
- 10 cables ordered
- 3 cables will be delivered on KW 23 to HLL
- 7 cables will be delivered on KW 26 to HLL

DHC Remaining Hardware I

- DHCC
 - 2 prototype cards ready
 - Will be tested next week

- DHRTM
 - 6 prototype cards ready
 - Will be tested next week

- Delivery of final modules should be in end of July



- DHE + galvanic isolator circuit
- Prototype schematic ready, to be tested in June
- Final Module design – 4 weeks
- Production 4 weeks
- Will not be ready for September, direct connection from DHE to DockBox PCB will be used
- I aim to install module in October

- Current functionality sufficient for commissioning
- Few important features to be implemented
 - DHE : Overlapping triggers
 - DHC : Event distribution to 4 ONSSEN
 - DHE+DHC : Recovery Logic
- Quite some work but not critical

- DHPT zero suppression works correctly (Andrei)
- Created environment needed for system tests and readout error diagnostics
- DHPT link stability problem persists and requires further investigation
- Problems with Link stability are not related to Camera Link Cable performance
- DHCC and DHRTM are on track
- DHI delivery is critical
- Firmware functionality sufficient for start up, upgrades can be done on a fly