Leibniz Gemeinschaft
Der Senat

SEN 0022/05
15.06.2005

Stellungnahme zur
Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung m. b. H. (BESSY)

Inhaltsverzeichnis

Vorbemerkung

Der Senat der Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e.V. – der Leibniz-Gemeinschaft – evaluiert in Abständen von höchstens sieben Jahren die Forschungseinrichtungen und die Einrichtungen mit Servicefunktion für die Forschung, die auf der Grundlage der „Ausführungsvereinbarung Forschungseinrichtungen“[1] vom Bund und von den Ländern gemeinsam gefördert werden. Diese Einrichtungen haben sich in der Leibniz-Gemeinschaft zusammengeschlossen. Die wissenschaftspolitischen Stellungnahmen des Senats werden durch den Senatsausschuss Evaluierung vorbereitet, der für die Begutachtung der Einrichtungen Bewertungsgruppen mit unabhängigen Sachverständigen einsetzt. Die Stellungnahme des Senats sowie eine Stellungnahme der zuständigen Fachressorts des Sitzlands und des Bundes bilden in der Regel die Grundlage, auf der der Ausschuss Forschungsförderung der Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung (BLK) überprüft, ob die Einrichtung die Fördervoraussetzungen weiterhin erfüllt.

Auf der Grundlage der von BESSY eingereichten Unterlagen wurde eine standardisierte Darstellung des Instituts erstellt, die mit der Einrichtung sowie den zuständigen Ressorts des Sitzlands und des Bundes abgestimmt wurde (Anlage A). Die vom Senatsausschuss Evaluierung eingesetzte Bewertungsgruppe hat BESSY am 07./08. Juni 2004 besucht und daraufhin einen Bewertungsbericht erstellt (Anlage B). Auf der Grundlage dieses Bewertungsberichts und der von BESSY eingereichten Stellungnahme zum Bewertungsbericht (Anlage C) erarbeitete der Senatsausschuss einen Entwurf für die Senatsstellungnahme. Der Senat der Leibniz-Gemeinschaft hat die Stellungnahme am 15. Juni 2005 erörtert und verabschiedet. Der Senat dankt den Mitgliedern der Bewertungsgruppe für ihre Arbeit.

1. Beurteilung und Empfehlungen

Der Senat schließt sich der Beurteilung und den Empfehlungen der Bewertungsgruppe an. BESSY wird von der international zusammengesetzten Gutachtergruppe äußerst erfolgreiche Arbeit bescheinigt. Nicht nur wurde der Zeitrahmen für Aufbau und Inbetriebnahme exakt eingehalten; auch die zuvor festgelegten technisch-wissenschaftlichen Anforderungen und Parameter wurden innerhalb des ersten Betriebsjahrs bereits erreicht, zum Teil sogar überschritten. Mit BESSY steht der Forschung eine international wettbewerbsfähige Synchrotronstrahlungsquelle der dritten Generation zur Verfügung, deren eigene Forschung zur technologischen Weiterentwicklung im Hinblick auf neue Anwendungsmöglichkeiten zur internationalen Spitze gehört mit Pionierleistungen, die weltweit anerkannt sind. Die Managementleistungen und das Engagement der Mitarbeitenden sind ebenfalls positiv hervorzuheben.

BESSY ist eine Serviceeinrichtung, die vor allem von externen Nutzergruppen in der experimentellen Physik, in Chemie und Materialwissenschaften sowie in der Strukturbiologie genutzt wird. Die von zahlreichen Wissenschaftlergruppen aus dem In- und Ausland mithilfe der von BESSY bereitgestellten Infrastruktur erzielten Forschungsergebnisse gehören teilweise zur internationalen Spitze (z B. in der Charakterisierung und Konstruktion optischer Elemente, in den Bereichen Magnetismus und allgemeine Spektroskopie, polarisierte Photonen, Mikrofabrikation). Ausstattung und Betriebssicherheit werden von den externen Wissenschaftlern als exzellent, die wissenschaftlich-technische Unterstützung der Nutzer, insbesondere auch im Hinblick auf neue und wenig erfahrene Wissenschaftlergruppen, aber als verbesserungswürdig einge-

[1] Ausführungsvereinbarung zur Rahmenvereinbarung Forschungsförderung über die gemeinsame Förderung von Einrichtungen der wissenschaftlichen Forschung (AV-FE)

stuft. Dies weist auf einige Strukturprobleme hin, die in der Bewertung deutlich geworden, aber nur zum Teil von BESSY zu verantworten sind.

Damit BESSY ihre internationale Spitzenstellung halten und für externe Nutzer dauerhaft attraktiv bleiben kann, müssen einige Rahmenbedingungen besser ausgestaltet sein. Dazu gehört vor allem die Ausstattung der Strahlrohre mit wissenschaftlich-technischer Assistenz. Der *support*, den BESSY externen Nutzern bereitstellen kann, ist deutlich schlechter als bei vergleichbaren Strahlungsquellen. Wenn BESSY im internationalen Wettbewerb um Spitzengruppen attraktiv bleiben soll, ist eine personelle Aufstockung des wissenschaftlich-technischen Personals unabdingbar. Nur so kann die Einbindung der Nutzer insbesondere aus den Universitäten in die Forschung und Entwicklung der Einrichtung weiterhin gewährleistet werden. Dem Konzept der „Kooperierenden Forschungsgruppen (CRGs)“ verdankt BESSY einen Großteil ihres Erfolgs. Hier treten zunehmend Probleme auf, weil die kontinuierliche Förderung dieser Gruppen nicht gewährleistet ist.

Ein zweiter Wettbewerbsnachteil von BESSY liegt darin, dass für allgemeine Nutzer ein Entgelt für Strahlzeiten erhoben wird. Dies ist international nicht üblich. In den USA und in Großbritannien ist die Kostenbeteiligung durch Nutzer rückgängig gemacht bzw. im Vorfeld zurückgenommen worden. Auch bei DESY sind keine Nutzerentgelte üblich, um einen innerdeutschen Vergleich anzuführen. Zumindest innerhalb Deutschlands oder besser innerhalb Europas sollten gleiche Standards für die Großgerätenutzung gelten, so das Votum der Bewertungsgruppe.

Der Senatsausschuss Evaluierung hat sich angesichts der Lage der öffentlichen Haushalte bisher in der Regel nicht Wünsche der Einrichtungen nach Mittelerhöhungen zu Eigen gemacht. In diesem Fall sieht er eine Ausnahme als begründet an und richtet an Bund und Länder die Bitte, diese beiden Punkte aufzunehmen. BESSY kann ihre internationale Spitzenstellung nur halten, wenn es keine Wettbewerbsnachteile bei der Grundausstattung hat. BESSY ihrerseits sollte ihren Teil dazu beitragen, dass die Bereitstellung ihrer Serviceleistungen für externe Gruppen intern höchste Priorität genießt. Dass eigene Forschung und Entwicklung zu den Kernaufgaben von BESSY gehören, ist unstrittig. Insbesondere mit institutionellen Mitteln sollte der Service und Betrieb von BESSY sichergestellt werden.

Eine Eingliederung von BESSY in eine Hochschule wird nicht empfohlen. Als überregionale Serviceeinrichtung sollte BESSY wie bisher allen Hochschul- und Forschungseinrichtungen zur Verfügung stehen und die Auswahl ihrer Nutzergruppen ausschließlich am wissenschaftlichen Ertrag orientieren. Mit ihrem Arbeitsauftrag und ihren Arbeitsschwerpunkten ist BESSY überregional von Bedeutung und von gesamtstaatlichem wissenschaftspolitischem Interesse.

2. Zur Stellungnahme von BESSY

BESSY hat zum Bewertungsbericht Stellung genommen (Anlage C). Die Einrichtung begrüßt die positive Bewertung und hofft, dass die Empfehlungen zur Personalerhöhung und zur Aufhebung der Nutzergebühren aufgegriffen werden, um die Serviceleistungen verbessern zu können. Sie begrüßt die positive Haltung gegenüber der institutsinternen Forschung auf speziellen Anwendungsgebieten. BESSY versichert, es bestehe keine Gefahr, dass der Betrieb der vorhandenen Einrichtung durch die Entwicklungsarbeiten für den FEL beeinträchtigt sei. Das FEL-Vorhaben sei als Zukunftsprojekt allerdings notwendig, um erstklassige Wissenschaftler insbesondere auch für den Betrieb von BESSY gewinnen zu können. BESSY erhofft sich eine Weiterförderung des FEL-Vorhabens nach 2005.

Der Senat nimmt die Stellungnahme von BESSY zum Bewertungsbericht zur Kenntnis. Er empfiehlt eine Personalaufstockung sowie eine zumindest europaweit einheitliche Regelung bezüglich der Gebührenerhebung bei Strahlungsquellen. Hinsichtlich des FEL-Vorhabens empfiehlt er, darauf zu achten, dass die Entwicklungsarbeiten aus Drittmitteln finanziert werden.

3. Förderempfehlung

Der Senat der Leibniz-Gemeinschaft empfiehlt Bund und Ländern, BESSY als Serviceeinrichtung für die Forschung auf der Grundlage der „Ausführungsvereinbarung Forschungseinrichtungen“ weiter zu fördern.

Senate Evaluation Committee

Leibniz Gemeinschaft

SAE 0052/04
1-Sep-04

Annex A: Presentation

Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung m. b. H

(Berlin electron storage ring company for synchrotron radiation)
(BESSY)[1]

Content

Appendices

[1] This presentation, compiled by the Evaluation Office, has been approved by BESSY and the relevant Federal and State departments.

List of Abbreviations

ALS:	Advanced Light Source, Berkeley
ANKA:	Angströmquelle Karlsruhe GmbH
APPLE:	Advanced Polarized Photon Light Emitter
AZM:	Anwendungszentrum Mikrosystemtechnik *Application Center for Micro Engineering*
BAM:	Bundesanstalt für Materialforschung und –prüfung *Federal Institute for Materials Research and Testing*
BESSY:	Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung *Berlin electron storage ring company for synchrotron radiation*
BMBF:	Bundesministerium für Bildung und Forschung *Federal Ministry for Education and Research*
BTC:	Beam Time Committee
CNRS:	French National Center for Scientific Research, Paris
COFIN:	Italian Grant Review Committee
CRG:	Cooperating Research Group
CW:	Continuous Wave Linear Accelerator
DAAD:	Deutscher Akademischer Austauschdienst *German Academic Exchange Service*
DELTA:	Dortmunder Elektronen Speicherring Anlage *Dortmund Electron Accelerator Facility*
DESY:	Deutsches Elektronen Synchrotron *German Electron Synchrotron*
DFG:	Deutsche Forschungsgemeinschaft *German Research Foundation*
DIAMOND:	Diamond Light Source, Didcot, UK
DOE:	US-Department of Energy
EFRE:	European Regional Development Fund
ELETTRA:	Synchrotron Light Laboratory, Trieste
ELSA:	Electron Stretcher Accelerator, Bonn University
ESRF:	European Synchrotron Radiation Facility, Grenoble
EUV:	Extreme Ultraviolet
eV:	Electron Volt
FEL:	Free Electronic Laser
FHI:	Fritz Haber Institute of the Max Planck Society
FU:	Free University of Berlin

FZJ:	Forschungszentrum Jülich (*Research Center Jülich)*
FZK:	Forschungszentrum Karlsruhe (*Research Center Karlsruhe)*
fs:	femto second
GeV:	Giga electron Volt
GW:	Giga Watt
HASYLAB:	Hamburger Synchrotron Strahlungslabor
HGF:	Helmholtz-Gemeinschaft Deutscher Forschungszentren *Helmholtz Association of German Research Centers*
HGHG:	High Gain Harmonic Generation
HMI:	Hahn-Meitner-Institute
HOM:	High Order Modes
HU:	Humboldt University, Berlin
IFW:	Institute for Solid State and Materials Research, Dresden
KeV:	Kilo electron Volt
LIGA:	LIGA technique, a micro-fabrication method developed in Karlsruhe (deep X-ray lithography, electroforming and moulding)
MeV:	Mega electron Volt
MAX-lab:	National Electron Accelerator Laboratory for Nuclearphysics and Synchrotronradiation Research, Lund University
MPG:	Max-Planck-Gesellschaft (*Max Planck Society)*
NSF:	National Science Foundation, USA
NSRRC:	National Synchrotron Radiation Research Center, Taiwan
PITZ:	Photo Injector Test Facility, DESY (Zeuthen)
PLS:	Pohang Light Source, Korea
ps:	pico second
PSF:	Protein Structure Factory
PTB:	Physikalisch Technische Bundesanstalt *National Metrology Institute for Scientific and Technical Services*
rf:	resonant frequency
SAC:	Scientific Advisory Committee
SASE:	Self Amplified Spontaneous Emission
SFB:	DFG-Sonderforschungsbereich *Collaborative Research Center (funded by DFG)*
SOLEIL:	Soleil Synchrotron, Saint-Aubin, France
SLS:	Swiss Light Source
SR:	Synchrotron Radiation
SRI:	International Conference on Synchrotron Radiation Instrumentation

T_c:	Superconducting transition temperature
TESLA :	Tera Electron Volt Energy Superconducting Linear Accelerator
TFR:	Forschungsrat für technische Wissenschaften, Schweden *Research Council on Technical Sciences, Sweden*
THz :	Terahertz
TU:	Technical University Berlin
UC:	User Committee
UV:	Ultraviolet
VUV:	Vacuum Ultraviolet
WR:	Wissenschaftsrat *German Science Council*
XUV:	Extended Ultraviolet

1. Development and Funding

The *Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung m. b. H.* (BESSY) was founded as a national institution in 1979. Its mission was to build a synchrotron radiation source and to operate it as a service institution for radiometric applications by the National Metrology Institute for Scientific and Technical Services (PTB), for X-ray lithography at the forefront of industrial applications, and for basic research and materials science at German universities and other research institutions.

BESSY is a publicly owned non-profit company serving science and industry. The basic tasks and goals of BESSY were laid down in the 1978 framework agreement between the Federal Government (Ministry for Research and Technology and Ministry for Economy), the State Government of Berlin, PTB, and the shareholders. The shares are now held by the Max Planck Society (MPG) (25%), Hahn-Meitner-Institute (HMI) (24%), German Electron Synchrotron (Deutsches Elektronen Synchrotron, DESY), Research Center Jülich (FZJ), and Research Center Karlsruhe (FZK) at 17 % each. Since 2000, BESSY has been a member of the Leibniz Association and receives institutional funding from the German Federal States and the German Government.

User operation started in 1982 at BESSY I, an 800 MeV storage ring in Berlin-Wilmersdorf, which provided XUV-radiation (extended UV) through its dedicated light source. Due to the enormous increase in demand for a higher quality synchrotron radiation source in basic science and steady technological advance as well as international competition, the building of a new high brilliance synchrotron radiation source was approved by the Federal Government and the Senate of Berlin. Subsequently, Berlin asked the German Science Council (WR) to evaluate future models for joint funding of BESSY during operation. The Council appointed a working group to visit the facility in May 1994. Based on their report, the WR finalized its statement on November 11, 1994 and emphasized the importance of BESSY II as a user facility. To fulfill its mission, an increase in personnel was recommended. The importance of in-house research, also covering areas beyond the field of accelerator research and instrumentation, was stressed.

Starting in 1999, BESSY has been operating the 1.7 GeV, 3rd generation electron storage ring BESSY II in Berlin-Adlershof, a complex machine which uses insertion devices (undulators, wigglers, wavelength shifter) as high brilliance light sources. BESSY I continued to operate in parallel with the construction and optimization of BESSY II until 1999. BESSY II achieved and surpassed the design parameters within the first year of operation respectively; at present, beam intensity and lifetime already exceed the design values by at least a factor of 2.

2. Mission, Tasks, Main Work Areas and Scientific Environment

The main **task** of BESSY is to provide highest quality synchrotron radiation (SR) for external users. The main target groups originate predominantly from the scientific community but there are also industrial clients. The research program covers disciplines from basic atomic, molecular, and condensed matter physics, surface science, chemistry and catalysis to structural biology, life sciences, and archeometry. However, the field of materials sciences, in particular magnetic materials for storage technologies, is an outstanding field of research. Of additional interest to industry are investigations of novel materials. X-ray based lithography, microscopy, nano-technologies and micro-fabrication play an important role. BESSY operates the Application Center for Micro Engineering (AZM) dedicated to advancing X-ray lithography and related new technologies.

National and international significance

BESSY was the first facility dedicated to synchrotron radiation research in Germany and has been the major provider of XUV-radiation ever since user operation started. Currently, it is the only German third generation synchrotron radiation facility. According to the institute, BESSY has become a major provider of radiation in the XUV range in Europe and the largest European facility of this kind. The ESRF fulfils the complementary role of being the third generation facility for the hard X-ray range.

Ten 3rd generation synchrotron radiation facilities operate world-wide. Seven of them (ALS, ELETTRA, MAX-lab, NSRRC, PLS, SLS and BESSY) are designed for optimum performance in the VUV and XUV range, while the three largest ones are optimized to achieve the best performance in the hard X-ray range.

The user community of the smaller machines, such as BESSY, predominantly investigates the electronic properties of matter and thus employs various types of spectroscopies. At the hard X-ray facilities it is mainly the atomic structure of matter that is investigated by scattering methods. Exploiting special insertion devices, the smaller 3rd generation rings can compete even in the range of hard X-rays with the older large 2nd generation machines.

In Germany there are four other synchrotron radiation facilities in operation:

• ANKA in Karlsruhe is a second generation Synchrotron radiation source operating for industrial users (analytical and LIGA applications) as well as for basic research by a local user community.

• DELTA in Dortmund and ELSA in Bonn, university-based facilities dedicated to developing machine components and to providing local groups with synchrotron radiation.

• HASYLAB at DESY in Hamburg, optimized for the hard X-ray range.

Among the distinguishing features of BESSY and its user program are the following:

- Insertion devices for arbitrarily adjustable polarized radiation allowing a broad program of basic science specifically for applications to study magnetic materials.
- High resolution beamlines with a world record resolving power of 117,000 in the soft X-ray range applied to basic research on atoms and molecules.
- Development of zone plate based soft X-ray microscopy in cooperation with Göttingen University which allowed to set up a facility for life and environmental sciences.
- Leading role in the area of photoelectron microscopy which lead to the development of commercial instruments.
- Comprehensive European industrial cooperation, developing and testing instrumentation for extreme UV semiconductor lithography in the PTB laboratory at BESSY. As a consequence of this demand, the Willy-Wien-Laboratory of the PTB with the new metrology light source is being built adjacent to BESSY.
- Development of a new operational mode (low-α mode) of BESSY II which makes it possible to generate steady state, brilliant, broadband coherent far-infrared (THz) radiation; only facility world-wide to deliver high intensity ~1 mm wavelength radiation. The ultra short bunches required for this operation mode allow time resolved experiments with a time resolution a factor of ten higher than other storage ring sources. The high intensity radiation in the ~1mm wavelength region is applied in spectroscopy of

high T_c materials and of very shallow states in semiconductors, as well as scanning near-field microscopy for imaging wet biological samples.

Synchrotron radiation in the VUV to X-ray range with services for research and technological development is provided 24 hours a day, seven days a week.

The **in-house use** of the facility for basic research lies below 10 % of the scheduled total beam time, demonstrating the service character of the facility. Since 2001 a challenging research program has been started in addition. In-house research concentrates on the development of new synchrotron radiation sources and the associated instrumentation, spectrometric techniques, soft x-ray microscopy, magnetic nanostructures and multi-layers, clusters as new materials, and micro-engineering.

The BESSY in-house research and **future development** program presently focuses on the following topics:

- Precision beam optics combined with a local orbit feedback system make it possible to reduce ground and man made motions significantly.
- Stable, coherent synchrotron radiation in the THz regime; the necessary short bunches provide the opportunity for time resolved experiments with ps resolution.
- Modern rf-systems with damped higher order modes are developed which make it possible to reduce HOM driven coupled bunch instabilities.
- Super-conducting rf-structures to be applied to 3rd order harmonic cavities for bunch lengthening.
- Development of super-conducting magnet devices installed at BESSY II to produce high fluxes of hard X-rays.
- Improvement of the APPLE II design of undulators to implement it in a vacuum which will result in an increase in the achievable X-ray energy of a variable polarized photon source.
- Building of three microfocus beam lines, one for hard and two for soft X-rays, both latter ones with variable polarization.
- Development of instrumentation for ultrafast X-ray physics with pulselengths <= 50 fs and circular polarization.
- Soft X-ray resonant, elastic, inelastic, and coherent scattering station to image the structure as well as to obtain spectroscopic information of nanostructures with one long term goal being the study of the electronic structure of active centers in proteins.
- Soft X-ray microscopes to be applied in life, environmental and materials sciences with improved energy and spatial resolution.
- Investigations of magnetic nanostructures and multi-layers exploiting polarization spectroscopic techniques.
- Four beam lines are at the disposal of the AZM serving interested industrial parties; they are presently operating for X-ray lithography (LIGA) and for tests of photo resists.

The major long term plan is to build and operate a FEL-facility, covering the intrinsic photon energy range of BESSY (20 eV to 1 keV) for studies of dynamical and non-linear processes in matter with unprecedented temporal and spatial resolution and intensity. In a series of workshops the scientific case has been developed and documented. This report received

excellent marks from the German Science Council (WR). By now, the technical design report has been completed. It entails plans for a second generation Free Electron Laser (FEL) facility providing reproducible 20 fs pulses of GW power by employing a high gain harmonic generation scheme (HGHG) rather than the SASE principle. The central part element is a continuous wave linear accelerator (CW) based on the TESLA SC cavities. The Technical Design Report will be presented to the WR for evaluation. The present research and development of the BESSY-FEL is funded by the "*Zukunftsfonds*" of the State of Berlin.

3. Structural Features und Organization

BESSY's independent bodies comprise the Assembly of Shareholders, the Supervisory Board and the Management. The **Assembly of Shareholders** appoints the Supervisory Board and decides on legal affairs, i.e. on changes of shareholders and original capital. The **Supervisory Board** has the authority over all central decisions concerning the direction of the scientific mission, financial affairs and appointment of the Management. It is also responsible for further important matters such as the operation and development of the facility, direction of new missions, approval and financing of research and development projects, guidelines for the use of the results of research and development, annual financial projections, and setting fees for the use of the facility. In close cooperation with the Scientific Advisory Committee (SAC) and the Financial Committee, the **Management** prepares recommendations for the Supervisory Board. The administration is headed by an authorized signatory who is a member of the BESSY management board. Thus, the Management of BESSY consists of the scientific director, the technical director and the head of administration, whereby the latter has authority over all financial affairs.

There are four advisory committees supervising the work at BESSY. The **Scientific Advisory Committee (SAC)** advises the Management and Supervisory Board on the scientific and technical programs. The members of the SAC are appointed by the Supervisory Board. They represent the major fields of research performed at BESSY. The SAC plays an important role as an independent external control body. It considers the facility's scientific program from a strategic point of view and evaluates the upgrade program for the beamlines and the accelerators as well as the in-house research. The evaluation and ranking of beam time proposals submitted by all the users semi-annually are the main duties of the **Beam Time Committee (BTC)**. The BTC makes recommendations for beam time allocations which are the basis for the beam time schedule produced by the scientific director. The **Financial Committee** is also appointed by the Supervisory Board and advises the board on financial affairs. The newly constituted **User Committee (UC)** is the link between users and Management. It advises individual users, user groups, and the scientific director on operational matters concerning external experiments conducted at BESSY. The panel consists of the beam time coordinator, the machine operations coordinator and four external members elected by the registered participants at the BESSY Annual Users' Meeting. User feedback is guaranteed by direct contact to the support staff and by a brief questionnaire included in the online beam time report, which is evaluated regularly.

The BESSY staff is organized in four divisions: accelerator (62 employees), experimental utilization (105 employees), infrastructure (25 employees) and administration (17 employees) (see Appendix 1). Internally, there are regular staff meetings on a weekly schedule. All scientific staff have signed the rules of good scientific practice.

In order to develop the user community, several workshops are organized annually with external experts as well as present and prospective users.

4. Resources and Personnel

Since 2000, BESSY has received institutional funding as a service institute in the framework of the "Blue List". In 2003, BESSY´s annual **budget** amounted to a total of 27.721 M€ compared to 34.428 M€ in 2001 due to reduced contributions from the EU (EFRE, see Appendix 2). The institutional support in 2003 totaled 18.522 M€ (67 %), 89 % of which can be assigned to support from the Federal Government or the Federal States (in equal parts). The proportion of third-party funding in relation to total financial resources reached 26 % (7.243 M€) in 2003. 66 % of the third-party income resulted form R&D agreements, services and licenses, most of which (82 %) could be assigned to the Experimental Division (5.975 M€ in 2003).

The service costs for Leibniz Institutes and German universities are included in the institutional funding of BESSY as a member of the Leibniz Association. Besides this, BESSY has concluded cooperation agreements with MPG, PTB, Federal Institute for Materials Research and Testing (BAM) and institutes of the Helmholtz Association of German Research Centers (HGF) (HMI, FZJ and FZK) which regulate the extent of BESSY services and the corresponding **beam time fees**. In the EC Framework Programs for research, beam time for EU users is financed by "Access-to-large-installations" contracts with the European Commission. For other external users BESSY charges beam time fees . These fees amount to about 30,000 € per week of beam time at one of the high performance undulator beamlines. According to BESSY, the beam time fee model puts the facility at a severe disadvantage in worldwide competition for the best users and user programs. BESSY is the only facility in the world charging beam time fees for basic research projects.

BESSY cooperates with some 100 academic and **industrial partners**. Additionally, BESSY users and industry carry out joint projects. The development of sophisticated instrumentation for research with soft X-rays has resulted in a number of license contracts and joint projects not only with (local) small companies (ACCEL, BESTEC, FMB, Röntec) but also with leading optical companies (Jenoptik, ZEISS, and others). These companies supply products developed jointly with BESSY for a world-wide market. Undulators developed and manufactured at BESSY which allow free selection of the polarization characteristics of the radiation are not only installed at the facility but also at other leading synchrotron radiation sources, i.e. the SLS. Special research contracts with industrial and other partners have been signed during the last two years. BESSY and the institutional users BAM and PTB have acquired industrial contracts in the amount of about 1 M€ annually over the past four years.

Currently, there is a total stock of 18 patents and 2 licenses resulting in revenues of 21,000 €, compared to 7 patents at the time of the last evaluation.

In 2003, almost 12 M€ were provided for **personnel** expenses, while expenses for materials amounted to about 8 M€ and for investments to 7 M€. BESSY currently has 209 employees who provide services for operating storage ring and beamlines as well as for BESSY owned end-stations. Among these are 76 positions for academic and higher management staff and 11 PhD students (see Appendix 4). More than 70 % of the academic staff is paid according to BAT Ib or higher. 90 % of all positions are financed by institutional resources. Most of the employees work in the experimental (105) and the machine division (62) respectively, while the administration department comprises only 17 positions (see Appendix 5). About 20 % of the

personnel are employed on temporary contracts. Most of the academic staff belong to the age groups 40 - 49 years (26 persons) and 30 - 39 years (21 persons) and have worked at the establishment for 5 - 9 years (23 persons) or less than 5 years (25 persons) (see Appendix 7).

Although applications by women are explicitly encouraged, the quota of female applicants has remained well below 5 % during the past years. However, since 2001, four new female scientists have started work at BESSY (see Appendix 6). Among the PhD students the percentage of female students has risen to 24 %. The overall quota for female employees is 15 %, dominated by 8 5% women in the administration. BESSY supports several programs and measures to raise the quota of women.

While staff size in the technical and infrastructure areas is regarded as adequate, BESSY considers itself understaffed in terms of scientists and engineers necessary to provide user services. According to the institute, it is thus difficult to compete with the standards of user services other facilities can offer, where several scientists are allocated to each beamline with additional technical support available. At BESSY, there are 33 scientists and 30 engineers/technicians in the experimental group who are responsible for insertion devices (4 PhD's), beamlines (11 PhD's), computer hardware and software (2 PhD's), experimental stations (6 PhD's), and research (10 PhD's) which on average amounts to less than one scientist per beamline. In the competition to attract the best user projects, BESSY sees itself at a severe disadvantage as it has high user fees on the one hand and is only providing minimal services to the user on the other. Furthermore, the institute foresees problems in financing personnel in future. Additional personnel costs resulting from the collective labor agreement for federal employees will not be covered by public funding. This will result in a general loss of funding and a reduction of the number of employees in the future. The present resources for durable equipment and consumables are adequate to guarantee the status quo with regard to the operation and service of the facility. If additional and substantial facility upgrades are no longer possible due to the lack of funding, BESSY fears for its scientific position. The facility development program at BESSY is currently funded through a special upgrade program through 2007. At present, an average 3.25 M€ per year are provided for upgrades.

5. Promotion of Up-and-coming Academics and Cooperation

Three leading members of the BESSY staff hold faculty appointments as professors at universities in Berlin and Potsdam. These include teaching obligations as well as supervision of Diploma and PhD theses. Nine BESSY employees are lecturers at universities and universities of applied science. Laboratory courses are organized for students from universities, universities of applied sciences, and high-schools. The association with the universities is of mutual interest. Students are attracted to work for their theses at BESSY. The universities can offer their students access to a high-tech research facility with an international ambience. During the last three years, 24 diploma theses, 52 PhD, and 11 Habilitation theses were carried out at BESSY, most of them by external users (21 diplomas, 46 PhD and 9 Habilitation theses). The "Society of Friends and Sponsors of BESSY" supports the research activities of young scientists at BESSY. The main activities of the society include the annual bestowal of the Dissertation Prize, the Innovation Award, and the organization of the BESSY-Forum. The Society has more than 100 members, about 30 % of which are companies or institutes.

Formal **cooperation** agreements have been concluded with the Berlin Universities (FU, HU, TU), Potsdam University, and the University of Applied Science TFH Wildau. With other leading

synchrotron radiation facilities, in particular with DESY in Hamburg and Zeuthen, BESSY has concluded cooperation agreements, too. They refer to the development of synchrotron radiation instrumentation and new technologies for the free electron lasers, such as the Photon Injector Test Facility (PITZ) at DESY Zeuthen. BESSY supported SLS during the design and construction phase. Examples of very successful bi-national cooperation include the Russian-German-Laboratory and the Associated Research Program, in which altogether 12 Russian universities and institutes are participating, co-financed by Russia and the Federal Ministry for Education and Research (BMBF). In a collaboration agreement between BESSY and the Budker Institute for Nuclear Physics, almost 80 % of the hardware for the injector synchrotron was manufactured in Novosibirsk, Russia. This intensive cooperation will also continue in future. Funded by the EC, BESSY has been and is involved in collaboration with other institutions and facilities in Germany and Europe to advance R&D activities, especially in terms of fs-slicing applications, FEL applications, and the development of micro zone plate optics.

A major contribution to the success of BESSY is the **Cooperating Research Group (CRG)** program, in which external groups set-up their own beamlines at BESSY. This has enabled a very rapid growth of BESSY II. In the CRG model these institutions get preferential access to a major proportion of the operational time of the beamline (usually 67%). The remaining time is available for general users from industry as well as from basic and applied research institutions. The CRGs are evaluated by review panels selected by the SAC. Among the existing CRGs are the following institutions:

- PTB, MPG, HMI, Protein Structure Factory (PSF), BAM, Göttingen University (2 or more insertion device beamlines each)
- FZJ, Max Born Institute, Paul Drude Institute, Institute for Solid State and Materials Research (IFW) Dresden, Universities of Würzburg, Cottbus, Kaiserslautern, three Berlin universities (1 insertion device beamline each)
- Universities of Heidelberg, Bochum, Osnabrück, and Potsdam, Technical University Dresden, TU-Berlin, University of St. Petersburg, Institute for Crystallography Moscow, Infra-Red consortium (each participating in 1 or 2 bending magnet beamlines)

Apart from the user program, short-term guests visit the institute regularly and present their results in seminars. During the last three years, 172 guests visited the institute, 27 of whom (most of them from Central and Eastern Europe) stayed between one and three months; 4 stayed longer. In 2004, a senior researcher from the French National Center for Scientific Research (CNRS) in Paris has spent several months at BESSY and the scientific director of the Advanced Light Source (ALS) Berkeley will visit for several month in 2005.

BESSY keeps an open house for interested outsiders. The spectrum of groups guided through BESSY ranges from school and university students to company representatives, privately organized groups, and politicians. A continuously growing number of guests has been welcomed each year (2000: 1,100 visitors; 2001: 1,300 visitors; 2002: 1,800 visitors, 2003: 2,900 visitors) and, in addition, close to 6,000 people came to BESSY during the “Long Night of Sciences”, both in 2002 and 2003.

Visits to partner institutes serve to intensify cooperation and extend scientists’ qualifications. During the last three years, 120 guest visits to other institutes were carried out by BESSY scientists, more than 90 % with a maximum duration of one month.

6. Results – Research, Development and Services

The key result of BESSY activities is the provision of extremely brilliant synchrotron radiation. The user community at BESSY has grown steadily over the past years as new beamlines have opened up new research opportunities, e.g. at the PSF. BESSY II is generally overbooked, e.g. the high performance beamlines, by a factor of two. Currently, the facility provides more than 40 weeks' **user services** per year. This corresponds to 4,800 user-dedicated operation hours per year. In addition, some 1,200 hours are operated for machine studies and beamline commissioning. Today, 26 insertion devices and 20 bending magnet beamlines are available. About 20 end-stations are operated by BESSY and CRGs. At present, more than 1,000 external scientists carry out almost 400 projects per year. 10 % of these are from non-German institutions. These numbers are increasing significantly due to the new hard X-ray beamlines. Recently, two stations have been commissioned by the PSF and two further beamlines are under commission from the HMI.

BESSY attracts users from all over the world. Most of the beam time is used by German universities, the Federal Institutes PTB and BAM, MPG, HGF and Leibniz Institutes. In addition, users from institutions within the European Union benefit from BESSY's services via special European Commission contracts. These activities will be continued in the new Framework Program (FP6): "Integrating Activity on Synchrotron and Free Electron Laser Science", which starts in spring 2004. Several activities are focused on technical applications mainly targeting industrial users. Companies developing technology for new microprocessor generations using EUV-lithography benefit from the long standing expertise of BESSY and PTB. The "Willy-Wien-Labor" at the PTB, which will house a low energy synchrotron radiation facility developed by the BESSY machine group, has already attracted the interest of the semiconductor industry. The BESSY AZM develops and produces prototypes of micro-mechanical devices for, or in collaboration with, industrial partners. The industrial application of BESSY-results has improved significantly since the last evaluation. BESSY in-house research has led to the registration of patents already mentioned. Monochromators and beamline components designed by BESSY are marketed by several companies (FMB, Jenoptik, ZEISS).

BESSY staff members participate in several **German Research Foundation** (DFG) programs (two "Collaborative Research Centers" (SFBs), one "Priority Program" and one "Research Unit"). BESSY had three R&D projects funded by the EU in the 5th Framework Program (FP). It is managing two and participating in three additional projects in FP6. Access to BESSY for research by EU scientists has been funded by the EC since 1988. In FP6, BESSY will be a major partner in the EC's largest Integrated Infrastructure Initiative (I3) project. Furthermore, BESSY has applied successfully to become an EC Marie Curie host institution for post-docs (>12 person-years) in FP6. BESSY is also a partner in five of the BMBF´s national competence networks. The micro lithography work is organized largely in the three BMBF funded projects, InnoRegio, MICROCOMP, and MODULIGA. BESSY has a leading role in a national project on nanometer optical components and cooperates with metrological and research institutes as well as with industrial partners. Several joint research projects are in progress with the HMI, i.e. an investigation of solar cell materials.

Publications and international presentations demonstrate the high standard of research at BESSY. Scientific results are published in peer-reviewed journals, as conference proceedings and technical reports. In 2002, a total of 91 papers (53 in peer-reviewed journals and 38 in others) were published by the institute (2001: 133, 2000: 108), compared to 32 in 1993 (1991: 52, 1991: 31). Most of them were published by the Experimental division (about 75 %) (see

Appendix 7). BESSY employees are involved in organizing workshops and conferences (e.g. SRI 2000) and participate in program or organizing committees for international conferences (29 conferences between 2000 and 2002, seven outside of Berlin). Every year, BESSY organizes an “Annual Users' Meeting”. The list of offices and functions held by BESSY staff ranges from referees for journals (4 between 2000 - 2002) to scientific advisors. The scientific director has worked as a referee for national and international funding agencies such as DAAD, DFG, DOE, NSF, COFIN and TFR and received an honorary doctorate from Uppsala University. During the last 10 years, three BESSY staff and 17 BESSY users have received faculty appointments.

The target audiences for BESSY communications include staff, users, industry, funding agencies, politics, press and media, as well as the general public, in particular, students and pupils. Users are addressed in talks and presentations at conferences and workshops, by articles in journals, and by the BESSY internet pages. The “Annual Report” includes abstracts of all the research carried out at BESSY. Since 2001, printed annual reports have been replaced by the “BESSY Highlights”, which aim to cover the entire scientific spectrum and also give the lay-public an opportunity to gain an impression of the work carried out at BESSY. The institute participates in exhibitions and science fairs to bring science to the public and to address industrial users.

7. Implementation of German Science Council’s recommendations

a) Joint funding of BESSY as a service institution of the “Blue List” (Leibniz Association)

Since 2000, BESSY has been funded as a service institution of the Leibniz Association. As already mentioned, it has been possible to attract user groups from many institutions. The main users are researchers from German universities and governmental institutions (BAM, PTB). Non-university users, as well as groups from institutions other than the Leibniz Association, pay a beam time fee which amounts e.g. to 30,000 €/week for the high performance undulator beamlines.

b) 25 % of scientists’ working time should be reserved for in-house research, specifically in accelerator research and instrumentation.

BESSY has initiated a broad development program to optimize the accelerator and the instrumentation. The fact that BESSY II already achieved and surpassed the design goals in the first year of operation underlines the success of this research. Since 2001, a challenging research program has been started in addition. The in-house use of the facility for basic research is below 10 % of the scheduled total beam time.

c) Use of the facility for applied research should be strengthened

The exploitation of the facility for applied research has been strengthened. Direct use of SR by industry is marginal but through the AZM close collaboration with industry has been brought about. In addition, a first industrial partner joined BESSY to manufacture gear parts for a micro harmonic drive gear by a direct LIGA process. The proportion of third-party funding from R&D assignments, services, and licenses in relation to total financial resources varied from 23 % (2001) to 17 % in 2003, showing a slight decrease. Cooperation with industry (INFINEON, CLARIANT, Micromotion, Elmicron) brought an income of almost 180,000 € per year in 2002 and 2003, of which 37,000 € in 2002 and 18,000 € in 2003 can be ascribed to beam time fees.

Major industrial cooperation is carried out by some of the CRG’s at BESSY, which offer additional services rather than just access to the use of synchrotron light or specific

instrumentation. Foremost in this cooperation are the activities of the PTB concerning the testing and prototype development of optics, masks, and exposure systems for EUV lithography. Furthermore, Schering is a user of the PSF at BESSY and the Fritz Haber Institute is organizing a consortium of chemical companies to study catalysts under reaction conditions. Additional industrial projects at BESSY involve AMD, Hitachi, Thyssen, and VW. In total BESSY and the institutional partners have acquired research contracts from industry amounting to about 1 M€ annually for the past four years.

d) 25 % of scientists employed on temporary contracts to ensure flexibility

22 % of academic and higher management staff are employed on a temporary basis.

e) Upgrade program over a period of 10 years

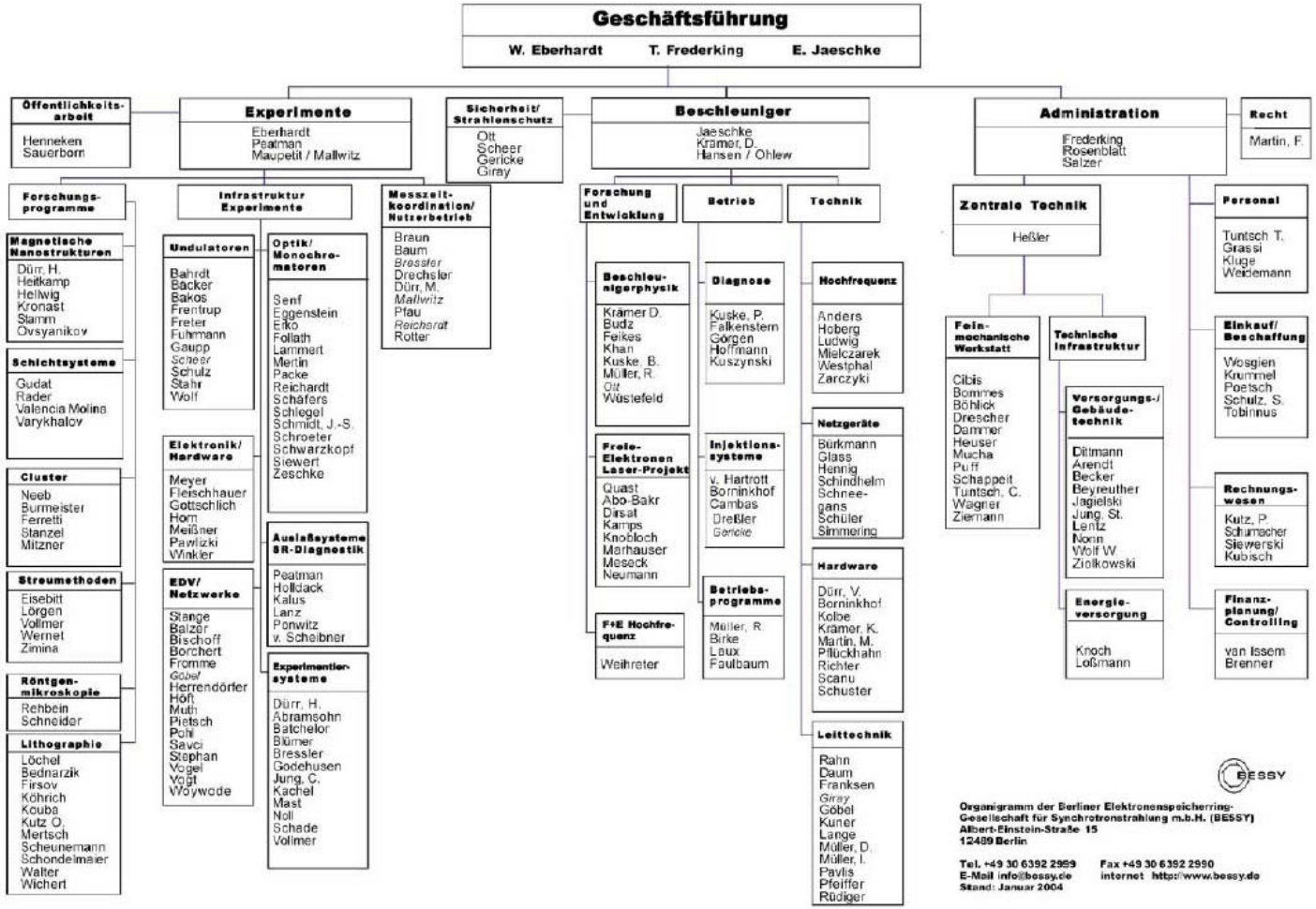
Additional investment money has been designated up to the year 2007 (3.25 M€ per year). In addition, special funds have been made available for the studies of the BESSY soft X-ray FEL from the initiative "Zukunftsfonds Berlin".

f) Close cooperation with other research institutes, especially the local universities

Three senior scientists are full professors at local universities (TU, HU and University of Potsdam). Cooperation with the HU has been intensified by the relocation of its science departments to Adlershof. A special beamline devoted to the training of students is currently under construction. BESSY cooperates with the leading SR laboratories and many national and international research institutes.

Appendix 1

Organization chart



Appendix 2

Financial resources and allocation of resources

(Figures in € 1,000)

	2003	2002	2001
I. Financial resources (income) [1]	**27,721**	**27,556**	**34,428**
1.1 Institutional funding	**18,522**	**18,222**	**21,964**
- Federal States[2]	8,238	8,181	5,076
- Federal Government[2]	8,238	8,181	5,076
- Other institutional funding[3]	2,046	1,860	11,812
institutional funding as a proportion of total financial resources (in %)	*67 %*	*66 %*	*64 %*
1.2 Research funding	**1,924**	**1,883**	**1,326**
As a proportion of total financial resources	*7 %*	*7 %*	*4 %*
1.3 R&D assignments, services, licences[3]	**4,776**	**5,869**	**8,216**
As a proportion of total financial resources	*17 %*	*21 %*	*24 %*
1.4. Other third-party resources	**543**	**817**	**365**
As a proportion of total financial resources	*2 %*	*3 %*	*1 %*
1.5. Capital surplus and transferred resources from the previous year	**1,956**	**766**	**2,556**
As a proportion of total financial resources	*7 %*	*3 %*	*7 %*
II. Allocation of resources (expenses)	**27,721**	**27,556**	**34,428**
2.1 Personnel	11,934	10,695	9,347
2.2 Materials, supplies, equipment	8,295	9,659	12,668
2.3 Investments (not incl. building investments)	6,558	6,786	11,647
2.4 Building investments[4]	-		-
2.5 Special positions (where applicable)	904	416	766
2.6 For information only: DFG charges	-	-	-

[1] Actual expenditures in each year classified by financial resource; not incl. money in transit

[2] Funding according to BLK decision

[3] Special financing, EU funds

[4] Building investments, multi-annual measures for building maintenance, land acquisition incl. demolition

Appendix 3

Third-party resources classified by organizational unit[1]

(Figures in € 1,000)

	2003	2002	2001
I. Total	**7,243**	**8,869**	**9,908**
- DFG (German Research Foundation)	64	-	-
- Federal Government	656	823	689
- Federal States	801	689	169
- EU project funding	380	371	460
- Foundations, other research support	23	-	8
- R&D assignments, co-operation with industry, services, licenses	4,776	5,869	8,217
- Other third-party resources	543	817	365
II. By organizational unit			
Experimental division	**5,975**	**7,005**	**6,822**
- DFG (German Research Foundation)	64	-	-
- Federal Government	656	783	477
- Federal States	3	8	149
- EU project funding	294	268	362
- Foundations, other research support	23	-	5
- R&D assignments, co-operation with industry, services, licenses	4,392	5,129	5,464
- Other third-party resources	543	817	365
Machine division	**1,268**	**1,564**	**877**
- DFG (German Research Foundation)	-	-	-
- Federal Government	-	41	212
- Federal States	798	680	20
- EU project funding	86	103	98
- Foundations, other research support	-	-	3
- R&D assignments, co-operation with industry, services, licenses	384	740	544
- Other third-party resources	-	-	-
Administration dept./ Technical services			**2,209**
- DFG (German Research Foundation)			
- Federal Government			
- Federal States			
- EU project funding			
- Foundations, other research support			2,209
- R&D assignments, co-operation with industry, services, licenses			
- Other third-party resources			

[1] Actual expenditure in each year classified by financial resource; not incl. money in transit

Appendix 4

Staffing
acc. to sources of funding and pay scale

- Personnel (financed by institutional and third-party resources) in terms of full-time equivalents
[reporting date 31.12.2003] -

	Total number	Number financed by	
		Institutional resources	Third-party resources
Total	**209**	**190**	**19**
1. Academic and higher management staff	**76**	**66**	**10**
- S (B4 and above)	3	3	0
- S (B2, B3)	0	0	0
- I, A16	5	5	0
- Ia, A 15	12	12	0
- Ib, A 14	34	28	6
- IIa, A 13	22	18	4
2. Doctoral candidates	**11**	**10**	**1**
3. Other staff	**122**	**114**	**8**
- III, IV, A 12, A 11, A 10	54	48	6
- V, A 9, A 8	52	50	2
- VI, A7	5	5	0
- VII, VIII, A 6, A 5	0	0	0
- Wage brackets, other staff	7	7	0
- Trainees	4	4	0

Appendix 5

Staffing acc. to organizational unit

- Personnel (financed by institutional and third-party resources) in terms of full-time equivalents
[reporting date 31.12.2003] -

	Total	Academic and higher management staff[1]	Doctoral candidates[2]	Other staff, trainees
Entire establishment	**209**	**76**	**11**	**122**
Administration dept.	17	2	0	15
Machine division	62	28	1	33
Experimental division	105	45	10	50
Technical services	25	1	0	24

[1] BAT IIa and above (not incl. doctoral candidates)
[2] If financed by institutional or third-party resources

Appendix 6

Personnel

- Individuals (financed by institutional and third-party resources) acc. to pay scale [reporting date 31.12.2003] -

	Total number	Financed by third-party resources		Temporary contracts		Women		Women on temporary contracts	
		Number	%	Number	%	Number	%	Number	%[1]
I. Total	**209**	**19**	9.1	**40**	19.1	**31**	14.8	**8**	25.8
1. Academic and higher management staff	**76**	**10**	**13.1**	**17**	**22.4**	**4**	**5.3**	**2**	**50**
- S (B4 and above)	3	0	0	2	66.7	0	0	0	0
- S (B2, B3)	0	0	0	0	0	0	0	0	0
- I, A16	5	0	0	0	0	0	0	0	0
- Ia, A 15	12	0	0	0	0	0	0	0	0
- Ib, A 14	34	6	25	10	41.7	3	12.5	2	66.7
- IIa, A 13	22	4	18.2	5	22.7	1	4.5	0	0
2. Doctoral candidates	**11**	**1**	**9.1**	**11**	**100**	**3**	**23.7**	**3**	**100**
3. Other staff	**122**	**8**	**6.6**	**12**	**9.8**	**24**	**19.7**	**3**	**12.5**
- III, IV, A 12, A 11, A 10	54								
- V, A 9, A 8	52								
- VI, A7	5								
- VII, VIII, A 6, A 5	0								
- Wage groups, other staff	7								
- Trainees	4								

[1] Women on temporary contracts / number of women

Cells marked in gray are not to be filled in.

Appendix 7

Publications

- Total number and classification by organizational unit[1] -

	2002	2001	2000
I. Total number of publications	**91**	**133**	**108**
- Monographs (authorship)	0	0	0
- Monographs (editorship)[2]	0	0	0
- Contributions to collective works	0	3	4
- Papers in peer-reviewed journals	53	55	60
- Papers in other journals	38	75	44
- Electronic publications[3]	0	0	0
II. By organizational unit			
Experimental division	**65**	**109**	**86**
- Monographs (authorship)	0	0	0
- Monographs (editorship)[2]	0	0	0
- Contributions to collective works	0	3	4
- Papers in peer-reviewed journals	50	55	59
- Papers in other journals	15	51	23
- Electronic publications[3]	0	0	0
Machine division	**26**	**24**	**22**
- Monographs (authorship)	0	0	0
- Monographs (editorship)[2]	0	0	0
- Contributions to collective works	0	0	0
- Papers in peer-reviewed journals	3	0	1
- Papers in other journals	23	24	21
- Electronic publications[3]	0	0	0

[1] Each publication is counted only once and should be assigned to one organizational unit.

[2] Contributions to a monograph, which is edited by employees of the establishment, are to be listed in "Contributions to collective works".

[3] Only electronic publications which have not been published in printed form, e.g. CDs, electronic manuals

Appendix 8

Documents submitted by BESSY

- Evaluation report according to the Evaluation Questionnaire for the Leibniz Association Research and Service Facilities (including tables)
- Research fields of users (Fig. 1)
- Increase of allocated beam time,1998 - 2003 (Fig. 2)
- Schematic layout of beamlines (Fig. 3)
- Operational and planned beamlines (Fig. 4a-d)
- Increase in number of beamlines (Fig. 5)
- Increase in number of endstations (Fig. 6)
- Origin of users (Fig. 7)
- Flow chart of the structure of the establishment (Fig. 8)
- Beam time statistics, 2000 - 2003 (Fig. 10)
- CRGs (Tab. 1.1)
- Endstations (Tab. 1.2)
- Project list (Tab. 1.3 on Compact Disc)
- Beam time schedules / operations calendar (2001 - 2003)
- Gesellschaftsvertrag (shareholder agreement)
- Geschäftsordnung für den Aufsichtsrat (Rules of procedure for the Supervisory Board)
- Geschäftsordnung für die Geschäftsführung (Rules of procedure for the Management)
- Geschäftsverteilung der Geschäftsführung (Management objectives)
- Rules of procedure for the Scientific Advisory Committee, Beam Time Committee, and User Committee
- Statement of the Scientific Advisory Committee on the activities of BESSY during the period from 1999 until 2003
- List of members of the advisory committees (Scientific Advisory Committee, Beam Time Committee, Financial Committee, User Committee)
- BESSY Highlights 2002
- Visions of Science
- Current financial budget (Table 3.11)
- Projects funded by third parties: current and approved projects as well as projects completed during the last three years classified by organizational units, including details on funding organization, terms and financial volume (excluding travel allowances, printing cost allowances) (Tables 3.21, 3.22)
- Detailed IT concept
- Faculty appointments

- Theses by BESSY staff and users (Habilitation, PhD, diploma)
- List of projects (EU, BMBF, DFG and others)
- Cooperating universities, institutes, and industry (incl. user cooperation)
- List of publications by BESSY staff in the last 3 years
- List of publications by users 2000 - 2003 (on Compact Disc)
- List of offices, functions and referees, prizes, awards
- Events
- BESSY appearances in print media (Fig. 11)

Senate Evaluation Committee

Leibniz Gemeinschaft

SAE 0061/04
11/30/2004

Annex B: Evaluation Report

Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung m. b. H

(Berlin Electron Storage Ring Company for Synchrotron Radiation Ltd.) (BESSY)

Content

1. Summarized Evaluation and Relevance of the Facility

The activities performed by BESSY during the past years were evidently extremely successful. A third generation synchrotron radiation source was built up and brought into operation within a surprisingly short period of time. The excellent performance and reliability of the facility, with beam parameters having reached or even surpassed its design specifications in the first year of operation, prove that the machine is well designed, built and operated by an excellent accelerator team. The quality of the large number of beamlines is outstanding. Recent technical developments relating to special operating modes for terahertz radiation and time-slicing as well as the pioneering work on the development and exploitation of variable modes of polarization are exceptional. All this has contributed to a user resource in the premier league of such facilities world-wide. The future prospects are promising.

For keeping its competitiveness it is essential that the facility be maintained in top shape, including upgrades of beamlines and advanced measurement stations that are specialized in particular front line research areas. Two important external constraints have a significant impact on the ability of BESSY to provide a fully effective user facility. First of all, the level of manpower dedicated to user support on the beamlines is far below the standards of comparable facilities. Secondly, the funding structure involving beam time fees places BESSY at a significant disadvantage internationally.

The shortage of assistance that the facility is able to offer to users – one scientist per beamline compared to four or five scientists/technical staff at other facilities – is a severe problem, in particular to new users at the experimental stations and newcomers to the field of synchrotron radiation. This is a very important aspect for a facility, which is in an open "market" of synchrotron light sources, competing for the best users. The second point relates to the user fees BESSY charges the general users. Discussions of similar proposals in other countries have been met with a consensus among the synchrotron community that this would be a real disadvantage and considerably lower the attractiveness of synchrotron radiation as a useful research tool for the scientific community.

In addition, a large fraction of the R & D activities have been devoted to the planning of a new *Free Electron Laser* (XUV FEL) facility. These activities on the machine side are financed to a major extent by additional third party funds up to April 2005. In the coming years BESSY has to find a balance between support of new activities like the FEL-project and the problems of user support. It will be important for the management to develop a strategy for the optimum use of BESSY and proper provision of user support. This requires the setting of clear priorities between user-service, in-house research and future plans. Running and improving the storage ring for the users must be the top priority for the next five to ten years. Financial and human resources should be used to keep the existing facility at the front line of SR-research and to provide an adequate level of user support.

BESSY researchers work at the forefront of scientific development. The management and the staff of BESSY have done brilliant work. They are highly motivated and should be enabled to perform as well in the future.

2. Mission, Tasks, Main Work Areas

BESSY II was designed as a service facility to deliver highly brilliant synchrotron radiation primarily in the VUV, XUV and soft-X-ray energy range. Its main **task** is the provision of service for

external researchers. Regarding the increasingly growing competition between light sources it is important that the facility is continuously upgraded and that scientists of BESSY spend an adequate portion of their working time on in-house research in particular front-line research areas. According to the German Science Council´s recommendations of the last evaluation BESSY scientists should spend about 25 % of their working time on in-house research, especially in the fields of accelerator physics and instrumentation.

BESSY has initiated a broad development program to optimise the accelerator and the instrumentation. Several developing projects have been carried out very successfully. Cutting edge radiation sources (e.g. undulators for tunable polarization, ultra-short THz radiation, femtosecond slicing) are provided, together with the optics for optimum use of the radiation (microfocusing). The excellent insertion devices are matched by the high quality beamlines and monochromators. Several beamlines are operated with record breaking energy resolution. In the designing and testing of optical elements the BESSY staff has set world standards and has contributed significantly to the promotion of high-tech optics. The extremely high quality of most of the BESSY photon beams is reflected in the high quality of the scientific results published in leading journals. This holds for the results obtained by the BESSY staff and by user groups. All this has made BESSY II an attractive research place for external groups and demonstrates the expertise of the corresponding **instrumentation group**.

The 1.7 GeV storage ring is optimized for photons in the lower energy range, but **harder X-rays** can be generated using wavelength shifters and wigglers with extremely high magnetic fields. Although other facilities such as the ESRF are the premier third-generation source for hard X-rays, the proposed installation of super bends (similar to the ALS) to provide the capability of carrying out diffraction experiments using the shorter wavelengths is encouraged. This is important, e.g. for protein crystallographers, and can serve the needs of a local user community in this particular energy range. Nevertheless priority should be given to the soft x-ray range, where BESSY is most powerful.

In the **Experimental Division** research activities were extended beyond the fields of instrumentation to the areas of Condensed Matter Physics and Materials Science with a focus on magnetism (magnetic polarimetry, ultrafast magnetization dynamics, magnetic imaging and holography, X-ray microscopy). The results, which have been achieved, are excellent.

The prime mission of BESSY is to provide highly brilliant synchrotron radiation for researchers in physics, chemistry, and biology. The research performed has peaks of absolute excellence in a number of domains like construction and characterization of optical elements, including microfabrication techniques, magnetism, and in general spectroscopy with polarised photons. BESSY completely meets the expectations of the user groups in these research fields. Other fields in science which could benefit from the specific characteristics of the low energy radiation provided by BESSY II (such as organic and biomaterials) should be developed more in the future.

Programmes for further improvements have recently been initiated or are well under way (e.g. sub-micrometer global orbit stabilisation, bunch lengthening with higher harmonic cavity to improve beam lifetime, multi-bunch feedback and HOM damped cavities). In addition to the well established standard user operation, further recent achievements can be highlighted: First, the large amount of flexibility built into beam optics allowed to operate the ring with very short bunches (1ps) and stable production of THz radiation as coherent synchrotron radiation from these bunches could be demonstrated. Second, the concept of fs-slicing has been es-

tablished and thus extremely short (although rather low-intensity) photon pulses were generated. While both concepts fill – compared to the broad needs of synchrotron radiation users at BESSY – still rather small niches for special applications at present, growing interest in the future for these advanced concepts can be expected. Furthermore, the highly developed technical skills of the BESSY team in constructing and building excellent beam insertion devices like undulators for circularly polarized light are truly outstanding.

It can be expected that the competition with other synchrotron radiation sources will become harder in the future and BESSY has to defend its "Unique Selling Position". This can be done by **extending its scientific expertise**. Important strategic research could be done in high-resolution microscopy (SMART), low-temperature high-resolution spectroscopy of correlated electron materials, and femtosecond dynamics. The success of the past will only persist in future if BESSY continues to be able to react flexibly to the steadily increasing and changing demands of science and technology. But the fields of basic research must not be as broadly based as they are at the moment. Results of research should always have a positive impact on the provision of service. Currently many scientists at BESSY are carrying out cutting-edge science in many areas. But as the resources are limited priorities have to be set. Consequently, the **number of research areas has to be reduced.** In order to meet the demands of the users in an increasingly competitive environment of synchrotron radiation services in an optimum way, the essential target will be to strengthen BESSY's strengths and to give up dispensable service activities.

Recently BESSY has submitted a technical design report for a soft x-ray **Free Electron Laser (FEL).** It appears that the management is concentrating a large amount of attention and resources on this project. While up to now this work was financed on the machine side predominantly by additional third party money, the situation will change dramatically in April 2005. The FEL-program is a good vision for the future, but it should be clear that the FEL is not going to replace the storage ring, and that the continuous upgrade of the ring, of the beamlines it feeds, and of the service to the users should be and remain the fundamental goal of the facility. The important and very promising work by the BESSY team on the technical aspects related to the linac in CW mode have to be stressed, but the basic technology was not developed by BESSY itself. It seems advisable that the already existing collaboration with other FEL projects (esp. at DESY) should be enforced on a mid-term time scale. The FEL-program might become an excellent longer-term future perspective for the laboratory, but it depends on other factors such as the development of the hard X-ray FEL project at DESY.

In the coming years, the top priority for BESSY must be to serve the interests of the large number of SR user groups. The facility is still relatively young and its potential should first of all be fully exploited. It should be recognized that there are many still relatively new and unexplored scientific areas which can be tackled with the **current ring**. These include the use of coherent x-rays for imaging and dynamical studies, coherent IR radiation for getting a complete description of the dielectric properties of materials systems, applications to nanoscience and the particular advantage of soft X-rays in being able to study magnetism in 3d transition metals, such as Fe, Ni and Co. A facility which can both image and carry out small angle scattering and reflectivity experiments on magnetic films and nanostructures could have very exciting impact on technological areas such as spintronics, magnetic information storage technology, etc. The optimum scientific utilization of the current ring should have the highest priority in the coming years.

It is the duty of the management to keep up a balanced program between **user-service**, in-house-research and future visions. Currently the facility seems to offer insufficient assistance by

beamline scientists to users and support is stronger at other facilities. Resources to provide assistance to users are overstretched and apparently not given the highest priority. As a consequence the facility must become more user friendly and the scientific and technical support of the beamlines has to be reconsidered by the management.

3. Structural Features and Organization

BESSY´s success is to a high degree due to a number of user groups constructing and running experiments or even whole beamlines in **Cooperating Research Groups (CRGs)**. The involvement of consortia of universities and institutes reduces in-house support and enables the facility to build beamlines in parallel. But due to the reduction in funding the university CRGs currently face severe problems, which lead to less manpower available for user support at these beamlines. The university groups should be provided with sufficient funding to enable them to provide service at the beamlines at an acceptable level. But BESSY must also be prepared to **take over some beamlines** and set priorities with eventually **closing beamlines**. Furthermore, not all of the CRG beamlines are as efficient as they could be. Beside the lack of resources in operating them, they suffer from the disadvantage of being too general in purpose with beam time wasted in changing configurations from one type of experiment to another. Special purpose beamlines tend to be more productive. The management should develop a strategy for these beamlines to operate them more efficiently.

The introduction of **cost-benefit** calculations, supervised by an accountant and practiced with a special software, has reached a good intermediate phase from the structural point of view. First results are expected in July 2004. Nevertheless, the proportion of general and administrative costs is still in the order of 50 %. Further developments towards the implementation of program budgets are under preparation.

As a link between users and management BESSY recently established a **User Committee**, which advises individual users, user groups, and the scientific director on operational matters. The panel consists of the beam time coordinator, the machine operations coordinator and four external members elected by the registered participants at the BESSY Annual Users' Meeting. Unfortunately, universities are not represented there automatically, as they are at DESY. Election rules should be adapted accordingly. Although the User Council must be seen as an advancement and users seem to be pleased with the person in charge of the users, there is a particular problem with the shortage of assistance that the facility is able to offer to new researchers, who are not familiar with the equipment at the experimental stations or the field of synchrotron radiation. An official procedure should be established to recruit new (inexperienced) users. Furthermore, user concerns actually should be the task of the advisory committee. The User Council does not have the same authorization and legal entitlement. The Advisory Committee might be encouraged to shift all duties concerning user interests onto the User Council.

4. Resources, Expenditures and Personnel

The management of BESSY operates within a complex funding structure, where financial contributions come from different sources under different boundary conditions. One of the consequences of past organizational restructuring has been that substantial **user fees** are charged for users not belonging to Leibniz establishments or universities. These user fees are forming an obstacle to the facility in attracting the best possible user groups. The scheme is rather unique

in the field of synchrotron radiation and should be changed in order to allow BESSY to compete for the best users and scientists, especially as new publicly available and competing radiation facilities will come online in the next few years. As the funding structure can only be changed by the donators themselves, an overall solution at least for European facilities should be sought.

There is no doubt that the beamlines at BESSY with only one scientist for support are **understaffed** compared to other sources where 4 to 5 scientists/technical staff are in charge of one beamline. The problem of staffing is aggravated by the fact that university groups appear to meet increasing difficulties with staffing their CRG beamlines and the strong management focus on in-house research and future projects. Another reason why staffing of beamlines has to be increased is an undeniable trend towards a higher degree of specialization of beamlines. Such beamlines become very advanced, so that they require much more user assistance from scientists from the facility. It is therefore recommended that additional positions be created for user support to stay competitive. The BESSY management estimates that about 34 additional employment positions would be required in order to enlarge the support at 11 ID-beamlines and to cope with the specialized experiments. The evaluation committee proposes an **increase in scientific personnel** of about 15 positions. This would enable BESSY to keep up with international standards of user support. All new positions should include an in-house research component, but be directly related to distinct duties in the user-operation. This concept, in operation at ESRF for years, should be realized at BESSY as soon as possible to stay competitive with the new facilities like SLS, Soleil and Diamond, where 4 to 5 beamline scientists/technicians are supporting one beamline. The task of user support should be equally distributed among staff members, to ensure high quality user support by scientists being themselves active researchers. An increase of the technical staff, although desirable as well, seems to be of secondary relevance.

Despite the high work load due to the limited number of scientists taking care of the regular user operations, the atmosphere at the laboratory is very positive. The staff generally is very motivated and dedicated to their tasks. A high level of identification with the facility can be noticed.

5. Promotion of Up-and-coming Academics and Cooperation

BESSY has an excellent record in collaborating with **universities**. Many PhD theses and ‘Diplomarbeiten’ are generated here. The collaboration with the universities contributes to a lively and competitive research atmosphere. Nevertheless, cooperation with Berlin universities and institutes should be intensified to increase the regular number of users. More attention should be turned towards making BESSY attractive for local users. Beamlines in materials science with hard x-rays and protein crystallography could serve the research interests of local groups.

The **CRG** participants are significantly involved in running beamlines at BESSY. But due to reduction in funding the high standard of research possibly cannot be kept up in the future. All efforts should be undertaken to ensure the strong involvement of the users in the research and the development of the facility in the years to come. Strong measures have to be taken by the management in close contact with the funding agencies for operation of and research at BESSY II so that the user community from universities is kept alive.

Although there is no doubt that BESSY´s success is in part due to the CRG-model, some beamlines run by partners are not as efficient as they could be. While the Protein Structure Factory (PSF) appears to run well, the beamlines of the **Hahn-Meitner Institute** (HMI) still have to demonstrate their full potential. Despite high investments in the HMI beamlines during the last four years, no convincing results could yet be achieved. The collaboration with the groups at

HMI, who are studying magnetism with the complementary technique of neutron scattering, is by far not as efficient as it could be. Close collaboration is strongly encouraged. The HMI could give the necessary push to improve the cooperation with BESSY by appointing an outstanding researcher of synchrotron radiation. Nevertheless, cooperation has to be improved in future by both sides.

BESSY provides over 40 weeks user services per year and is usually oversubscribed by a factor of two. More than 1,000 external scientists carry out about 400 independent projects at BESSY per year in basic research. An approximate 10 % of these are from non-German institutions. Most of the beam time is used by German universities, MPG institutes, and the Federal Institutes PTB and BAM. The CRG partners get preferred access for a about two thirds of the time of the beamline operated by them. In-house use of basic research facilities lies below 10 %. The large number of external CRG partners is quite unique in Europe and emphasizes the service character of the facility.

An example of very successful bi-national cooperation is the **Russian-German-Laboratory** and the Associated Research Program. The program is co-financed by Russia and the Federal Ministry for Education and Research (BMBF). As funding is running out by 2006 it is recommended that the project should receive sponsorship beyond this time of 35,000 € annually to guarantee that the intensive cooperation will also continue in the future.

6. Results and Scientific Resonance

Many scientists at BESSY are performing cutting-edge science in different areas in a competitive environment where technical and scientific knowledge changes very fast.

The Director of the **Experimental Division** is a leading and world-renowned physicist who has contributed much to this cutting-edge science. Although the preparation of the FEL project took up a significant amount of resources, in-house research is very strong especially in the field of magnetism. **XUV-holography** was pioneered at the ALS, but BESSY is internationally competitive here as well as in cluster physics. In the fields of **Metrology**, optics test bench, lithography BESSY is unique on a European scale and PTB runs the only synchrotron metrology lab in Europe. The Metrology Light Source (MLS), which is scheduled to start operation in 2008, is a unique project. Furthermore the industrial lithography (LIGA) activities of the Application Center for Micro Engineering (AZM) have to be mentioned. The AZM does an excellent job, but cooperation with industry should be intensified to increase resources.

The Göttingen **X-ray transmission microscope** at BESSY has been world-leading; the technology has been fully-matured and is now continued in-house, where emphasis will be given to applications in different areas. The SMART project is very ambitious and unique and the consortium should make efforts to maintain its leading position.

The **machine group** has done an excellent job in setting up and running the facility. The storage ring performs well in view of the very different insertion devices (undulators, superconducting wigglers etc.) installed in the machine. The highly developed technical skills of the BESSY team in constructing and building excellent beam **insertion devices** like **undulators** for circularly polarized light are truly outstanding and represent the state of the art. BESSY-technology has been transferred to firms, which have delivered it to other sources (e. g. SLS). The facility has a high international reputation in the advancement and spreading of this technology. In the designing and testing of **optical elements** the BESSY staff has set world standards and has

contributed significantly to the promotion of high-tech optics. In addition to the well established standard user operation, further recent achievements can be highlighted. First, the large amount of flexibility built into beam optics allowed the successful establishment of an operation mode (low-alpha mode) with extremely **short bunches**. These are needed to generate very high intensity beams in the **THz regime**. At present BESSY is the only machine providing coherent synchrotron radiation in the THz regime, which is an outstanding achievement. The low-alpha mode further enables the generation of <2 ps pulses over the entire wavelength range, albeit at much reduced current. The concept of **fs-slicing** has been established and thus extremely short (although relative low-intensity) photon pulses are generated. This enables totally new fields of research on extremely short time scales. Recent measurements at BESSY have demonstrated the slicing principle for the first time in a dedicated set-up with a helical undulator as radiator. But it has to be mentioned that the method of e-beam slicing was pioneered at the ALS and both concepts fill – compared to the broad needs of synchrotron radiation users at BESSY – still rather small niches for special applications at present.

The exploitation of the facility for applied research has been strengthened although direct use of SR by industry is marginal. A closer collaboration with industry has been brought about through the AZM. Major industrial cooperation is carried out at some of the CRGs. Furthermore, Schering is a user of the PSF at BESSY and the Fritz Haber Institute is organizing a consortium of chemical companies to study catalysts under reaction conditions. Additional industrial projects at BESSY involve AMD, Hitachi, Thyssen, and VW.

The extremely high quality of most of the BESSY photon beams is reflected in the high quality of the scientific results published in leading journals. This holds for the results obtained by the BESSY staff and by user groups. The “Highlights 2003” booklet is an attractive and readable collection of accounts with exciting science being carried out. This form of presentation of research and developments on an annual basis is highly appreciated by the scientific community.

7. Implementation of German Science Council´s Recommendations

Although BESSY has implemented a remarkable part of the German Science Council´s 1994 recommendations, there is still an urgent need to perform some changes, which can help BESSY to better fulfil its role as a user-friendly service centre.

The recommendations were implemented as follows:

a) 25 % of scientists' working time should be reserved for in-house research, specifically in accelerator research and instrumentation.

The recommendation to strengthen in-house research primarily intended to forward accelerator physics and instrumentation. BESSY initiated a broad development program to optimize the accelerator and the instrumentation and reached impressive achievements, but in-house research extended far beyond the primary intentions of the Science Council. Currently scientists at BESSY are carrying out research in many areas with a focus on solid state physics. As resources are limited and user tasks have been neglected in the past, priorities have to be set for the future. All research scientists should contribute to the user support.

b) Importance of role as user-friendly service centre, greater emphasis on applied basic research respectively industry-related research.

The facility is offering insufficient assistance to users and should become more user-friendly. This is a point to which the management should give a higher priority in the forthcoming years. Applied work and research related to industry has been strengthened as stated above.

c) 25 % of scientists employed on temporary contracts to ensure flexibility

22 % of academic and higher management staff are employed on a temporary basis.

d) Joint funding of BESSY as a service institution of the "Blue List" (Leibniz Association), charge of user-fees from certain users

Since 2000, BESSY has been a member of the Leibniz Association and has been funded as a service institution according to the "Blue-List"-Model. For users not belonging to Leibniz establishments or universities BESSY charges beam time fees. The fee model should be reconsidered as it puts the facility at a severe disadvantage in worldwide competition for the best users.

e) Leadership-structure comprising three managers organized as a board of directors

Today the Management of BESSY consists of the scientific director, the technical director and the head of administration.

f) Establishment of a committee with scientific advisory tasks undertaking regular evaluation

The newly-constituted Scientific Advisory Committee plays an important role as an independent external control body. It considers the facility's scientific program from a strategic point of view and evaluates the upgrade program for the beamlines and the accelerators as well as the in-house research.

g) Upgrade program over a period of 10 years

Additional investment money has been designated up to the year 2007 (3.25 M € per year). In addition, special funds have been made available for the studies of the BESSY soft X-ray FEL from the initiative "Zukunftsfonds Berlin".

h) Extension of international relations

BESSY cooperates with the leading SR laboratories and many national and international research institutes. An example of very successful bi-national cooperation is the Russian-German-Laboratory and the Associated Research Program, which is recommended to be continued.

i) Close involvement in research and teaching in higher education, further joint chairs

There is close collaboration with the universities concerning teaching and joint chairs as well as staffing and maintenance of CRG-beamlines. The working relationship with the universities is excellent and should be maintained at all costs. The university groups should be provided with sufficient funding so that the user community from the universities and the CRG-model can be kept alive.

j) More intensive cooperation with local research institutes

Cooperation with Berlin universities and institutes still has to be intensified to increase the number of users. More attention should be turned towards making BESSY attractive for local users. The collaboration with the groups at HMI, which is strongly encouraged, has to be improved in future by both sides.

k) Quick production of BESSY II´s full capacity, transition phase of two years

The speed and efficiency with which BESSY II was developed, built and brought into operation is an extraordinary and unprecedented achievement. Beamlines have been put into operation at an incredible speed. The management and the staff have built up a large number of beamlines and experimental stations in a few years. The machine operation is highly efficient and surpassed its design goals shortly after becoming fully operational. BESSY currently has 209 employees compared to 177 positions intended by the SC.

8. Summary of the Evaluation Committee´s Recommendations

- The internationally recognized activities performed by BESSY should be maintained in the future. To strengthen its competitiveness BESSY has to intensify its user support. The scientific and technical support of the beamlines has to be reconsidered. In the coming years BESSY has to find a proper balance between user support, running of and improving further BESSY II and the other activities like the FEL-project. Furthermore an official procedure should be established to attract inexperienced users and newcomers.
- As resources are limited, strict priorities have to be set and the number of research areas has to be reduced, if necessary.
- The shortage of staffing of beamlines should be a primary concern for the management. It is recommended that about 15 additional scientific positions be created for user support. All positions should include an in-house-research component at the undulator beamlines, but be directly related to distinct duties in the user-operation. It must be guaranteed that each member of the scientific staff performs both research and service and that a healthy balance between the two is kept.
- It must be clear that the Free Electron Laser (FEL) is not going to replace the storage ring. The continuous upgrade of the ring, the beamlines, and of the service to the users should be and remain the fundamental goal. It must be reconsidered, if the FEL is really needed by the users. BESSY should enforce the already existing collaboration with other FEL projects on a mid-term time scale. In the coming years the top priority should be to serve the interests of the SR user groups. User service seems to suffer from concentrating too much on in-house research and the FEL-project. Therefore the efforts put into pushing the FEL program should be reduced.
- Involving the users in the research and developing the facility (CRG-Concept) must be ensured in the future. Cooperation with Berlin universities and institutes should be intensified to increase the regular number of users and to attract local users. Close collaboration with the HMI Institute is encouraged. The cooperation between the two should be improved by both sides in future.
- Since the funding situation with some of the cooperating research groups is not stable, BESSY must be prepared to take over some beamlines or eventually close some of

them. The management should develop a strategy to operate the beamlines more efficiently.

- The user fee model is a severe disadvantage to the facility. It should be reconsidered and a single solution – at least for the European facilities – be developed by the donators.
- It is recommended that the Russian-German Research Program should be supported beyond 2006 with 35,000 € annually.
- Although priority should be given to the soft x-ray range, where BESSY is most powerful, the plan to develop hard X-ray lines using superbends in a regional centre is to be encouraged.

Appendix

Evaluation BESSY (7/ 8 June 2004)

Participants:

1. Evaluation Team

Chairman (Member of the Senate Evaluation Committee)

Prof. Dr. Dietrich **Wegener** (Dortmund University, Experimental Physics V)

Vice Chairman (Member of the Senate Evaluation Committee)

Prof. Dr. Ortwin **Renn** (Stuttgart University, Institute for Social Science)

External Experts

Prof. Dr. Massimo **Altarelli** (Elettra, Sincrotrone Trieste, Italy)

Dr. Reinhard **Brinkmann** (DESY, Hamburg, Germany)

Prof. Dr. Wolfgang **Ehrfeld** (Ehrfeld Mikrotechnik AG, Mainz, Germany)

Prof. Dr. Roger **Fourme** (Synchrotron Soleil, Orsay, France)

Prof. Dr. Gerhard **Materlik** (Diamond Light Source, Chilton, UK)

Dr. Stephen **Milton** (Argonne National Laboratory, Illinois, USA)

Dr. Harald **Reichert** (Max Planck Institute for Metals Research, Stuttgart, Germany)

Prof. Dr. Dr. h.c. mult. Achim **Richter** (Darmstadt University of Technology, Institute of Nuclear Physics, Germany)

Prof. Dr. Sunil K. **Sinha** (University of California, Dept. of Physics, San Diego, USA)

Prof. Dr. Bernd **Sonntag** (DESY, Hamburg, Germany)

Prof. Dr. Metin **Tolan** (Dortmund University, Experimental Physics I, Germany)

Prof. Dr. Friso **van der Veen** (Swiss Light Source, Paul Scherrer Institute, Villigen, Switzerland)

Dr. Edgar **Weckert** (HASYLAB at DESY, Hamburg, Germany)

Prof. Dr. Phil **Woodruff** (University of Warwick, Dept. of Physics, UK)

Federal Representative

RD Dr. Thomas **Roth** (Federal Ministry for Education and Research)

Representative of the States

MinDirig Dr. Waltraud **Kreutz-Gers** (State Ministry for Science and Research of Northrhine-Westfalia, Düsseldorf)

2. Guests

Representative of the relevant Federal Department

Prof. Dr. Jürgen **Richter** (Federal Ministry for Education and Research)

Representative of the relevant State Department

Sen. Dirig. W. **Eckey** (Berlin Ministry for Science, Research and Culture)

Dr. Rainer **Schuchardt** (Berlin Ministry for Science, Research and Culture)

Representative of the Bund-Länder Commission for Educational Planning and Research Promotion

Dr. Karin **Andrae**

Representative of the Leibniz Association

Prof. Dr. Jürgen **Sprekels** (Weierstrass Institute for Applied Analysis and Stochastics, Berlin)

Representative of the Advisory Committees

Prof. Dr. Michael **Grunze** (University of Heidelberg, Institute of Physical Chemistry)

3. Cooperating Partners

Dr. Joachim **Bansmann** (Rostock University, Dept. of Physics)

Dr. Esther **Dudzik** (Hahn-Meitner-Institute, Berlin)

Prof. Dr. Udo **Heinemann** (Max-Delbrück-Center for Molecular Medicine, Berlin)

Dr. Bernd **Jenichen** (Paul-Drude-Institute, Berlin)

Dr. Bernd **Müller** (Federal Institute for Materials Research and Testing, Berlin)

Dr. Thomas **Schmidt** (Würzburg University, Experimental Physics II)

Dr. Gerhard **Ulm** (National Metrology Institute for Scientific and Technical Services, Berlin)

Prof. Dr. Christof **Wöll (** Ruhr-University, Bochum, Physical Chemistry)

4. Evaluation Office

Ludger **Viehoff** (Head of Division)

Dr. Dagmar **Bley** (Assistant Head of Division)

27.01.2005

Anlage C: Stellungnahme der Einrichtung zum Bewertungsbericht

Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung m.b.H (BESSY)

Die BESSY Geschäftsführung begrüßt den vorgelegten hervorragenden Evaluierungsbericht und dankt den Mitgliedern der Evaluierungskommission für die sorgfältigen und tiefgehenden Untersuchungen und die ausgesprochenen Empfehlungen. Wir stimmen mit der Feststellung überein, dass Nutzerservice und Strahlzeitgebühren Problembereiche sind, die für einen erfolgreichen Betrieb von BESSY II als nationale Serviceeinrichtung mit weit reichender internationaler Bedeutung geklärt werden müssen. Die Geschäftsführung hofft, dass sich die klaren Empfehlungen für einen Personalaufwuchs bei der Nutzerbetreuung und für den Wegfall der Strahlzeitgebühren durchsetzen werden. Nur auf diese Weise werden wir in die Lage versetzt, unseren Service für die auf dem Gebiet der Synchrotronstrahlung arbeitende internationale Wissenschaftler-Community nachhaltig zu verbessern.

Die Geschäftsführung weiß die außerordentlich positive Evaluierung des „in-house“ Forschungsprogramms zu würdigen. Die allgemeine Zielsetzung mit diesem Programm nicht nur Beschleunigerentwicklung und Instrumentierung sondern auch wissenschaftlich orientierte Forschungsbereiche bei BESSY zu etablieren war vom Aufsichtsrat bereits 1999 beschlossen worden. In den drei Jahren seit 2001, dem Starttermin der neuen Forschungsstruktur, hat dieser Aspekt der Eigenforschung bereits weltweite Anerkennung gefunden. Alle im Forschungsprogramm eingebundenen Wissenschaftler sind auch an der Nutzerbetreuung bei BESSY aktiv beteiligt. Diese Politik verfolgt die Geschäftsführung von Anbeginn.

Der Speicherring BESSY II wird als Serviceeinrichtung für die Wissenschaft mit Sicherheit für die nächsten 15 Jahre an der Spitze platziert sein, vorausgesetzt, dass sowohl personelle wie finanzielle Ressourcen bereitgestellt werden, um die Instrumentierung am Limit des technologisch Möglichen zu halten. Hierzu hat die BESSY Geschäftsführung ein weit reichendes Entwicklungsprogramm für Beschleuniger, Insertion Devices, Strahlrohre und Experimentierstationen für die Jahre ab 2007 dem Wissenschaftlichen Beirat und dem Aufsichtsrat vorgelegt. Wir hoffen, dass dieser sehr positive Report sowie der Nachdruck, den die Evaluierung diesen Themen verleiht, bei der Sicherung der Finanzierung helfen werden.

Für BESSY als Institution ist es von außerordentlicher Bedeutung, dass für die Finanzierung des Zukunftsprojekts BESSY- FEL Lösungen gefunden werden. Der FEL wird niemals die existierende Synchrotron Strahlungsquelle BESSY II ersetzen. Er wird aber ganz anders geartete und aufregende wissenschaftliche Gebiete erschließen wie sie im „Scientific Case“ dokumentiert sind, der von der Arbeitsgruppe Großgeräte des Wissenschaftsrats hervorragend beurteilt wurde. Wir werden ohne ein Zukunftsprojekt dieser Qualität nicht in der Lage sein, Spitzenforscher aus den Gebieten Beschleunigerentwicklung und Instrumentierung für BESSY zu gewinnen oder zu halten. Wir stimmen mit der Evaluierungskommission voll überein, dass eine verantwortungsbewusste Geschäftsführung die Balance beim Einsatz von Ressourcen für den täglichen Betrieb und die Verbesserung der bestehenden Anlage einerseits und für die Sicherung der Zukunft des Hauses BESSY andererseits halten muss. In diesem Zusammenhang ist es außerordentlich wichtig, dass nach Auslaufen der Förderung durch den Zukunftsfonds des Landes Berlin im April 2005 eine Fortführung der Finanzierung für die exzellent arbeitende F&E Gruppe junger Beschleunigerphysiker/innen gefunden wird, die garantiert, dass die Entwicklungsarbeiten auf höchstem Niveau weitergeführt werden können.