現地レポート／OMET MATHIEU

School of High Energy Accelerator Science, Department of Accelerator Science）

Destination country: GERMANY

Receiving univ./linstitute: Deutsches Elektronen-Synchrotron (DESY)

Period of study: 13/10/2013 ～ 24/11/2013

Status of course/research progress

As a first project the klystron linearization implemented at DESY by Wojciech Cichalewski was analyzed and compared to the one I have implemented at Fermilab NML. This klystron linearization is essential to international linear collider (ILC) to improve the stability. Since the FPGA firmware implementation consists mainly of a lookup table and multiplications, the actual know-how is located in the MATLAB script for the generation of the lookup table. This script was analyzed and a way for improvements regarding the amplitude and phase linearization performance was found and suggested. A previously planned migration of the klystron linearization algorithm to the uTCA.4 board was canceled because no access to the FGPA firmware was granted in order to protect of DESY's intellectual property.

In a second project the klystron of the Accelerator Module Test Facility (AMTF) stand 3 was characterized in matters of output amplitude and phase using an open loop feed-forward (FF) scan. This data was recorded for several reasons. With this data the phase linearization performance of the formerly implemented klystron linearization can be better understood. Furthermore this set of data can be the basis of a possible FPGA-based klystron simulator. Beside the klystron output characteristic in matters of amplitude and phase also the performance of the used vector modulator was analyzed. In general experience in klystron operation was deepened.

A third project with a more conceptual character was begun, namely the strategies for exception handling especially in the scope of the klystron linearization. It covers what possibly can go wrong, how to detect it, how to prevent it, and how to recover from it.

Beside this a shift at the FLASH main control room was joined. This gave a good insight about the operation of FLASH, the control system DOOCS, and the GUI JDDD.

In the scope of the weekly DESY low-level rf (LLRF) seminar a talk with the title "Development and Test of Digital LLRF Control Procedures and Techniques Towards ILC" was given.

Furthermore tours around the facilities of AMTF, the Cryo Module Test Bench (CMTB), and the European XFEL were joined.

Beside the work at DESY the Helmholtz-Center Berlin was visited for one day in order to give a seminar talk with the title "Entwicklungen und Tests von digitalen Low Level RF (LLRF) Regelungstechniken und Prozeduren im Rahmen des International Linear Colliders (ILC)", get in touch with the people for a possible future position (the contact was initiated by Eiji Kako-sensei during the SRF2013 conference in Paris), and joining guided tours at the electron storage ring BESSY II as well as at the heavy machine hall, in which a vertical cryo test stand for up to two 9-cell TESLA-type cavities and an undulator test stand are located.

Life situation

I'm living in a rented room in a private apartment about 10 Minutes far from DESY by bus, since the stay at the DESY Hostel is limited to a maximum of four weeks. The contact to the owner of the apartment was arranged by DESY.