Warsaw ELHEP Group

Research Visit Summary

at DESY, TESLA

01 – 16 February 2003

Warsaw University of Technology
Institute of Electronic Systems

Electronics for High Energy Physics Experiments; tel. 8998-1955;
http://nms.ise.pw.edu.pl/elhep; email: rrom@ise.pw.edu.pl

DESY, Hamburg, 15.02.2003

Warsaw ELHEP Group for TESLA Test Facility

Institute of Electronic Systems (ISE), Warsaw University of Technology
Institute of Experimental Physics (IFD), Warsaw University

VISIT SUMMARY in DESY/TESLA on 1-16 February 2003

Persons:

R.Romaniuk (1-16Feb.), K.Pozniak (1-16Feb.), W.Zabolotny (2-9Feb.), T.Czarski (2Feb.-1March), P.Rutkowski (20Jan.-21 Feb.), T.Jezynski (permanent stay-paid by - half Tesla – half BAC/ZEUS), Z.Luszczak (permanent stay –paid by BAC), M.Kudla (2-9Feb.), K.Bunkowski (2-9Feb.), M.Pietrusinski (2-9Feb.),

General Tasks:

Tesla Cavity Simulator and Controller
Hardware and software development program

ESGARD Joint Research Program CARE financed by UE within FP6 (JRP - SRFCAV and SRFTECH)
Participation of ELHEP.ISE in ESGARD/CARE - SRFCAV
Consultations with dr S.Simrock on ELHEP participation in ESGARD-CARE-SRFCAV
Consultation with dr Dieter Proch on ESGARD prior to ESGARD coordination seminar in CERN, Monday 10 Feb.2003
CARE Program – Coordinated Accelerator Research in Europe
(Network) NoE of ESGARD – European Steering Group on Accelerator R&D – dr Terry Garvey coordinator;

Consultations

With dr Reinhard Brinkmann
ELHEP situation in DESY, Information about ELHEP activities
Participation in experiments on radiation hardness of electronics in LINIAC II
Participation of ELHEP in Network of ESGARD
With dr Dieter Proch on ESGARD

SEMINARS and Tutorials by ELHEP

The following seminars were held by the group (TTF Controlroom, bldg. 28, Hall 3):

S1 Wednesday, 5.2.03 from 10:00 - 11:00 + discussion
Single event upset (SEU) in SRAM-based FPGAs
(Karol Bunkowski)

S2 Thursday, 6.2.03 from 10:00 - 11:00 + discussion

VHDL Basics, VHDL seen from electronic designer point of view
(Maciek Kudla with support of his colleagues)

S3 Thursday, 6.2.03 from 15:00 - 16:00 + discussion
VHDL design of Pattern Comparator (PAC) FPGA for CMS and some remarks on VHDL usage in Tesla cavity controller.
(Maciek Kudla with support of his colleagues)
- PAC VHDL design will show the interaction between the software (CMS detector simulator) and hardware (VHDL simulator and FPGA development system) tools as well as specially built programs to interface those two environments

S4 Wednesday 12 2.03 W.Zabolotny, T.Czarski, P.Rutkowski, T.Jezynski, and other ELHEP members, Cavity Controller Set-up, VC on LLRF at 14.00-15.00; Abstract: Third generation of cavity CONTROL SYSTEM; test set-up for cavity control system – MatLab cavity model, Analog cavity simulator; Current status of FPGA cavity simulator

DESY Summer Student Program 2003

Consultation with dr Joachim Meyer – Chair of the DESY Summer Student Selection Committee
Candidate documentation submissions to Ms Andrea Schrader
Two students from ELHEP.ISE to be considered:
Piotr Pucyk and Michal Husejko

Video Conference facilities for ELHEP Warsaw Laboratory

Facilitate cooperation between Warsaw Tesla Laboratory and DESY/TESLA
Enable participation of Warsaw ELHEP Laboratory in VC on LLRF&C Systems
The VC was tested between DESY and ELHEP Warsaw and next multiconference additionally with Jefferson Lab, Los Alamos and DESY using ISDN connection.
Discussion about purchase of cheap equipment consisting of echo-canceling microphone and enhanced web camera. Estimated costs 1500 Euro.

Participation in regular Video Conferences of the LLFR Group

Wednesday 22.00.PM, conference on system development for the Spallation Neutron Source; Oakridge Nat.Lab, Jefferson Lab., Los Alamos Nat.Lab., DESY; S.Simrock, R.Romaniuk, T.Czarski, P.Rutkowski;
Regular participation of ELHEP via ISDN is difficult because of high telephone connection costs with USA. IP VC version has to be implemented.

OFFSET Program

Meeting with prof. Wesley Smith of University of Wisconsin on OFFSET Program (Lockheed-Martin-F16); Part of the ELHEP-TESLA cooperation may be included in Offset program, via participation of American HEP laboratories like: LANL, SNS, Oak Ridge, Jefferson Lab., etc.

TESLA LLRFC System database

Meeting with dr Kay Rehlich and dr S.Simrock , R.Romaniuk and Zbigniew Luszczak. Dr S.Simrock prepared LLRF database concept document. Z.Luszczak of ELHEP is considered as a person participating in database preparations and development.

New Publications

Discussion on new digest paper on Cavity Control System – Advanced Modeling and Simulations for Tesla Linear Accelerator, by T.Czarski
Dr S.Simrock shared with T.Czarski his views about the article and provided some useful hints for future writing.
A new paper and technical note is under preparation concerning cavity simulator in MatLab.

TESLA Reports 2003

Four Tesla Reports are considered for publications TR2003-05, -06, 08 and 09
They will be available on the TESLA Web under the address:
http://tesla.desy.de/new_pages/Reports/2003
Discussion on Tesla Reports preparations with dr S.Simrock.
Discussion with Tesla Reports secretary Ms Katrin Lando on future submissions.
The Reviewer for TR is dr Reinhard Brinkman. All reports were delivered to dr R. Brinkman.

Meeting on Radiation investigations of electronics for TESLA

Persons participating: Reinhard Brinkman, Hans Weise, Stefan Simrock, Ryszard Romaniuk and four members of ELHEP Group
Subject: Using Liniac II as a test bed for gamma radiation influence on LLRF electronics for TTF II
Decisions: Additional person from ELHEp to be possibly involved in the program; Needed hardware, software and experimental set-up to be assessed; Experimental program details to be established bt S.Simrock and R.Romaniuk.

Summary visit to dr D.Trines
Persons: S.Simrock, R.Romaniuk
Subject: Update on the current works realized by ELHEP Group, Annex to agreement between DESY and WUT; Additional tasks to be taken by the ELHEP Group,

Decision of the German Government on TESLA program financing

On 5th Feb. 2003 a decision was taken to finance half of separate FEL program (340 million Euro). Second half would be ascribed to the European partners. TESLA liniac is now postponed for the future.

Tesla Cavity Simulator and Controller

Hardware and software development program
The tasks which are under realization now:
1. Tests of FPGA cavity controller
preparing of laboratory set-up for tests of cavity controller and cavity simulator,
set up enables control, setting parameters of cavity controller
testing of cavity controller with analog cavity simulator
integration of Mat-Lab with hardware cavity controller at step-like work mode;
2. Design and testing of FPGA cavity simulator

Design of digital model under Xilinx core generator was performed.: main parameters - 64bits of accuracy at 40MHz clock
The model is now confined by compilation problems (2Gbit memory bottleneck)
New version of cavity simulator is under development. The model bases more on VHDL. Model design is shifted from Xilinx core generator to own VHDL solutions. The aim is to minimize the size of the design.

Contributions of individual members of ELHEP Group

Tomasz Czarski: cavity controller modeling, trials to combine MatLab model with hardware
Krzysztof Pozniak: VHDL internal interface
Karol Bunkowski: radiation tests program for FPGA control boards; presented a seminar on radiation tests in Yvaskula cyclotron
Maciej Kudla: VHDL, presented a two part seminar/tutorial on VHDL programming and designed system for CMS detector;
Wojciech Zabolotny: MatLab/FPGA model of cavity simulator
Piotr Rutkowski: C++
Tomasz Jezynski: laboratory set-up, hardware tests; diagnostic system for Bac detector – the system may be adapted in case of need for TTF purposes. The system features channel calibrations, efficiency mapping, configuration, graphical visualization.
Michal Pietrusinski: VHDL
Ryszard Romaniuk: Esgard/Care/ programs, Cavity controller modeling,
Zbigniew Luszczak: LLRF database, GUI interface, Database software
BacNavigator+BacViewer, now available on zwalab5.desy.de may be adapted in the future for TTF purposes. This software is modular and reconfigurable and allows to view all detector resources

Suggested Plans of ELHEP Group for the nearest future

Pre-next-visit activities (in Warsaw):
Further design of simulator
Compillable and synthesizable model of cavity simulator
Hardware for Warsaw ELHEP laboratory needed
New cavity simulator is under consideration, done under pure VHDL. Comparison with MatLab model would then be possible.

Decision on own test board design
The board should consist of:
mother control board – control small Xilinx or Altera chip (Spartan, Acex, Cyclon, etc.)
two daughters boards per one control board - possessing fast Xilinx Virtex or Altera Stratix with DSP modules, and additional components like - SRAM memory, multichannel DAC, ADC, fiber optic Gbit data links, etc, and ETRAX PC.

Full development costs of two test boards at ITR/Warsaw are approx. 5kEuro.
VME crate is needed to test the own development boards

Suggested visit of a few Elhep members to TTF on 23 March – 6 April 2003
Tests of cavity simulator
Integration with cavity controller

Preparing Xilinx development boards for tunnel installations, auxiliary equipment, fitting of voltages, supplies, packages, VME crate
Xilinx developments board and software tests

Suggested visit of dr S.Simrock to Elhep Warsaw on 20-25 May 2003
Visiting of Elhep laboratory at ISE.WUT. New laboratory space under preparation
Participation in IEEE-SPIE sponsored WILGA Symposium on Electronics for High Energy Physics.

Suggested visit of a few Elhep members to TTF on 23 June – 6 July 2003
Hardware tests on liniac (XDB).
Option: Labortory (and on site) tests of own development board

List of Publications

W.M.Zabolotny, K.T.Pozniak, R.S.Romaniuk, T.Czarski, I.M.Kudla, K.Kierzkowski, T.Jezynski, A.Burghardt, S.Simrock, Design and simulation of FPGA implementation of RF control system for Tesla Test Facility; Proceedings of SPIE, vol. 5125; Tesla Report 2003;

T.Czarski, R.S.Romaniuk, K.T.Pozniak,S.Simrock, Cavity control system, essential modeling for Tesla linear Accelerator; Proceedings of SPIE, vol. 5125, Tesla Report 2003;

T.Czarski, R.S.Romaniuk, K.T.Pozniak, S.Simrock, Cavity control system, models simulations for Tesla linear accelerator, Proceedings of SPIE, vol. 5125, Tesla Reports 2003;

T.Czarski, R.S.Romaniuk, K.T.Pozniak, S.Simrock, Cavity control system, advanced modeling and simulation for Tesla linear accelerator, Proceedings of SPIE, submitted for publication, Tesla Report 2003;

/compiled by dr hab. R.S.Romaniuk/