

Preface

Jochen R. Schneider

Welcomed by Albrecht Wagner 250 guests from all over the world met at DESY on May 19th, 2004, to celebrate 40 years of synchrotron radiation research at DESY Hamburg. This anniversary coincided with the 80th birthday of Professor Peter Stählerin. He was DESY research director at that time and the first to recognize the experimental opportunities offered by the synchrotron radiation generated in the bending magnets of the new 6 GeV electron synchrotron DESY. Speakers at the colloquium included some of the pioneers of synchrotron radiation research in Hamburg: Ruprecht Haensel, Wulf Steinmann, Taizo Sasaki, Gerd Rosenbaum, Christof Kunz and Wolfgang Eberhardt. The audience was gripped by the excitement of the early days of parasitic use of particle physics machines with beams jumping up and down, in very strong contrast to the expected performance of the PETRA III storage ring facility, which was presented by Edgar Weckert. With the VUV-FEL user facility, presented by Josef Feldhaus, DESY will pioneer free electron laser research. Operation for users will start in April 2005 and we wonder what stories these pioneers will tell in 40 years. The European XFEL Facility was presented by Jochen Schneider. With this type of source it will be possible for the first time to study directly new states of matter on atomic length and time scales and the expectations of the science community are very high.



Fig.1:

Celebration of 40 years of synchrotron radiation research at DESY:

Many thanks to Professor Peter Stählerin at the occasion of his 80th birthday for initiating synchrotron radiation research at DESY.

(from left to right: A. Wagner, B. Sonntag, J.R. Schneider and P. Stählerin)

William Stirling, the Director General of the European Synchrotron Radiation Facility ESRF in Grenoble, cordially conveyed the congratulations of this world leading partner institute. All the new projects can only be realized with strong support from the public and politics and therefore the encouraging addresses by Dr. Jörg Dräger, Senator for Science and Health of the City of Hamburg, and Dr. Hermann Schunck, Director General for Science, Transport, and Aerospace Research at the German Ministry of Education and Research, were very much appreciated. The celebration of the 40 years of synchrotron radiation research in Hamburg spanned very nicely the arch from the pioneering work with synchrotron radiation to the early days of free electron laser research and a lot of stimulating discussions took place at the reception and the dinner party.

After extensive preparation in 2003 and with help from the Scientific Council (EWR) and the Machine Advisory Committee (MAC) DESY presented its research programmes for the period 2005-2009 to the strategic evaluation by the Helmholtz Association of National Research Centers

(HGF). Within the research field "Structure of Matter" DESY participated in 3 programmes:

- Elementary Particle Physics
- Astroparticle Physics and
- Large Scale Facilities for Research with Photons, Neutrons and Ions (PNI)

The results of the assessments of all the 3 programmes by high ranking international review boards were very good, the photon activities at DESY received the highest possible ranking. The Senate of the Helmholtz Association followed the recommendations of the review panel which were summarized as follows:

"The PNI programme is the flag ship of the Helmholtz Association regarding its mission of planning and operating large scale user facilities. The Review Panels overall judgment is that the Helmholtz PNI programme is simply outstanding, especially given that it represents a nationally-based rather than international programme. The Review Panel is impressed by the research opportunities at Helmholtz and by the high performance at the facilities. The scientific quality of the research conducted at and enabled by the facilities as well as the support for users is outstanding.

The series of photon facilities either being developed or proposed at DESY are the most exciting projects in the programme topic "Photons". This promises to give Germany, Helmholtz and DESY a world leadership position.

The development of PETRA III will require a detailed review of the future role, if any, of DORIS at midterm", i.e. in 2007.

In addition the Panel recommended very strongly to strengthen the photon science in-house research through the proposed Center for XFEL Science, which will serve as an anchor point for the preparation of the scientific programmes at the VUV-FEL and the planned European XFEL Laboratory. Furthermore the Center will coordinate the necessary R&D programmes for undulators, beamlines, instrumentation, detectors and data processing.

As a consequence of the HGF evaluation DESY will open two more positions for leading scientists (C4) in photon sciences and increase the personnel for in-house research from today 15 to about 90 FTE (full time equivalent) in 2009. Combining resources from the departments of Photon Sciences and Particle Physics DESY will set up a strong in-house group for detector developments and look for intense corporation with detector groups at universities and other research centers.

The HGF Senate endorsed the distribution of resources among the 3 programmes proposed by DESY. Fig.2 shows the distribution of the resources for in-house research and facilities in particle physics and photon sciences. The infrastructure resources of about 50 M p.a. were not evaluated and are not presented. The funding available for research in particle physics slightly increases in 2007 in order to strengthen DESY's involvement in the preparation of the International Linear Collider project (ILC). In 2007 the physics programme at HERA II will come to an end and therefore the resources for Particle Physics Facilities decreases. On the other hand, due to DESY's engagement with PETRA III and the European XFEL Facility the funding for photon science facilities increases in 2007, the resources for in-house research in photon sciences increase significantly.

On the left side of fig.3 the resources available for facilities and in-house research in photon sciences are shown in more detail. The resources for "Experiments" cover the cost for operation and

upgrading of the photon beamlines at DORIS III, the VUV-FEL and PETRA III. The remaining funds are needed to operate and further develop DORIS III and the VUV-FEL as well as the contribution from DESY's institutional funding to the realisation of the projects PETRA III and the European XFEL Laboratory. The right side of fig.3 shows the distribution of funds available for in-house research with photons at DORIS III, the VUV-FEL and PETRA III ("Experiments"), for the Center for XFEL Science and for Detector Development.

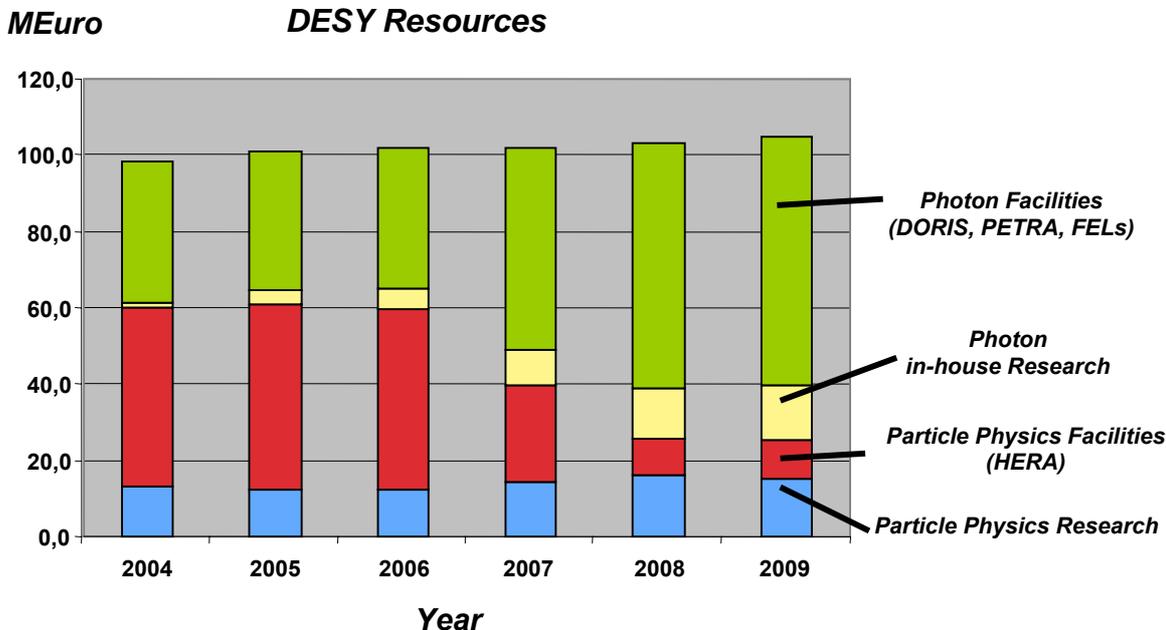


Fig.2: Distribution of the resources for in-house research and facilities in particle physics and photon sciences as approved by the Senate of the Helmholtz Association for the years 2005 to 2009.

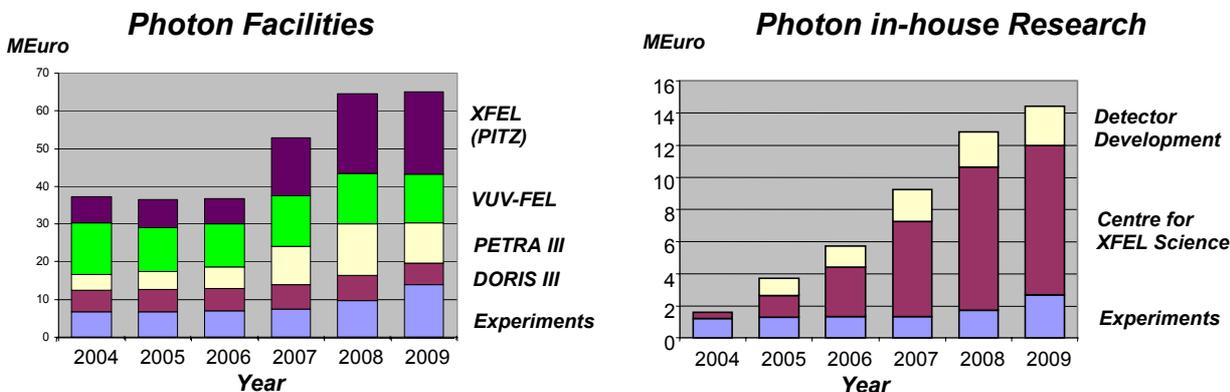


Fig.3: Resources available for facilities and in-house research in photon sciences at DESY.

All together 2004 was a very successful year for photon sciences at DESY. At DORIS III the new HARWI wiggler for high energy synchrotron radiation for the materials science laboratory operated by the GKSS was installed, the instrumentation for small angle scattering has been modernised, a new 10 T cryo-magnet was successfully put into operation at wiggler beamline BW5, and a new in-vacuum high-resolution X-ray fluorescence spectrometer was installed at beamline W1. A very successful feasibility study for top-up operation at DORIS III demonstrated the possibility for this mode of operation once PETRA III is in operation, which would further improve the beam stability at DORIS III.

In 2004 DORIS III provided 4781 hours of scheduled dedicated user time with an operation efficiency of 93,1 %. For experiments which need a special time structure, the storage ring was operated in reduced bunch mode for about 8 % of its running time. In summer a 12 weeks shutdown was needed for the realisation of various improvements of beam stability and the installation of the new HARWI wiggler. The operation of PETRA II as a synchrotron radiation source was limited to about 630 hours.

The Technical Design Report for Petra III was published in February 2004. On November 25th, 2004, we received green light for the start of construction of the facility from the German Ministry of Education and Research. PETRA III will be available for users in 2009.

For over one year the FEL at the TESLA Test Facility has been rebuilt and upgraded to the VUV-FEL user facility supplying a high brightness photon beam between 6 and 120 nm. On December 13th, 2004, the first spontaneous undulator radiation has been observed and characterized. Start of first FEL operation for users is planned for April 2005.

Important progress has been made on the way to the planned European XFEL Facility in Hamburg: A Memorandum of Understanding for the preparatory phase of the XFEL has been signed by 8 European countries and an Interim Report on the Scientific and Technical Issues of the XFEL facility has been prepared by an expert group with members of 11 European countries. At DESY a project group handling 37 work packages was formed. The documents for the plan approval procedure will be ready in March 2005. In December 2004 a letter of intend for collaboration on technical and scientific developments for research using free electron lasers between Uppsala University, Stockholm University, the Royal Institute of Technology (KTH) and DESY has been signed.

The HASYLAB Annual Report 2004 is again published as a CD-ROM and an internet version, only a limited number of hard copies will be provided. It contains 663 reports on experiments performed this year at HASYLAB, including structural biology. The list of groups involved in the preparation and performance of experiments at HASYLAB in 2004 contains 270 institutes and about 1415 scientists. In the field of structural biology about 370 scientists from 124 institutes, primarily from Europe, used the EMBL beamlines and facilities at DESY. The reports on their experiments were collected in a second section of the Annual Report. As in the preceding years, the authors are fully responsible for the content and the layout of their reports.

The support of photon sciences at DESY by the "Verbundforschung" programme of the German Ministry of Education and Research and by the European Union through the "Integrated Initiative (I3) on Synchrotrons and FELs" and the "European FEL Design Study (EUROFEL)" is very much appreciated. EUROFEL includes activities from all 13 European laboratories currently interested in R&D for free electron lasers and is coordinated by DESY.

The achievements made in the year 2004 were only possible due to the high motivation of the HASYLAB staff, of all the colleagues at DESY and the various outstations at DORIS. The interplay with our users and their strong commitment to the facility are crucial for the success of the laboratory and are very much appreciated. All together we are facing fascinating times for research with photons at DESY.



Jochen R. Schneider
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