



# **Warsaw ELHEP Group**

# **Research**

# **Visit Summary**

## **at DESY, TESLA**

**09 – 22 September 2002**

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**Warsaw University of Technology**  
Institute of Electronic Systems

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Hamburg, 9-22 September 2002

## **Warsaw ELHEP Group LLRF Control, TESLA DESY**

Visit of the ELHEP (Electronics for High Energy Physics) Group from Warsaw University of Technology (WUT), Institute of Electronic Systems (IES) and Warsaw University, Institute of Experimental Physics (UW.IEP) to TESLA/DESY/Hamburg; 9-22 September 2002

A list of involved persons: Desy/Tesla Host and Task Leader: dr S.Simrock; DESY Liaison: dr Z.Golebiewski; ELHEP Members: Dr R.S.Romaniuk – Group Coordinator, Dr K.T.Pozniak, Dr W. Zabolotny, Mr I.M.Kudla, Mr K.Kierzkowski, Local Members of the ELHEP Group at DESY: Mr Z.Luszczak, Mr.T.Jezynski, Mr T.Czarski

### **Visit Summary**

#### **Introduction**

A general agreement was signed a year ago between DESY and Warsaw University of Technology concerning the participation of scientists from WUT in TTF. Institute of Electronics Systems (IES) was made a representative of WUT in this cooperation. The IES, in cooperation with Institute of Experimental Physics of Warsaw University, has formed a dedicated ELHEP group of experts, scientists, engineers and physicists, technicians and students (M.Sc., Ph.D.) with their work specialties (physics, electronics, IT science and practices) chosen to undertake relevant problems of HEP experiments. The Group now consists of around 30 members, 10 senior researchers and 20 young scientists. Senior members of the Group have long lasting experience in HEP electronics, for example in ZEUS and CMS experiments.

#### **1. Personal resources assigned for Tesla Project**

The ELHEP Group offers its experience for Tesla Project (TP). ELHEP would make its best to try to increase its personal presence in the development of the LLRF Control System for Tesla. The need for as much as 20 persons was initially expressed by TP. ELHEP would try to address some of these needs for experts acquainted to some extent with relevant problems. Now three permanent persons are preparing for TP. Next 3-4 persons from the Group are preparing to come to DESY soon for some time. It is not excluded that some of these persons may stay then in DESY TP for longer. The ELHEP members working in DESY will be strongly backed in some of their tasks by experienced Group members in Warsaw. Occasionally, if needed, the Group senior members from Warsaw will visit DESY to support practical activity at the TTF experiment site.

List of persons:

Permanent TP members in DESY:

1. Dipl.Ing.Tomasz Jezynski (LLRF)
2. Dipl.Ing.Tomasz Czarski (LLRF and cavity modeling, Matlab)
3. Dipl.Ing.Zbigniew Luszczak (data quality management –DQM, system databases), for some period, part time with VETO Detector

Permanent team extension (during approx. next 6 months)

1. Dipl.Ing.Zbigniew Rutkowski (J-TAG, boundary scan)
2. Ing.Mariusz Ptak ( optical multi gigabit links)
3. Dipl.Ing.Tomasz Nakielski (VHDL design, system diagnostics)
4. TBD (Dipl.Ing.Michal Radtke) (downconverter)
5. Ph.D., Student of prof.J.Dobrowolski (RF signal distribution system)

6. Further team extension would be considered depending on the initial cooperation results up to 10-12 permanent persons during a year (Dipl.Ing. Rafal Salanski, Ing. Przemyslaw, Szamocki,...)

Senior members in Warsaw to visit DESY every two months

1. Dr Ryszard S. Romaniuk (electrooptics, communications, GOL, system design and testing, ELHEP coordination)
2. Dr Krzysztof T. Pozniak (VHDL, FPGA, measurements, system design and testing)
3. Dr habil. Grzegorz Wrochna (system design)
4. Dr Wojciech Zabolotny (VHDL, FPGA, system design and testing)
5. Dipl.Ing. Maciej Kudla (VHDL, FPGA, system design and testing)
7. Dipl. Phys. Michal Pietrusinski (object oriented programming and databases)
6. Dipl. Techn. Krzysztof Kierzkowski (PCB design and testing)
7. Up to next 3-5 persons to be defined in next 6 months (analog electronics, floating point electronics, microwaves, etc.)

## **2. Technical resources**

To perform efficiently its tasks the Group needs some basic material resources in DESY and in Warsaw. The DESY needs were initially defined as: laboratory space and equipment. A separate steady laboratory room (rooms) able to accommodate up to twenty-few people seems to be necessary. Now a temporary solution was assumed and the Group (now 8 persons) is using a laboratory facility adjacent to Tesla Control Room in building 28.

A list of needs, purchases, borrows and things necessary to start new laboratory and work facility of the ELHEP Group was initially discussed and defined. Some of the needs are just being realized.

The Warsaw needs of the Group will be addressed mainly from the local resources. The IES assigned special laboratory space (200m<sup>2</sup>) dedicated exclusively for ELHEP Group. However, especially during the initial period of the Group formation and stabilization, some advanced electronic measurement equipment borrows and electronic parts flow will be necessary from DESY.

## **3. LLRF Control and Data Readout Tasks**

1. Control Loop modeling and realization (including cavity simulation)
  - a. High Definition Language and Xilinx/Altera
  - b. Control demonstrations at the TTF
  - c. Test board supplemented with analog multiplexer to serve 8 cavities
  - d. Multi-board set-up (development tool-kit)
  - e. Decision on dedicated test board design and fabrication
2. Readout and Data Acquisition
  - a. Electro Optical Sampling
  - b. Cavity Probe Signals (efficient calculations during dead-time of the system)

## **4. TESLA International Infrastructure**

1. Publications, conferences, education
  - a. Annual conference of ELHEP
  - b. Special Journal Issues on Tesla
  - c. Tesla lectures

Dr S. Simrock, DESY

Dr R.S. Romaniuk, IES WUT

<b>Visit of the ELHEP Group from Warsaw University of Technology (WUT), Institute of Electronic Systems (IES) and Warsaw University, Institute of Experimental Physics (IEP) to TESLA/DESY/Hamburg; 9-22 September 2002</b>					
<b>A list of involved persons: Tesla Host and Task Leader:</b> dr S.Simrock; <b>DESY Liaison:</b> dr Z.Golebiewski; <b>ELHEP Members:</b> Dr R.S.Romaniuk, Dr K.T.Pozniak, Dr W. Zabolotny, Dr I.M.Kudla, Mr K.Kierzkowski, <b>Local Members</b> of the Elhep Group at DESY: Mr Z.Luszczak, Mr.T.Jezynski, Mr T.Czarski					
<b>Suggested preliminary plan of meetings and events</b> (to be reviewed and accepted by the hosts at Tesla)					
#	WHEN (how long)	WHAT	WHO	SUBJECT	REMARKS
1	Monday 09.09	Arrival	5 persons from ELHEP dr Z.Golebiewski	Technical, organizational and supplementary subjects, International Office, rooms, equipment, Group accommodation, etc.	Meeting with dr Z.Golebiewski would be highly appreciated
2	Tuesday 10.09 Morning	Seminar	Whole ELHEP Group	Internal Seminar on work development; Current work on Tesla, Speakers are local members of Group	Group self-organization issues, work delegation
3	Tuesday 10.09 Afternoon (2H)	Technical Meeting	dr S.Simrock dr Z.Golebiewski ELHEP	Group presentation: persons and plans; Assuming schedules for the two-week work period; General and particular tasks; New persons, etc. Technical problems: resources, schedules, equipment, room, etc; Combination of Group activities in DESY/Hamburg and in Warsaw	Major technical meeting of the visit
4	Wednesday 11.09 Morning	TTF Visit	dr S.Simrock or other person acquainted with Tesla ELHEP	Visit to TTF site; Discussion, Perhaps a short lecture on Tesla overview with emphasis on critical issues and LLRF	Seeing is believing Hands-on experience
5	Friday 13.09 During the day	Working Seminar	dr S.Simrock dr Z.Golebiewski ELHEP	Work development on Tesla; Modeling of LLRF Speakers: T.Jezynski, T.Czarski, Z.Luszczak	After this meeting Mr T.Czarski is leaving DESY for a few weeks
6	Thursday 19.09 Morning	Technical Meeting	Dr S.Simrock ELHEP	Technical meeting preparing materials (if any) for closing seminar and meeting on Friday	Preparation for Friday meeting
7	Friday 20.09 Morning (2H)	Visit Closing Seminar	dr S.Simrock dr Z.Golebiewski ELHEP	Conclusions: What we did during the visit; What is to be done, establishing time priorities Confirmation of plans for further work; Preliminary plans for next visits: who, when, what for; Preparing (perhaps signing) work status document	Perhaps we should prepare a summary of current activities and intentions for a few next months

#	SUBJECT	CONTENTS	REMARKS
1	Assumptions	<p>The general assumptions for ELHEP-TESLA cooperation are as follows:  ELHEP is interested only in long term and massive (not marginal) involvement</p> <p>Expert ELHEP Team building and development working for Tesla, Cern (LHC) and Zeus  TESLA and LHC would possess the highest priority in ELHEP activities  ELHEP has its roots in academia and the Educational and didactic aspects are important  Justification for sending of young gifted people to Tesla and publicity  Only broad systematic approach may be realized and be successful  ELHEP has to build a sister laboratory in IES.WUT closely associated with TESLA</p>	
2	Aims of Visit	<p>The aims of the current visit of Elhep are as follows, and divided to two categories:  General aims:  Continuation of current work tasks  Starting to build group's work environment and Group self-organization  Particular aims:  Introduction of new people  Gathering of Tesla materials and continuously learning Tesla  Continuation of discussion of Elhep involvement directions and plans for Tesla, with Tesla hosts</p>	
3	Tasks to be done by Elhep	<p>Current tasks to be done by Elhep members for Tesla are as follows:  FPGA, Hardware solutions, trials, tests, conclusions for next solutions</p> <p>Downconverter  Feedback loop analysis and modeling</p>	
4	Resources at DESY for the ELHEP Group	<p>Rooms, equipment, software, tools, computer accounts, data base access,</p>	
5	Resources at IES/.WUT for the Elhep Group	<p>What we have at IES.WUT  What we do not yet have  How to build sister laboratories?</p>	
6	People	<p>New people will join the Group</p> <p>Maciej Radtke – potentially downconverter  Piotr Rutkowski (Ph.D. student)– testing of large systems, J-Tag, Boundary Scan  Would probably join the Tesla ELHEP Group in November  Ph.D. student of prof.J.Dobrowolski – possibly downconverter</p>	
7	WWW	<p>WWW site of the team, combined places in Hamburg and Warsaw</p>	

8	Tesla materials	Brochures, books, CDs	
9	Tesla professional publicity in Poland	Publication of papers on Tesla in Polish professional press	
10	Special Edition of Elektronika Journal devoted to Tesla	<p>Preliminary plans July 2003</p> <p>Cost 1,5kEuro; 30% of total, Tesla contribution would be highly appreciated</p> <p>Contents: up to 10 professional engineering papers on different subjects of Tesla</p> <p>Design of Tesla cover</p> <p>Authors: dr S.Simrock, 3-4 persons from DESY, 2-3 persons from ELHEP</p> <p>Volume 36-40 standardized A4 journal pages</p>	
11	Education and didactics M.Sc. Ph.D.	<p>Serious justification is that we allow Ph.D. studies in high technology environment</p> <p>All or nearly all work for Tesla offered to young scientists and engineers should be combined with Ph.D. possibilities</p> <p>In 2-3 years we may expect first Ph.D. results</p> <p>Can dr S.Simrock be a reviewer or tutor of Ph.D. performed at Desy and Tesla? May some of these Ph.,Ds. be finished at DESY? Some will be concluded at WUT.</p>	
12	Education and didactics Lectures and Tesla visits for students	<p>TESLA lectures at the Department of Electronics, WUT for M.Sc and Ph.D. students (around 10 persons per lecture)</p> <p>Visits of these students for a summer week in Tesla, June/July every year, around 5-10 persons</p>	
13	Elhep contribution to Tesla	<p>Participation in Tesla Publications and Technical Notes</p> <p>Participation in some Tesla real life experiments and measurements</p> <p>Elhep should be mature enough to start to contribute actively</p> <p>The incubation period should be as short as possible</p> <p>There are, however some obstacles to shorten this period like: personal, IES.WUT laboratory and local Warsaw finances, justification and lobbying</p>	
14	Annual ELHEP Symposium	<p>The Elhep Group organizes an Annual Symposim in WILGA</p> <p>Symposium on Photonics and Electronics for High Energy Physics Experiments</p> <p>22-25 May 2003 WILGA Village near Warsaw, Resort of WUT</p> <p>Invitation for dr S.Simrock as an invited lecturer</p> <p>Symposium works issued in Proceedings SPIE (<a href="http://www.spie.org">www.spie.org</a>)</p>	

		<a href="http://nms.ise.pw.edu.pl/ieee">http://nms.ise.pw.edu.pl/ieee</a> Sponsored by IEEE The symposium gathers a number of people from research and university institutes working on HEP and a large number of students and young scientists, including a few guests from abroad. Usual participation is around 200 persons. The costs are very low, the conditions are modest, bungalow type but acceptable	
15	Plans	The plans are divided to immediate and more long-term: The plans for the immediate future are preliminarily as follows: Possible arrival of Mr P.Rutkowski (Ph.D. student) or one more additional person, on November-January; Next visit of Elhep predicted in December Long-term plans: Have staff of at least 5 permanent persons staying permanent with Tesla Have the possibility to send M.Sc. and Ph.D students for short term visits Contribute very actively to Tesla Build sister laboratory in Warsaw	