Contribution ID: **36** Type: **not specified**

Beam-based Arrival Time Feedback at FLASH

Thursday 8 December 2016 09:45 (15 minutes)

The free-electron laser FLASH with its up to 400us long bunch trains and high bunch repetition rates allows for applying an intra-train feedback system for an arrival time jitter reduction which is mandatory for many of today's pump-probe experiments.

Such a fast feedback system is based on superimposing the RF field information with beam-based measurements in an optimized Low-Level RF (LLRF) controller. The principle of operation had already been shown on a former electronics platform.
Now, we have proven its functionality with the new MicroTCA.4 based system.

The LLRF frontend receives the beam-based information from the Bunch Arrival Time Monitor (BAM) via an optical Multi-Gigabit link. The BAM application has been implemented on a Virtex-5 FPGA carrier utilising a specialised double-width FPGA Mezzanine Card (FMC), which incorporates following main features: 3 optical channel inputs (data and clock) with 800MHz InGaAs photodiodes followed by 2GHz current-feedback amplifiers, a clock generator module with integrated 2.8GHz voltage control oscillator (VCO), 4 ADCs for dual channel interleaved sampling at 16 bit with up to 250 MSPS.

Here, we present the MicroTCA.4 based frontend of the BAM and its application for the fast beam-based feedback system; the recent measurements have shown a bunch timing jitter reduction to below 20fs with simultaneous flattening of the timing slope across the bunch train, which was achieved during 24h long runs of a photon user's experiment.

Primary author: Mrs CZWALINNA, Marie Kristin (DESY)

Co-authors: Mr PIOTROWSKI, Adam (FastLogic Sp. z o.o. Lodz, Poland); Mr SCHMIDT, Christian (DESY); Mr DINTER, Hannes (DESY); Mr SCHLARB, Holger (DESY); Mr PRZYGODA, Konrad (DESY); Mr BUTKOWSKI, Lukasz (DESY); Mr VITI, Michele (DESY); Mr RYBANIEC, Radoslaw (Warsaw University of Technology, Warsaw, Poland); Mr PFEIFFER, Sven (DESY)

Presenter: Mrs CZWALINNA, Marie Kristin (DESY)

Session Classification: Session 5

Track Classification: Applications in research facilities and industry