Leibniz Gemeinschaft

Der Senat

16. November 2021

Stellungnahme zum Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) im Forschungsverbund Berlin e.V.

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Vorbemerkung

Die Einrichtungen der Forschung und der wissenschaftlichen Infrastruktur, die sich in der Leibniz-Gemeinschaft zusammengeschlossen haben, werden von Bund und Ländern wegen ihrer überregionalen Bedeutung und eines gesamtstaatlichen wissenschaftspolitischen Interesses gemeinsam gefördert. Turnusmäßig, spätestens alle sieben Jahre, überprüfen Bund und Länder, ob die Voraussetzungen für die gemeinsame Förderung einer Leibniz-Einrichtung noch erfüllt sind.[1]

Die wesentliche Grundlage für die Überprüfung in der Gemeinsamen Wissenschaftskonferenz ist regelmäßig eine unabhängige Evaluierung durch den Senat der Leibniz-Gemeinschaft. Die Stellungnahmen des Senats bereitet der Senatsausschuss Evaluierung vor.

Für die Bewertung einer Einrichtung setzt der Ausschuss Bewertungsgruppen mit unabhängigen, fachlich einschlägigen Sachverständigen ein. Der für das FMP zuständigen Gruppe stand eine von der Einrichtung erstellte Evaluierungsunterlage zur Verfügung. Die wesentlichen Aussagen dieser Unterlage sind in der Darstellung (Anlage A dieser Stellungnahme) zusammengefasst.

Wegen der Corona-Pandemie musste der für den 11. und 12. März 2021 vorgesehene Evaluierungsbesuch am FMP in Berlin entfallen. Die Bewertung erfolgte im Rahmen eines Ersatzverfahrens, das der Senatsausschuss Evaluierung (SAE) in Umsetzung eines Grundsatzbeschlusses des Senats vom 31. März 2020 eingerichtet hat. Der Senat hält in diesem Grundsatzbeschluss fest, dass das Ersatzverfahren ein Notbehelf ist und ausschließlich auf Einrichtungen angewendet wird, die im Regelturnus von sieben Jahren evaluiert werden. Die Bewertungen, auf deren Grundlage der Senat Stellung nimmt, sind auf zentrale Kernfragen der Entwicklung und Perspektive einer Leibniz-Einrichtung fokussiert. Ausführliche Einschätzungen und Schlussvoten zu Teilbereichen und Planungen für „kleine strategische Sondertatbestände“ müssen regelmäßig entfallen.

Die Bewertungsgruppe erstellte den Bewertungsbericht (Anlage B). Das FMP nahm dazu Stellung (Anlage C). Der Senat der Leibniz-Gemeinschaft verabschiedete am 16. November 2021 auf dieser Grundlage die vorliegende Stellungnahme. Der Senat dankt den Mitgliedern der Bewertungsgruppe und des Senatsausschusses Evaluierung für ihre Arbeit.

1. Beurteilung und Empfehlungen

Der Senat schließt sich den Beurteilungen und Empfehlungen der Bewertungsgruppe an.

Das „Leibniz-Forschungsinstitut für Molekulare Pharmakologie“ (FMP) betreibt exzellente Grundlagenforschung auf der Vorstufe zur Medikamentenentwicklung. Im Rahmen der Arbeiten werden pharmakologisch relevante Biomoleküle zunächst identifiziert, nachfolgend deren Struktur charakterisiert und schließlich im Hinblick auf eine zukünftige Weiterentwicklung verändert. Dieses methodische Vorgehen spiegelt sich sehr konsequent in der Struktur des Instituts mit den drei leistungsstarken Sektionen „Molekulare Physiologie und Zellbiologie”, „Strukturbiologie” und „Chemische Biologie” wider.

[1] Ausführungsvereinbarung zum GWK-Abkommen über die gemeinsame Förderung der Mitgliedseinrichtungen der Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e. V.

Das Institut erzielt hervorragende **Ergebnisse**, die in entsprechend hochrangigen fachübergreifenden Journalen veröffentlicht werden. Es hält Patente und ist in der Unternehmensgründung erfolgreich. Zudem hat das FMP eine tragende Rolle in der Koordination des Konsortiums EU-OPENSCREEN und erbringt in diesem Verbund über die *Chemical Biology Platform* wichtige Dienstleistungen. Forschungs- und Serviceaufgaben in der Plattform gut auszubalancieren, ist mit Blick auf die berufliche Entwicklung des wissenschaftlichen Personals weiterhin wichtig.

Seit der letzten Evaluierung hat sich das Institut hervorragend weiterentwickelt. **Leitungswechsel** in einigen Arbeitseinheiten wurden für sinnvolle Neuausrichtungen im Forschungsspektrum genutzt. Das FMP berief gemeinsam mit Berliner Universitäten sehr ausgewiesene Wissenschaftlerinnen und Wissenschaftler. In den kommenden Jahren treten zwei international herausragende Forscher in den Ruhestand ein. Das Institut hat die Prozesse zur Wiederbesetzung bereits in Gang gesetzt. Leitung und Gremien des FMP müssen gemeinsam mit den universitären Partnern längere Vakanzen vermeiden, wie sie in der Vergangenheit bei der Neubesetzung von Abteilungsleitungen eintraten.

Die **Ausstattung** des FMP mit Mitteln der institutionellen Förderung ist derzeit auskömmlich. Die Drittmitteleinnahmen wurden seit der letzten Evaluierung signifikant gesteigert. Insbesondere die Bewilligung von neun ERC-Grants im Evaluierungszeitraum verdeutlicht die herausragende Arbeit des Instituts. Außerdem wirbt das FMP, u.a. im Rahmen von Excellenz-Clustern, Sonderforschungsbereichen, Graduiertenkollegs und Schwerpunktprogrammen, umfangreiche Mittel bei der DFG ein. Das FMP verfügt über eine moderne Geräteinfrastruktur. Es ist sehr erfreulich, dass Bund und Länder umfangreiche zusätzliche Mittel zum Aufbau eines der weltweit größten und leistungsfähigsten NMR-Spektrometer bereitstellen. Es soll 2023 in Betrieb gehen und wird die nationale und internationale Reputation des Instituts noch weiter erhöhen.

Die strategischen **Planungen** für die nächsten Jahre werden begrüßt. Das FMP sieht vor, neue Methoden im Bereich der Magnetresonanz-Bildgebung und Licht-Mikroskopie anzuwenden sowie seine Expertise in der NMR-Spektroskopie und Zellbiologie mit der Kryo-Elektronenmikroskopie (Kryo-EM) zu verbinden. Zum Aufbau einer eigenen Kryo-EM-Plattform sieht das FMP vor, im Rahmen eines temporären Sondertatbestands zusätzliche Mittel zu beantragen. Diese Planungen sollten weiterverfolgt werden, denn die derzeit an Berliner Partnerinstitutionen zur Verfügung stehende Forschungsinfrastruktur reicht für die geplanten Arbeiten nicht aus. Das FMP hat seine Planungen mit den Partnern sehr gut abgestimmt und in das wissenschaftliche Umfeld integriert. Das Institut muss allerdings im Blick behalten, dass es die notwendigen personellen Kapazitäten für den Betrieb der Geräte bereitzuhalten hat.

Das FMP bietet sehr gute Möglichkeiten für die verschiedenen Phasen der **wissenschaftlichen Qualifikation**. Dies wird durch die Berufung von fünf Nachwuchsgruppenleitungen auf Professuren im In- und Ausland eindrucksvoll belegt. Alle Doktorandinnen und Doktoranden sind in das Graduiertenprogramm des FMP eingebunden. Die durchschnittliche Promotionsdauer von 4,7 Jahren ist jedoch zu lang und sollte verkürzt werden.

Der Anteil von Frauen am wissenschaftlichen Personal befindet sich mit ca. einem Drittel auf demselben niedrigen Niveau wie bei der letzten Evaluierung. Auf Leitungsebene ist

trotz einer leichten Erhöhung der Anteil der **Wissenschaftlerinnen** nach wie vor zu gering. Neubesetzungen müssen nun für Verbesserungen genutzt werden. Dazu muss das Institut eine klar definierte Strategie zur Gleichstellung entwickeln, die auch Maßnahmen zur Förderung einer inklusiven und diversen Arbeitsumgebung umfasst.

Das FMP ist ausgezeichnet mit dem anregenden wissenschaftlichen Umfeld in Berlin vernetzt. Besonders hervorzuheben ist die Zusammenarbeit mit dem benachbarten Max-Delbrück-Centrum für Molekulare Medizin (MDC). Die enge **Kooperation** mit den drei Universitäten in Berlin sowie der Charité – Universitätsmedizin ist neben gemeinsamen Berufungen in Verbundprojekten sichtbar, in denen Angehörige des Instituts auch leitende Funktionen übernehmen. Außerdem arbeitet das FMP mit biotechnologischen bzw. pharmazeutischen Unternehmen zusammen und ist auf europäischer Ebene sehr aktiv.

Auf Basis moderner Technologien betreibt das FMP molekulare Grundlagenforschung, um pharmakologisch relevante Moleküle nutzbar zu machen. Die Arbeiten erfordern die am Institut vorhandene große methodische und fachliche Breite sowie übergreifende Zusammenarbeit. Die Leistungen des FMP können daher in dieser Weise an einer Hochschule nicht erbracht werden. Eine Eingliederung des FMP in eine Hochschule wird daher nicht empfohlen. Das FMP erfüllt die Anforderungen, die an eine Einrichtung von überregionaler Bedeutung und gesamtstaatlichem wissenschaftspolitischem Interesse zu stellen sind.

2. Zur Stellungnahme des FMP

Der Senat begrüßt, dass das FMP beabsichtigt, die Empfehlungen und Hinweise aus dem Bewertungsbericht bei seiner weiteren Arbeit zu berücksichtigen.

3. Förderempfehlung

Der Senat der Leibniz-Gemeinschaft empfiehlt Bund und Ländern, das FMP als Einrichtung der Forschung und der wissenschaftlichen Infrastruktur auf der Grundlage der Ausführungsvereinbarung WGL weiter zu fördern

24 February 2021

Annex A: Status report

Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) within the Forschungsverbund Berlin e.V.

Contents

1. Key data, structure and tasks

Key data

Year established:	1992
Admission to joint funding by Federal and *Länder* Governments:	1992
Admission to the Leibniz Association:	1997, founding member
Last statement by the Leibniz Senate:	2014
Legal form:	Part of the Forschungsverbund Berlin e.V. (Joint administration of 7 Leibniz institutes)
Responsible department at *Länder* level:	The Governing Mayor of Berlin, Senate Chancellery – Higher Education and Research
Responsible department at Federal level:	Federal Ministry of Education and Research (BMBF)

Total budget (2019)

€ 20.5M institutional funding

€ 8.8M revenue from project grants

€ 0.3M revenue from services

Number of staff (2019)

151 individuals in research and scientific services

55 individuals in service sector

19 individuals in administration

Mission and tasks

"*The FMP conducts basic research in the field of molecular pharmacology." (Quoted from the Institute Regulations)*

Research at the FMP is conducted within three scientific sections, each comprising two departments, several research groups (headed by senior or independent junior group leaders) and core facilities (see Appendix 1). The IT services, safety officers and technical services are organized as separate service units. The FMP operates a local administration and partakes in the Joint Administration of the Forschungsverbund Berlin e.V. (FVB).

2. Overall concept, activities and results

The FMP conducts basic research in the field of molecular pharmacology aiming at the identification, characterization, and manipulation of novel biological targets (i.e. proteins and protein complexes). For analysing their function at the cellular and organismic level FMP's research activities combine structural biology with genetics, biochemistry, chemical biology and bio-imaging.

Hence, research at the FMP aims at developments that conceptually advance molecular pharmacology and is thus positioned in the run-up to drug research rather than drug research itself. The institute's cross-disciplinary research is conducted within three sections:

- Section "Molecular Physiology and Cell Biology" investigates proteins and pathways as potential targets for pharmacological manipulation by genetic, cell biological, biochemical and physiological approaches from the molecular-to-systems level.
- Section "Structural Biology" analyses the structure, assembly and dynamics of proteins and protein complexes as a prerequisite for interference by chemical biology approaches.
- Section "Chemical Biology" develops tools and lead compounds to manipulate protein function using (semi)-synthetic chemistry as well as biochemical and light-based approaches.

Results

Research

The FMP strives for high quality scientific publications in leading international peer-reviewed journals. Between 2017 and 2019 FMP researchers contributed to 312 publications, of which 255 (82 %) were articles in peer-reviewed journals (see appendix 2).

Since the last evaluation, the institute has developed new techniques and strategies enabling pharmacological interference of molecular mechanisms at all levels of analysis. The FMP highlights the following activities and core results:

- Involving researchers from several groups across sections the institute identified a variety of different proteins, such as heteromers of constituents of the volume-regulated anion channel (VRAC) that conducts organic substances, modulates insulin secretion and transports anticancer drugs. Another example is the investigation of class II phosphatidylinositol 3-kinases, their regulators and counteracting protein complexes that are important pharmacological targets for several diseases, ranging from myopathies and neuropathies to thrombosis, cancer and epilepsy.
- FMP scientists developed solid-state NMR methodologies combined with cryo-electron microscopy (cryo-EM) and applied them to membrane proteins, rhomboid proteases and bacterial cytoskeletal proteins. In combination with atomistic molecular dynamics simulations the atomic structure and function of ion channels were revealed. Moreover, FMP researchers demonstrated that the presynaptic protein

α-synuclein is natively unfolded in healthy cells, which has implications for the possible treatment of Parkinson's disease.

- Further collaborative studies involving researchers from several sections have enabled the detection and mechanistic analysis of the signaling functions of inositol poly- and pyrophosphates including the identification of yeast and mammalian proteins interacting with inositol pyrophosphates as well as the development of small molecule inhibitors targeting pharmacologically important enzymes.
- FMP scientists also have developed new methods for the synthesis and modification of functional proteins (e.g. antibodies) and have applied these to create bioactive protein conjugates e.g. as antiviral agents preventing human and avian influenza virus infection.

Research infrastructures

The FMP harbors several large scale research infrastructures that are open to all groups of the institute to perform collaborative research projects with national and international partners.

Since 2008, the FMP has led a process to implement a European chemical screening network. In 2018, with the foundation of the EU-OPENSCREEN ERIC, the process was concluded successfully (see chapters 6 and 8). This network was initiated by the institute's Chemical Biology Platform (CBP), which supports drug research projects and provides medicinal and computational chemistry support to deliver chemical tool compounds. Its origins are strong collaborative ties with the MDC, which have been further expanded to the Berlin Institute of Health (i.e. Charité – Universitätsmedizin Berlin). The CBP currently comprises

- The Screening Unit, which conducts screening projects for the FMP and for local, national and international partners. 65 collaborative projects were performed between 2017 and 2019. It serves on the basis of academic collaborations as an open-access facility for EU-OPENSCREEN.
- The Compound Management, which creates and manages a collection of about 75.000 compounds.
- The Medicinal Chemistry group that further develops initial bioactive compound hits into lead compounds and creates tool compounds. It likewise serves on the basis of academic collaborations as an open-access facility for EU-OPENSCREEN.
- Scientific Computing as part of the Structural Chemistry and Computational Biophysics group (formerly Computational Chemistry/Drug Design Group) that takes care of the platform's cheminformatics requirements.

The institute hosts a broad spectrum of further core facilities. The NMR Spectroscopy facility for structural biology and chemistry, providing access to highly sensitive instrumentation and expertise at national and international levels. The facility provides collaboration with partners in academia and industry, in the ESFRI-project INSTRUCT and in the Horizon 2020 project iNEXT (see chapter 6). The Mass Spectrometry facility allows for proteomic and structural studies by cross-linking mass spectrometry (XL-MS) and the

Cellular Imaging facility makes light and electron microscopes for high-resolution and functional imaging available (see chapter 3, Planning for additional funds).

Transfer

FMP scientists provide services to the scientific community, in particular in review processes, consultancy in science policy and related to publishing or funding decisions.

The institute pursues an active exploitation and transfer strategy, which is coordinated by the Technology and Transfer Office and aims at a systematic development of relationships with partners in industry and other research institutions. For that purpose, structures for the systematic exploitation of commercially attractive research results were put in place. Besides in-house expertise the FMP uses the expertise of the FVB and of *Bayerische Patentallianz GmbH* as an external partner.

Between 2017 and 2019, 6 out of 10 invention disclosures led to patent applications. All in all, 114 patents were granted (see appendix 2). Next to licensing of patents or model organisms, revenues have been generated in R&D cooperations with industry partners and by providing services.

The FMP supports scientists planning to establish a new business based on knowledge generated at the institute. Patent families for potential spin-offs are excluded from technology offers to industry. In 2019 and 2020, leading scientists of the FMP established two spin-off companies (*Tubulis GmbH and Prosion GmbH*) in collaboration with Universities in Munich and Cologne. Both companies received exclusive licenses encompassing several patent families each. Another joint spin-off together with MDC is currently in preparation.

3. Changes and planning

Development since the previous evaluation

Since the previous evaluation, gaps in the research portfolio have been closed by implementing new departments and groups. The following changes in staff and research topics have aided to further sharpen the long-term focus of the FMP on molecular pharmacology:

Departments

- 2014: new head of department Molecular Biophysics, in joint appointment with Humboldt-Universität Berlin (HUB), who also leads the Section Structural Biology. The new department head studies the structure, dynamics and function of membrane proteins as well as supramolecular assemblies by application and development of solid-state NMR spectroscopy but also in combination with cryo-electron microscopy.
- 2015: new head of department Chemical Biology I, in joint appointment with HUB, who also serves as scientific director. The new department head strengthens research in chemical biology and cell signalling by investigating a group of complex soluble messengers, which are related to the phosphoinositide lipids studied by the Department Molecular Pharmacology and Cell Biology.

Research groups

In 2017 and 2020, a total of four research groups were closed due to the retirement of their leaders. Some topics of these former groups, including research on tight junctions and the development of bioactive substances for the modulation of protein-protein interactions aided by bioinformatics are being continued in the core facility Cellular Imaging and the research group Structural Chemistry and Computational Biophysics, respectively.

- 2017: The head of the former FMP junior research group became DFG-funded Heisenberg-Professor at HUB (Chair of Cellular Biophysics). Until 2022, the group is hosted at the FMP as guest research group Molecular Neuroscience and Biophysics. The group investigates fast signalling in the brain, with an emphasis on glutamate receptors using biophysical approaches.
- 2018: new head of research group Structural Interactomics and core facility Mass Spectrometry (change due to the retirement of the former leader) in joint appointment with Charité – Universitätsmedizin Berlin. The group aims to develop and apply mass-spectrometry-based approaches to characterize the complexity of protein interactions within the cell.
- 10/2020: new research group Structural Chemistry and Computational Biophysics. This group focuses on the development and application of molecular modelling and molecular dynamics simulations together with chem- and bioinformatics tools for designing novel bioactive molecules.

Junior research groups

Of the six junior research groups at the time of the last evaluation, five leaders left the institute to take up professorial positions at Universities in Germany (Bremen, Cologne, Erlangen-Nuremberg, Kaiserslautern) and abroad (Weizmann Institute of Science in Rehovot, Israel). Two groups are still hosted at the FMP with DFG-funding: The Heisenberg guest group Molecular Neuroscience and Biophysics and the Molecular Imaging group with a Reinhart-Koselleck-project developing magnetic resonance-based imaging methods for medical diagnostics. Four new groups were established:

- 2015: externally funded Emmy-Noether junior research group Molecular and Theoretical Neurosciences. The group combines experimental and theoretical approaches to elucidate molecular mechanisms of neurotransmission across chemical synapses using the fruit fly *Drosophila melanogaster* as model system. From 2022 on, the group will be financed by the FMP.
- 03/2020: new junior research group ChemBioProbes. The group develops novel chemical tools to label endogenous proteins with new fluorophores and to manipulate biological function with light (i.e. photopharmacology).
- 10/2020: new junior research group Synapse Biology. The group develops unique mouse models to investigate neural communication during development, in periods of activity prior to the onset of disease and during disease.

– 11/2020: new junior research group Structure and Mechanism of Microbiome Driven Diseases. The group applies structural biology to understand molecular mechanisms of microbiome-driven carcinogenesis in the human colon.

Core facilities

– 10/2020: new core facility Cell Engineering. This unit originated from the research group Protein Trafficking and the head is jointly appointed with Charité – Universitätsmedizin Berlin. The facility generates gene knock-outs and knock-ins using CRISPR/Cas gene editing techniques.

– 10/2020: new core facility Compound Management. The infrastructure is located next to the EU-OPENSCREEN ERIC and the head is currently employed as compound manager of the ERIC on a half-time basis until the end of 2021 to support EU-OPENSCREEN.

Strategic work planning for the coming years

The FMP's long-term strategy aims at further refining its integrated platform for the identification, characterization, and manipulation of difficult-to-address biological targets of prime pharmacological importance.

Among the strategic goals the institute points to the following:

– FMP research will continue its strong focus on membrane biology (i.e. membrane protein and lipid dynamics) and signaling processes including ion homeostasis, inositol signaling and neurotransmission, while at the same time expanding its scope to include ageing research or emerging threats such as microbiome-driven diseases and novel human-pathogenic viruses. Genetic and RNA-interference-based screening paired with advanced bio-imaging (e.g. super-resolution and correlative light and electron microscopy, live imaging) and physiological methods will serve to unravel key proteins and pathways involved in these processes and act as tools to functionally verify insights obtained from structural and molecular analyses. In addition, FMP researchers will implement novel optopharmacological and semi-synthetic approaches to dissect protein function in cellular systems and *in vivo*.

– FMP research follows the vision to visualize molecular processes at all scales from the study of single molecules in atomic detail to the structure and function of molecular ensembles *in situ* and *in vivo*. To this aim FMP researchers will combine methods of cellular and structural biology, most notably NMR spectroscopy, single-particle cryo-EM and cryo-ET, as well as novel correlative light and electron microscopy (cryo-CLEM) to determine the 3D structure and dynamics of proteins and protein ensembles, *in vitro* and *in situ* (i.e. in their native environment in cells and tissues).

– To utilize knowledge gained from molecular and functional analyses for the development of strategies for pharmacological manipulation of key proteins and pathways, FMP researchers integrate computational chemistry and modeling, genetic, optopharmacological, semi-synthetic, and chemical screening technology with advanced proteomics and functional studies. The FMP aims at taking a leading role in the further development of chemical tools and probes to unravel protein function and regulation in cell physiology and in the development of next generation biopharmaceuticals.

The medium-term goal of FMP research is to further develop its multidisciplinary, integrated approach to molecular pharmacology including technological advances. Furthermore, the FMP research aims to sharpen its portfolio towards topics of key importance for molecular pharmacology. In close collaboration between experimental researchers and theoreticians across the three sections, the institute plans to study complex systems and protein in their native and near-native environments, e.g. cation and viral proton channels or bacterial biofilms.

Planning for additional funds deriving from institutional funding

Two main research areas at the FMP are the investigation of endocytosis and the entry of pathogens into cells and tissue. Both processes are highly relevant in the emergence of diseases such as developmental defects, myopathies and brain disorders as well as in the context of infectious diseases. The visualization of these mechanisms requires high-resolution methods, e.g. cryo-electron microscopy (cryo-EM) and cryo-electron tomography (cryo-ET) in combination with correlative light microscopy. This in combination with established light microscopy and NMR techniques allows for analysis at all levels from the molecular structure of single molecules *in vitro* to their functional architecture *in situ* and *in vivo*.

Another cornerstone of research at the FMP is understanding the functional mechanism of membrane proteins, such as ion channels, intra-membrane proteases, and transporters, and the activation or inhibition of therapeutically relevant proteins by small molecules or antibodies. Here, single particle cryo-EM is an important method to complement the existing structural biological work by NMR.

To ensure the successful implementation of single particle cryo-EM and cryo-ET including its extension to correlative light and cryo-electron microscopy, four instruments are required. For this purpose, the institute intends to apply for additional institutional funding (Temporary extraordinary item of expenditure, *temporärer Sondertatbestand*):

- a 200 kV screening cryogenic microscope (€ 2.0M) with latest version electron detector
- a 300 kV high-resolution electron microscope (€ 6.0M) with latest generation direct electron detector and energy filter
- a correlative light microscope (cryo-LM, € 0.5M)
- a cryo-Focused-Ion-Beam-Milling Scanning electron microscope (€ 1.3M)

The Scientific Advisory Board and the FMP institute's committee of the Supervisory Board approve of presenting the proposal to the evaluation board.

The neighbouring Max Delbrück Center for Molecular Medicine will provide space for instrumentation in its newly built cryo-EM facility at Campus-Buch.

„Temporary extraordinary item of expenditure“: summary of funds planning

	2025
Own funds + additional funds = „extraordinary item of expenditure“	*9,800 k€*
Own funds from existing funding by institution (at least 3 % of core budget)	*538 k€*
TU Berlin funds	*500 k€*
FU Berlin funds	*100 k€*
Additional funds of institutional funding	*8,662 k€*

4. Controlling and quality management

Facilities, equipment and funding

Funding (see appendix 3)

In 2019, FMP's revenue was € 29.5M. Institutional funding amounted to € 20.5M. Additional funding included € 8.8M from third-party funded project grants (corresponding to 30 % of revenues) and € 0.3M from services (1 %).

The most important third-party funding sources are the German Research Foundation (DFG; share of third party funding: 33 % in 2019) and the EU (19 %). Since the last evaluation FMP researchers have received a total of nine ERC grants (3 starting, 3 consolidator, 3 advanced).

The institute plans to further refine its strategy for raising third-party funds, e.g. by starting out on new, high-risk directions in basic research and to explore potential applications. Additionally, the institute actively seeks external collaborations in strategic key areas and provides access to large infrastructure for third-party funded networks at national and international levels.

Facilities

The FMP is housed in a main research building on the Campus Berlin-Buch and shares space with the neighbouring Max Delbrück Center for Molecular Medicine (MDC). The NMR Spectroscopy facility is housed in two separate buildings and a third NMR building is being planned.

The institute provides core infrastructure for NMR-based structural studies, light and electron microscopy, mass spectroscopy and proteomics, chemical and RNAi-based screening, screening of genome-engineered cells, and chemical synthesis (see chapter 2). Additionally, Peptide Synthesis and Biophysics services are provided by the departments Chemical Biology II and Molecular Biophysics, respectively, and by a newly founded Cell Engineering facility.

An in-house Animal Facility offers access to laboratory animals. Additional mouse specific-pathogen-free (SPF) cage space is available in the animal facility of Max Delbrück Center for Molecular Medicine (MDC) which is partially (13%) owned and used by the FMP (see also below and chapter 8).

The FMP runs a local IT infrastructure that extends to several buildings on-campus and comprises a new main data center and a second data center that provides redundancy.

Organisational and operational structure

The FMP is one of currently seven institutes of the Forschungsverbund Berlin (FVB) with administration being shared between the joint FVB administration (situated at Berlin Adlershof) and a local administrative unit at the FMP.

The FMP is managed by the Board of Directors *(Direktorium*, scientific management*)* which consists of the scientists appointed as directors, and the Managing Director of the FVB (administrative management). Currently, two scientists, leading the departments Molecular Pharmacology and Cell Biology and Chemical Biology I, are appointed as directors. For a period of three years, one of the directors serves as Managing Director.

FMP's organizational units as of January 2021 are six departments, four research groups, five junior research groups and eight core facilities that are organized within three scientific sections (see appendix 1). One of the department heads is appointed head of the section and coordinates its activities. Resources are generally allocated to the individual research groups or departments rather than to the sections.

The directorate serves to organize scientific activities, public relations, technology transfer, and promoting of young scientists on behalf of the directors. The IT services, safety officers, and technical services are organized as separate service units reporting to the Board of Directors.

Decisions are finally made by the Board of Directors, advised by the department heads and by the Institute Council (*Institutsrat*), which meets approximately four times per year. At least once a year, the managing director reports to the Institute's assembly (*Institutsversammlung*) about past and current developments and plans for the future. Several organizational measures support the processes to decision making. The director meets bi-monthly with the section and department heads (*Abteilungsleitertreffen*) to discuss the medium-term research strategy and measures for implementation of the institute's concepts. The annual work plan, its financial underpinnings, scientific milestones, and the expected output are parts of the program budget document which is also the basis for the annual meeting of the FMP's Scientific Advisory Board.

Quality Management

The FMP follows the standards and rules of good scientific practice as published by the German Research Foundation (DFG). In addition, *Rules to Ensure Good Scientific Practice at the FMP* and *Standard Procedures in Case of Suspected Scientific Misconduct*, determined by the Managing Board of the FVB, set rules and standards. The institute has an elected ombudsperson who acts as an impartial mediator.

The institute aims at a fully digitalized research data management. Currently, FMP laboratories implement Electronic Lab Notebooks (ELN) as a prerequisite of digitizing research data for re-use. Central long-term storage of publication-linked research data is provided. Together with other institutes of the FVB, a current research information system (CRIS) will be acquired and implemented at the beginning of 2022. Furthermore, the FMP will adopt standards of the national research data infrastructure (NFDI) initiative.

The Animal Facility is headed by a fully qualified veterinarian. Staff of the facility regularly receives training regarding animal welfare and obtains all required certificates. A legally required committee for animal welfare controls the facility activities and reports to the relevant state office. The Animal Facility as well as the Cell Engineering and Peptide Synthesis facilities are run on a fee-for-service basis.

The FMP aims at publications in international, high-impact journals with a peer-reviewing system. Authors are encouraged to choose open access publishing, if feasible, and supports open access publishing by its in-house open access publication fund. The FMP also has joined the DEAL project that was initiated by the alliance of the German science organizations. This project aims at changing the paradigm of scientific publishing from subscription-based to open access publishing.

The FMP sets incentives to reward and encourage collaborations, applications for third-party funds, and technology transfer. These include internal project grants for cross-sectional collaborative research and a technology transfer award. Target- and result-oriented budget control is also implemented by the program budget.

For the institute's technology transfer strategy see chapter 2.

Quality management by advisory boards and supervisory board

The Scientific Advisory Board (SAB) consists of eight scientists. Members are elected for four years, reappointment is possible once. The members are proposed by the FMP or the SAB and are appointed by the Board of Trustees (*Kuratorium*) of the Forschungsverbund Berlin (FVB). The SAB advises the directors of the FMP and the Board of Trustees on scientific aspects of the institute's work program and national and international collaborations. It assesses the research and service achievements and advises the Board of Trustees on the appointment procedures for the Board of Directors and for the senior scientists. The SAB meets annually. Between external evaluations, the SAB performs an audit.

The supervisory board of the FMP is the Board of Trustees (*Kuratorium*) of the FVB that comprises representatives of the State of Berlin, the BMBF, the Berlin universities, the scientific community, and the business sector. It is responsible for all essential science-political, programmatic and economic issues of all the institutes within the FVB, appoints directors, and confirms joint professorial appointments. Decisions by the Board of Trustees that relate to the FMP are prepared by its Institute Committee (*Institutsausschuss*).

5. Human Resources

As of December 31st, 2019, the institute has 225 employees, thereof 151 in research and scientific services, 55 in services, and 19 in administration. These persons are supported by 10 student assistants and 3 trainees (see appendix 4). In addition, the FMP hosts between 30 and 50 guests, mostly scientists funded by long-term scholarships.

Leading scientific and administrative positions

In December 2019, the FMP was led by two scientific directors, four department heads and ten heads of research groups and core facilities. Then, there were three junior research groups at the FMP (for changes in leadership personnel see chapter 3).

Scientific directors and department heads are jointly appointed professors with one of the Berlin universities (see chapter 6). Appointment procedures follow the standards of the partner university and the guidelines of the FVB (*Leitlinien für gemeinsame Berufungsverfahren der Institute im Forschungsverbund Berlin e. V.),* taking into account the recommendations of the Leibniz Association for the appointment of leading scientific and administrative staff. These are:

- since 01/1998: Head of department *NMR-supported Structural Biology* in joint appointment with FU Berlin.
- since 09/2006: Head of department *Physiology and Pathology of Ion Transport* in joint appointment with Charité – Universitätsmedizin Berlin, Section head *Molecular Physiology and Cell Biology.*
- since 01/2012: Head of department *Molecular Pharmacology and Cell Biology* in joint appointment with FU Berlin, Managing Scientific Director of the FMP.
- since 11/2012: Head of department *Chemical Biology II* in joint appointment with HU Berlin, head of Section *Chemical Biology.*
- since 04/2014: Head of department *Molecular Biophysics* in joint appointment with HU Berlin, Section head *Structural Biology*.
- since 07/2015: Head of department *Chemical Biology I* in joint appointment with HU Berlin, Director at the FMP.

All executive scientists and scientific staff are appointed based on public advertisements and an active recruitment strategy. The FMP states that competing for the most suitable candidates for open positions worldwide remains a continuous challenge.

At the institutes of the Forschungsverbund Berlin (FVB), a local head of administration is appointed in a joint process involving the institute directors and the managing director of the FVB, as this position is part of the joint administration.

Staff with a doctoral degree

Most of the staff with doctoral degrees are on fixed-term contracts. The staff scientists on permanent contracts provide special skills and expertise to the institute, for example by taking care of large and complex research infrastructure such as NMR spectrometers and electron microscopes.

In December 2019, the FMP employed 53 Postdocs and three heads of junior research groups on fixed term contracts. Postdocs join the FMP to acquire new skills, to perform in research *en route* to heading their own laboratory. Postdoctoral researchers are encouraged to participate in a variety of external and internal workshops and courses, including the program of the FMP graduate school.

Currently, the institute hosts five junior group leaders that belong to the third-level of leading FMP scientists. They are often funded jointly through the institutional budget and project funds or by external grants (e.g. DFG Emmy Noether Programme) or a combination thereof (e.g. joint junior groups with the Cluster of Excellence NeuroCure). Junior group leaders are generally hired on the basis of a [5+4]-year funding scheme including a mid-term evaluation after five years. The FMP points to five junior group leaders who have left the institute since the last evaluation to take up tenured professorships and three Post-docs that moved on to external leading positions in academia.

Doctoral Candidates

All FMP graduate students join the FMP Graduate School that offers a four-year study course of interdisciplinary scientific training, networking, soft skills including language courses, and active career scouting. A supervision agreement (*Betreuungsvereinbarung*) defines rights and responsibilities of students and supervisors. PhD students are supervised by a thesis committee comprising two or three experienced scientists who meet annually.

FMP scientists and PhD students actively participate in a number of other graduate programs. These include for example the Integrated Research Training Group (IRTG) of the Collaborative Research Center SFB 958 at FUB and the MDC PhD program.

In December 2019, 63 doctoral candidates worked at the FMP, of which 60 were employed on a contract while 3 held a scholarship. 24 doctoral candidates came from abroad. PhD students not holding scholarships receive fixed-term contracts according to their funding scheme, usually for three to four years, which may be extended if required (65%, E13). On average, 15 doctoral degrees were completed annually over the period of 2017 - 2019. The average doctoral period was 4.7 years (2014-2020).

Science-supporting staff

The FMP offers advanced vocational training for administrative and technical staff, either in-house or by external experts. Staff working in the animal facility regularly receive training in laboratory animal science, with a focus on rodents. The animal employees participate in courses offered by the MDC and obtain the necessary certificates to document a sufficient training status.

The institute employs apprentices in either administration, technical services, animal upkeep, or technical assistance (chemistry or biology). In December, three trainees worked at the FMP.

Equal opportunities and work-life balance

As of December 31st 2019, the proportion of women in “Research and Scientific Services” was 34%. In terms of individual scientific status groups, 38% of doctoral students and 16% of leadership personnel were women. 50% of the newly appointed group leaders during the reporting period are women scientists.

The FMP follows the guidelines and rules of the Leibniz equality standards and of the FVB. Since 2011, the FMP has itself set binding target quotas for the proportion of women at all levels based on the cascade model. The institute actively encourages female candidates

to apply for open positions at the FMP. Both gender equality commissioners are released part-time from other duties. They have a budget at their own disposal.

The institute supports its employees in solving family-related difficulties by a series of measures, including co-financing of the day-care facility CampusSterne on the Campus Berlin-Buch. To underscore the institute's promotion of equal opportunities and work-life balance, and to accelerate implementation of relevant measures, the FMP participates in the audit *berufundfamilie* (see chapter 8). The certificate has been confirmed for the third time in 2020.

6. Cooperation and environment

The local **collaboration with universities in Berlin** is of particular importance for the FMP. The six department heads are appointed jointly with Humboldt-Universität zu Berlin (HUB, 3x W3), Freie Universität Berlin (FUB, 1x W3, 1x C4) and Charité – Universitätsmedizin Berlin (1x W3), the joint medical faculty of FUB and HUB. Two heads of research groups are jointly appointed, one each with HUB (W3) and Charité (W2).

FMP scientists contribute to university teaching at all levels, from undergraduates to PhD students. Since the last evaluation, they have held courses and lectures on a scale of about 380 semester weekly hours. Teaching activities are not limited to professors, but also involve scientists on all levels. Finally, university students come to the FMP for internships that can often replace laboratory courses.

Principal investigators at the FMP regularly are project leaders in DFG-funded collaborative research and infrastructure projects jointly organized with universities. These include:

- The Clusters of Excellence "NeuroCure - Comprehensive approaches to neurological and psychiatric disorders" (since 2007, with Charité, FUB, HUB) and "UniCat/UniSysCat - Unifying Systems in Catalysis" (since 2007, with Technische Universität Berlin (TUB), FUB, HUB, Charité)
- The Collaborative Research Centers "From Molecules to Modules: Organisation and Dynamics of Functional Units in Cells" (SFB 740, 2007-2018, with Charité, HUB, TUB, MDC), "Scaffolding of Membranes" (SFB 958, since 2011, with FUB, Charité, MDC), and Transregio "Molecular Switches: Spatio-temporal Control of Cellular Signal Transmission" (SFB-TRR 186, 2016-2024, with Universität Heidelberg, FUB, Charité, MDC)
- The Research Training Groups "BIOQIC –BIOphysical Quantitative Imaging Towards Clinical Diagnosis" (GRK 2260, 2017-2021, with HUB, FUB, MDC) and "TJ-Train" (GRK 2318, since 2017, with FUB, HUB, Charité)

The FMP collaborates closely with the neighbouring **Max Delbrück Center for Molecular Medicine (MDC)**, an institution of the Helmholtz Association. The FMP states that research activities in both institutes are largely complementary and over the years have resulted in a large number of joint publications. Both institutions share large infrastructure (e.g. animal facilities, Chemical Biology Platform), exchange reagents and expertise, and are engaged in joint teaching activities.

Joint initiatives of the FMP, Berlin universities and Helmholtz centres are the "Joint Berlin MX Lab" with focus on structural studies, the Imaging Netzwerk Berlin (INB) devoted to promoting bioimaging with a special focus on medical applications, and the Berlin Integrative Structural Biology Network (BIS) that unites Berlin-wide infrastructure for structural biology research, especially with respect to the development of joint facilities for cryo-EM and cryo-ET.

Within the **Leibniz Association** the FMP participates in the Leibniz Research Networks "Pharmaceutical Agent and Biotechnology" and "Healthy Ageing" and aspires to become a member of the Leibniz Research Network "Infections '21".

A major focus of the FMP's activities to foster **European collaborative networks** have been the continued development of its Chemical Biology Platform and the founding of the European Research Infrastructure Consortium (ERIC) of EU-OPENSCREEN in 2018. EU-OPENSCREEN originated from an initiative led by the FMP and its partners to implement a European Infrastructure for high-and medium throughput screening. It was included into the European Strategy Forum for Research Infrastructures (ESFRI) roadmap in 2008. In 2018, the EU-OPENSCREEN ERIC's head office was founded on the Campus Buch, with support from the FMP (see chapter 8). The initiative involves Europe's leading screening sites and chemistry facilities to make them accessible to external academic users and companies.

Furthermore, the FMP provides expertise in biological NMR applications including instrumentation for solid-state and solution-NMR within the collaborative research projects *iNEXT* financed within the Horizon 2020 Program of the EU. It is closely linked to the broader European infrastructure initiative *INSTRUCT-Ultra* focused on structural biology. In this network the FMP currently provides access to its state-of-art cluster in NMR spectrometers. In addition to these major collaborative networks, the FMP is involved in various other European programs funded by the ERC or within the EU-Framework Programs.

FMP scientists collaborate with **companies** ranging from small biotechnology to pharmaceutical companies. Particularly strong ties exist in the areas of NMR spectroscopy and chemical biology. Building upon innovation of its researchers, the FMP has supported the foundation of small companies (e.g. Tubulis GmbH, Prosion GmbH), with which collaborations are still ongoing.

Institution's status in the specialist environment

With its strategic concept of interdisciplinary multilevel research in molecular pharmacology, the FMP sees itself in a nearly unique position at the national and international levels. In the following, the FMP lists a small selection of institutions having partially similar activities and foci:

Among the institutions with a chemical biology approach to drug development, the FMP sees the *Institute of Chemistry and Cell Biology (ICCB)* at Harvard Medical School, Boston and the *Max Planck Institute (MPI) for Molecular Physiology* including its *Chemical Genomics Centre (CGC)* in Dortmund. As an example of an NMR center dealing with structural biology, the FMP names the *Max Planck Institute for Biophysical Chemistry* in Göttingen. Examples of research institutes active in the fields of molecular neuroscience and cell

physiology are the *Karolinska Institute* in Stockholm and the *Max Delbrück Center for Molecular Medicine* in Berlin-Buch (*MDC,* see above).

7. Subdivisions of FMP

Section Molecular Physiology and Cell Biology

[58.7 FTE, thereof 29.1 FTE Research and scientific services, 18.6 FTE Doctoral candidates, and 11 FTE Science-supporting staff]

Research within this section addresses the molecular architecture, physiological functioning, and dynamics of membrane-bound receptors, channels and transporters, signaling factors and adhesion molecules as well as lipids and lipid-metabolizing enzymes that regulate their activities in order to target them for pharmacological interference to enable novel cures for disease.

The FMP points to important progress with respect to

- the identification and molecular characterization of important ion channels, transporters, and molecular chaperones,
- signaling at the neuronal circuit level,
- mechanisms that control membrane flux at the cell surface and within the endolysosomal system to regulate cell homeostasis and communication in the nervous system.

Results are based on shared and integrated common methodologies that range from genetics to electrophysiology, biochemistry, and molecular imaging (e.g. super-resolution and electron microscopy) approaches.

Between 2017 and 2019, the section published 104 peer-reviewed articles, 17 reviews and 3 individual contributions to edited volumes. Project grants amounted to € 11.4M over the same period and were obtained mostly from the DFG (€ 6.0M) and the EU (€ 3.3M). They include four ERC grants, a Reinhart-Koselleck grant and further funding from the DFG for participation in Collaborative Research Centers, Research Units, Research Training Groups, and a Cluster of Excellence (NeuroCure).

In the next years, the section's research aims to capitalize on obtained mechanistic insights and is directed at the further dissection and pharmacological manipulation of proteins to explore novel treatment options for diseases ranging from inherited myopathy and hypertension to neurological and neurodegenerative disorders. This includes the analysis of signaling lipids, enzymes, and acid-activated ion channels. The diversity and plastic remodeling of synapses will be studied in invertebrates, *Drosophila* and mouse models. The molecular studies of neuronal receptors will be expanded into synaptic physiology. For that purpose, cryo-EM as well as computational methods and machine learning will be applied.

Since the last evaluation, one research group was closed due to the retirement of the group leader and three junior research groups left the institute because their leaders took up professorial positions elsewhere. Instead, one research group, two junior research groups, and

one core facility were newly established. Currently, the section comprises the following units:

Department of Physiology and Pathology of Ion Transport [9.8 FTE]

This department investigates ion transport processes across biological membranes from the molecular to the organismic level. To unravel the role of ion channels in health and disease human molecular genetics and mouse models are used to study a variety of organs, e.g. the nervous system, endocrine cells, bone, kidney and the immune system.

Department of Molecular Pharmacology and Cell Biology [22.3 FTE, since 2012]

The department focuses on endocytic and endolysosomal membrane traffic in non-neuronal cells and in the brain using a wide array of biochemical, genetic and bio-imaging approaches. The overarching goal to develop novel strategies for pharmacological or genetic interference to combat diseases, including epilepsy, neurodegeneration, lysosomal disorders, myopathies and cancer.

Heisenberg Guest Research Group Molecular Neuroscience and Biophysics [7.9 FTE, since 2017]

The group has developed from a former junior research group at the FMP as the group leader has become Chair of Cellular Biophysics at HU Berlin. The group investigates fast signalling in the brain, with an emphasis on glutamate receptors using biophysical approaches. It is hosted at the FMP as a senior research group until 2022.

The **Junior Research Group (Emmy Noether) Molecular and Theoretical Neurosciences** [6 FTE, since 2015] combines experimental and theoretical approaches to elucidate molecular mechanisms of neurotransmission across chemical synapses using the fruit fly *Drosophila melanogaster* as model system.

The **Junior Research Group Synapse Biology** [2 FTE, since 2020] further strengthens the focus of the section on membrane dynamics and its role in the nervous system. The group is co-funded by the Cluster of Excellence NeuroCure.

The **Core Facility Cellular Imaging** [7 FTE] provides expertise in light (e.g. super-resolution imaging) and electron microscopy. In 2018, there was a change in leadership due to retirement.

The **Core Facility Cell Engineering** [3 FTE, since 2020] originates from the research group Protein Trafficking. It applies the CRISPR/Cas technology to provide FMP researchers with genome-edited cell lines.

The **Animal Facility** [5 FTE] provides housing for rodents and frogs and expertise in animal husbandry, transgenic, and knockout mouse breeding colony maintenance.

Section Structural Biology

[46.1 FTE, thereof 30.1 FTE Research and scientific services, 7.5 FTE Doctoral candidates, and 8.5 FTE Science-supporting staff]

This section addresses atomic structures and functional dynamics of proteins and protein complexes in their natural environment. This includes membrane proteins in the context

of native-like lipid bilayers, fully assembled molecular machines, and soluble proteins within live cells. Furthermore, the section investigates larger systems such as organelles, cells, tissue, or even organisms using structural proteomics and imaging approaches.

Towards these aims, an integrated structural biology strategy is adopted combining solid- and solution-state nuclear magnetic resonance (NMR), mass spectrometry (MS) and cryo-electron microscopy (cryo-EM) combined with computational and theoretical approaches, for instance structure-based drug design and atomistic molecular dynamics simulations (MD). Structural knowledge obtained from these studies are also translated into magnetic resonance imaging diagnostic tools (MRI).

The FMP points to important progress with respect to

- Atomic structures of supramolecular assemblies and membrane proteins, functional insights into ion channels and rhomboid proteases, elucidation of higher order architectures of molecular assemblies *in vivo*, and the application of protein structures to sensitive MRI detection.
- The computational groups have developed a small molecule as antagonist for the TSH-receptor as well as low molecular weight inhibitors of the Ena/VASP EVH1 interaction.
- Methodological developments include the areas of DNP-enhanced and ultra-fast magic-angle spinning NMR, integrated solid-state NMR/cryo-EM structure determination, multivalent MRI reporters, and structural proteomics.

Between 2017 and 2019, the section published 80 peer-reviewed articles, 10 reviews and 2 individual contributions to edited volumes. Project grants amounted to € 5.5M over the same period and were obtained mostly from the DFG (€ 1.9M) and the EU (€ 1.7M). They include four ERC grants, a Reinhart-Koselleck grant and further funding from the DFG for participation in Collaborative Research Centers and in a Cluster of Excellence (UniSysCat).

The NMR Spectroscopy core facility continuously upgrades the equipment and replaced the hardware of five spectrometers. In addition, new probes and a spectrometer for non-invasive live animal MRI as well as a high-end mass spectrometer were purchased. In 2023, a new 1.2 GHz NMR spectrometer, the largest and most powerful NMR spectrometer world-wide, will be installed in a new building (see chapter 8).

In the upcoming years, a major theme of the section will be to clarify the structure, dynamics, and function of proteins, e.g. selective and non-selective cation channels and viral proton channels of Influenza A, West Nile and Dengue viruses, under conditions which closely mimic their native environment. In addition, different states of proteins involved in phase separation and the structural aspects regarding biofilm components will be investigated. MS-based approaches, in particular cross-linking MS (XL-MS), will be further developed and applied to characterize the interplay between organelles as well as host-virus and host-pathogen interactions.

Since the last evaluation, two research groups were closed due to retirement of the group leaders and one junior research group left the institute because its leader received a professorship elsewhere. In 2014, the department *Molecular Biophysics* was established,

which is led by the section head. Furthermore, one research group and two junior research groups were newly established. The core facility Mass Spectrometry, formerly assigned to the section Chemical Biology, moved to this section. Currently, the section comprises the following units:

Department of Molecular Biophysics [11.2 FTE, since 2014]

The department studies protein structure and dynamics using solid-state NMR (ssNMR) that allows to investigate membrane proteins in native-like lipid bilayers at room temperature and under physiological buffer conditions. The group develops novel ssNMR-based methods and applies them combined with other structural and biophysical methods, e.g. cryo-EM in order to elucidate the atomic structures of flexible supramolecular assemblies.

Department of NMR-Supported Structural Biology [10.3 FTE]

The department applies magic-angle-spinning (MAS) solid-state NMR in structural and metabolomics investigations on complex systems such as proteins embedded in lipid bilayers or large macromolecules in their natural environment. Furthermore the group used dynamic nuclear polarization (DNP) to study ribosomes, biofilms or black cartilage of patients.

The **Research Group Structural Interactomics** and **Core Facility Mass Spectrometry** [6.3 FTE] aim to develop and apply mass-spectrometry-based approaches to characterize the complexity of protein interactions within the cell. In 2018, there was a change in leadership due to retirement.

The **Junior Research Group Molecular Imaging** [5 FTE, since 2009] focuses on establishing novel magnetic resonance reporters and the related detection techniques for diagnostic imaging and spectroscopy. The group is mainly third-party funded via a Reinhart-Koselleck grant (2017) for research on xenon biosensors and their potential to increase the significance of magnetic resonance imaging in molecular diagnostics.

The **Junior Research Group Structure and Mechanism of Microbiome-Driven Diseases** [2 FTE, since 11/2020] applies structural biology to understand molecular mechanisms of microbiome-driven carcinogenesis in the human colon.

The **Core Facility NMR Spectroscopy** [3.6 FTE] maintains the NMR spectrometers and supports the application of NMR spectroscopy, either solid state or solution state.

Section Chemical Biology

[51.2 FTE, thereof 23.1 FTE Research and scientific services, 14.3 FTE Doctoral candidates, and 13.8 FTE Science-supporting staff]

The section investigates biological processes by means of chemical approaches. For that purpose scientists apply novel synthetic, analytical, and computational methods to investigate the function of biologically important proteins and cellular signaling pathways, and to identify, validate, and develop new specific bioactive molecules to interfere with targets of particular pharmacological relevance.

The FMP points to the following important developments

- In combined efforts with the other sections at FMP, bioactive molecules of different molecular complexity have been discovered, which included low molecular weight drug-like molecules, metabolic messengers as well as modified proteins and antibodies with high medical potential.
- New imaging tools have been developed to monitor fundamental biological processes and to visualize disease-relevant targets for diagnostic purposes.
- The advancement of new analytical techniques enabled the identification of previously unknown targets in proteomic research and new possibilities for monitoring the consequences of chemical interference and modification.

The central hub in the section is the Chemical Biology Platform (CBP) which hosts the core facilities Screening Unit, Medicinal Chemistry, Scientific Computing of Structural Chemistry and Computational Biophysics, and Compound Management. The CPB plays a central role by providing expertise in medicinal chemistry and high-throughput screening to enable hit-to-chemical tool optimization. The design of novel bioactive molecules was also supported by computational and theoretical expertise of the CBP, especially molecular modeling and molecular dynamics (MD) simulations. It is a key partner in the EU-OPENSCREEN initiative and further research networks.

Between 2017 and 2019, the section published 87 peer-reviewed articles, 8 reviews, 5 individual contributions to edited volumes and 4 articles in other journals. Project grants amounted to € 8.8M over the same period and were obtained from the DFG (€ 1.3M), Federal and *Länder* governments (€ 1.7M) and the EU (€ 1.1M). They include further funding from the DFG for participation in Collaborative Research Centers, Research Training Groups and in a Cluster of Excellence (UniSysCat). A section's department head chaired the DFG-funded Priority Program on chemoselective protein synthesis (SPP 1623).

In the upcoming years, one particular goal is to take small molecules and biologics, which showed promising bioactivity *in vitro,* to the next complexity level and investigate their performance in living cells, model organoids, and organisms. Further objectives include developments in new analytical formats and diagnostic imaging tools, new chemical tools and biologics, and the targeted delivery of chemical probes and next-generation pharmaceuticals

Within the Chemical Biology Platform the *Compound Management* will further update the FMP-owned compound library striving to reach the final capacity of 110.000 compounds during the next evaluation period. The *Screening Unit* will implement 3D cellular high-content screening with automated microscopes and machine learning routines for pattern recognition. In cooperation with the core facility Cell Engineering it is planned to generate reporter cell lines for genome wide gene-function studies based on CRISPR/Cas technology.

Since the last evaluation, two research groups were closed due to the retirement of the group leaders. In 2015, the new head of the department *Chemical Biology I* joined the FMP. In 2020, three new units were established: one research group, one junior research group and one core facility. Currently, the section comprises two departments and one junior research

group. Both research groups and two of the three core facilities form the Chemical Biology Platform.

Department of Chemical Biology II [11.5 FTE]

The department develops new chemical and biochemical methods and tools for the specific modification of peptides and proteins, both on isolated biomolecules as well as in living cells and organisms. Herein, the main objective is to apply these highly selective bioconjugation reactions to study the functional consequences of naturally occurring posttranslational modifications (PTMs) and to generate novel protein- and antibody-conjugates for pharmaceutical and medicinal applications.

Department of Chemical Biology I [8.4 FTE, since 2015]

This department studies metabolic messengers, which can influence protein modifications, gene expression, and signal transduction in the cell. In particular, the group focuses on inositol poly- and pyrophosphates that have been linked to metabolic diseases, cancer and ageing. For that purpose an interdisciplinary approach is applied to develop new chemical and biochemical tools so that the inositol poly- and pyrophosphate pathway can be rationally exploited for therapeutic purposes in the long run.

The **Research Group Structural Chemistry and Computational Biophysics** [4 FTE, since 10/2020] focuses on the development and application of molecular modelling and molecular dynamics (MD) simulations together with other chem- and bioinformatic tools with the aim to design novel bioactive molecules and to characterize their interactions with biological targets.

The **Research Group Medicinal Chemistry** [9.7 FTE] aims to develop probes and advancing enabling methodologies for the identification and investigation of unexplored biological targets. For that purpose, the group uses hit-to-chemical tool optimization, targeting imaging tools and developing new synthetic methods to access novel privileged scaffolds.

The **Junior Research Group ChemBioProbes** [3.1 FTE, since 03/2020] designs and synthesizes new probes for the visualization, interrogation and manipulation of biomolecules to understand fundamental biological processes, such as organellar arrangement, protein trafficking and receptor stoichiometry.

The **Core Facility Screening Unit** [7 FTE] provides open access towards High-throughput screening (HTS) technologies to study gene and protein functions, both on isolated biomolecules as well as in living cells and organisms.

The **Core Facility Peptide Synthesis** [2.2 FTE] aims to provide synthetic peptides to all research groups at the FMP and is equipped with two fully automated instruments for multiple simultaneous peptide synthesis, including parallel synthesizer and a recently purchased Microwave-assisted synthesizer.

The **Core Facility Compound Management** [1 FTE, since 10/2020] stores proprietary synthesized compounds and evaluates them on drug-likeliness. Its infrastructure moved in 2019 next to the compound management of the EU-OPENSCREEN ERIC leading to synergies concerning knowledge and staff.

8. Handling of recommendations from the previous evaluation

The FMP responded as follows to the 5 recommendations of the last external evaluation (highlighted in italics, see also statement of the Senate of the Leibniz Association issued on 27 November 2014, page B-3):

1) *"It is welcomed that FMP is trying to implement building measures which would allow projects and infrastructure related to EU-OPENSCREEN to be funded in the context of the European Strategy Forum on Research Infrastructures (ESFRI)."*

   The FMP has continued its strong support for the development of EU-OPENSCREEN as a European Infrastructure. In 2018, EU-OPENSCREEN has been founded as an independent entity with its headquarters situated on the Campus Buch. On its way to this status, the FMP harbored the EU-OPENSCREEN team, has given advice and provided infrastructure as well as funds for staff to facilitate the founding of its ERIC. The FMP has also applied for and administered all additional funds provided by the German Ministry for Education and Research (BMBF, approximately € 11M). These funds were used to renovate two floors of a building on Campus Buch to provide the technical infrastructure required to host the offices and central substance library of EU-OPENSCREEN, and to upgrade FMP's Screening Unit and Medicinal Chemistry as EU-OPENSCREEN partner sites. Meanwhile, renovation of the building has been completed, and the EU-OPENSCREEN central office moved into its premises on the first floor of the TRH. Acquisition and implementation of the substance library is in progress. Further technical upgrades of Screening Unit and Medicinal Chemistry services are in progress and expected to be completed before summer 2021.

2) *"FMP's list of requirements with regard to additional funding for expanding facilities and infrastructure should be prioritised in consultation with the Scientific Advisory Board and the Board of Trustees of Forschungsverbund Berlin. Subsequently, the feasibility of various sources of financing should be examined and, if appropriate, the relevant evaluation procedures initiated. This should include an analysis of potential participation by the institute's closest collaborative partners."*

   The FMP employs established procedures, e.g. consultation with its Scientific Advisory Board as a first step, deliberations with State of Berlin representatives, to prioritize investments as also laid out in its annual *Programmbudget*, while maintaining the option to act flexibly in case sudden demands arise.

   Within the reporting period, the institute has been highly successful in acquiring additional funds that have enabled the FMP to further develop its facilities. During the last evaluation 2014, the acquisition of a 1.2 GHz spectrometer had been discussed and recommended. With support of the Scientific Advisory Board, the Board of Trustees of the *Forschungsverbund* Berlin, and the State of Berlin, it has now been possible to secure funding for this instrument that will be installed on campus in 2023. This investment places the FMP at the very forefront of NMR-based structural biology research. In addition to the GHz NMR spectrometer, the FMP has acquired additional instrumentation for high-resolution light and, together with its Berlin partners (MDC,

FUB, Charité), cryogenic electron microscopy. The latter will need to be expanded considerably during the forthcoming years as explained in detail in chapter 3.

3) *"It is recommended to make the expansion of animal experimentation capacity a major priority and to coordinate closely with the relevant bodies in order to find ways of establishing sufficient capacity and the required hygiene standard, either at FMP itself or at one of the collaborative partners."*

   In the run-up to the last evaluation in 2014, the capacities for breeding and upkeep of mice were identified as a potential limitation for the further development of the institute. This situation has now been resolved through several measures: (i) The implementation of ventilated cages has increased the capacity of the available space for mouse husbandry. (ii) Retirement and departure of leading scientific staff members have reduced the number of mouse lines, thus decreasing the demand for mouse cage space. Finally, (iii) additional mouse cage space has become available in the MDC animal facility, in which the FMP owns a 13% fraction of the cage capacity. As a result, the FMP will relocate all activities requiring SPF-conditions (e.g. breeding of mice, keeping of mouse lines) to the MDC facility, while its own non-SPF space will become a dedicated experimental animal facility (see chapter 4).

4) *"FMP must keep striving to increase the proportion of women in the scientific sector and especially at leadership level."*

   The FMP has implemented measures to support equal opportunity, including measures to appropriately balance work and family life as evidenced by the successful re-audit beruf*und*familie. A nearly balanced gender distribution has been reached at the level of graduate students and postdoctoral researchers, while continued efforts must be made to further increase the proportion of women scientists in leading positions, for example via active recruitment and career promotion of female scientists.

   The FMP is proud of the fact that during the reporting period all of its female junior group leaders have secured independent tenured positions as professors at leading academic institutions in Germany. These losses in the number of female group leaders are partly compensated for by the arrival of one new female junior group leader at the end of 2020.

   During the funding period the FMP has also been successful in hiring women scientists at the senior level. In 2015 a department head was actively recruited from Princeton University to the FMP to become Director and W3-S professor of Chemical Biology at HU Berlin. Moreover, the FMP has succeeded in hiring two woman scientists as head of research groups Structural Interactomics and the core facility Mass Spectrometry. The award of an ERC Starting Grant and a W2-S Women Professorship within the Leibniz Competition to one of them testify to her credentials. Since 2014, 67% of newly recruited professors and 50% of newly recruited group leaders were female scientists.

   The FMP will consequently follow this strategy in the future and continues to seek increasing the proportion of women scientists at all levels, while promoting scientific excellence (see chapter 5).

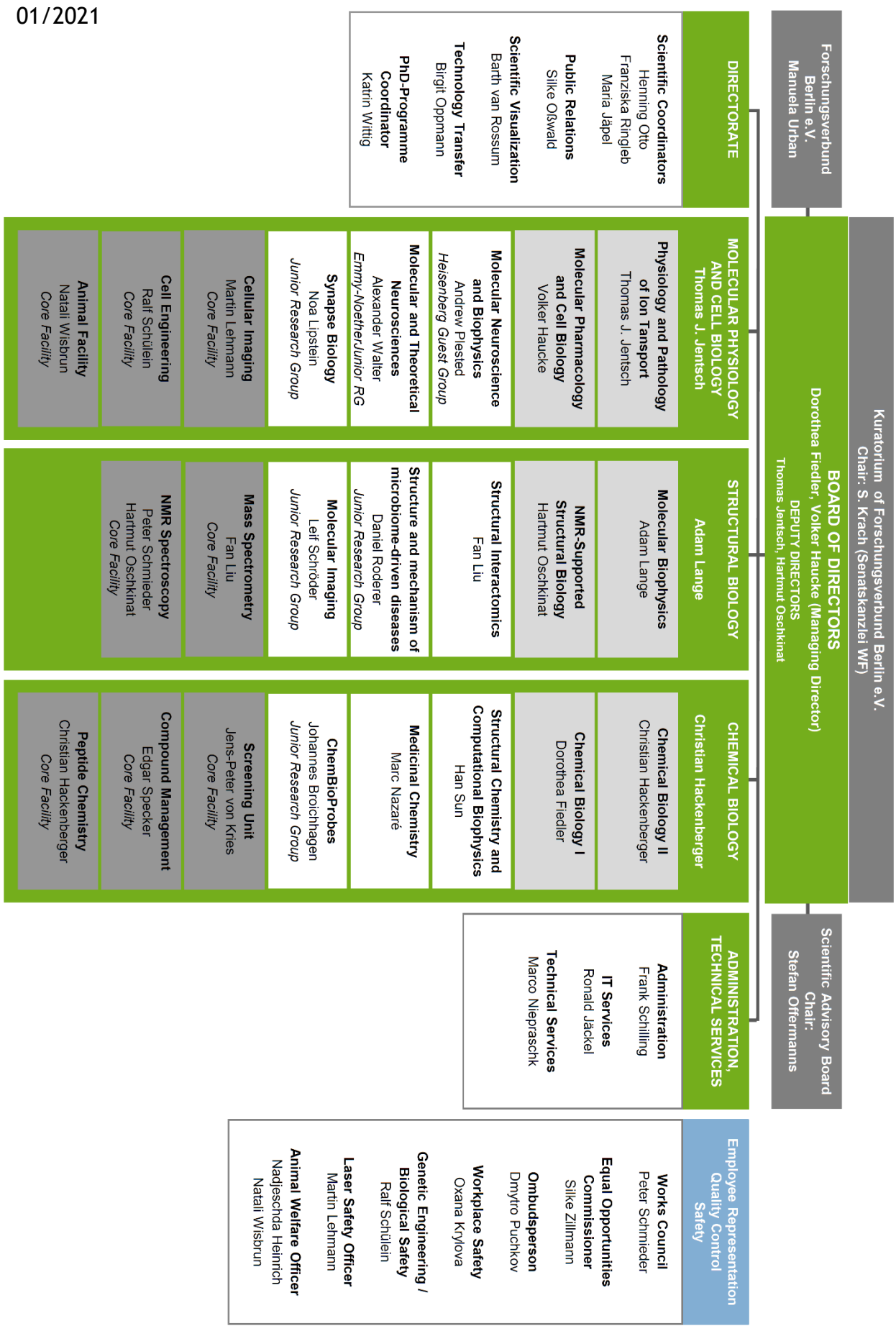
5) *"The 'integrated projects' programme, which supports cross-sectional research, has proven very effective. FMP should consider using this tool on a larger scale."*

The FMP notes that additional new collaborations have arisen from this scheme and points to having doubled its volume. Now, the institute finances one new project each year, including one PhD position for three years or one Postdoc position for two years and consumables (€ 15K p.a.).

Appendix 1

Organisational Chart

01/2021



Appendix 2

Publications, patents, and expert reviews

	Period		
	2017	**2018**	**2019**[1)]
Total number of publications	111	101	100
Individual contributions to edited volumes	4	2	4
Articles in peer-reviewed journals / Reviews	90 / 14	77 / 14	88 / 8
Articles in other journals	3	8	0

Industrial property rights [2)]	**2017**	**2018**	**2019**
Patents (granted/applied)	35 / 22	38 / 26	41 / 35
Other industrial property rights (granted/applied)	1 / 0	1 / 0	1 / 0
Licences	2	1	1

[1] Contributions that have been accepted for publication but not yet appeared are added in parenthesis.
[2] Concerning financial expenditures for revenues from patents, other industrial property rights and licences see Appendix 3.

Appendix 3

Revenue and Expenditure

Revenue		2017			2018			2019[1]		
		k€	% [2]	% [3]	k€	% [2]	% [3]	k€	% [2]	% [3]
Total revenue (sum of I., II. and III.; excluding DFG fees)		**27,958.8**			**29,293.1**			**34,285.9**		
I.	**Revenue (sum of I.1., I.2. and I.3)**	**26,522.5**	**100 %**		**28,516.7**	**100 %**		**29,540.5**	**100 %**	
1.	INSTITUTIONAL FUNDING (EXCLUDING CONSTRUCTION PROJECTS AND ACQUISITION OF PROPERTY)	17,036.6	64 %		20,690.8	73 %		20,474.4	69 %	
1.1	Institutional funding (excluding construction projects and acquisition of property) by Federal and *Länder* governments according to AV-WGL	17,036.6			20,690.8			20,474.4		
1.2	Institutional funding (excluding construction projects and acquisition of property) not received in accordance with AV-WGL	0.0			0.0			0.0		
2.	REVENUE FROM PROJECT GRANTS	9,231.1	35 %	100 %	7,704.4	27 %	100 %	8,780.5	30 %	100 %
2.1	DFG	3,161.0		34 %	3,059.5		40 %	2,917.5		33 %
2.2	Leibniz Association (competitive procedure)	480.3		5 %	394.0		5 %	424.5		5 %
2.3	Federal, *Länder* governments	741.8		8 %	694.4		9 %	1,119.0		13 %
2.4	EU	3,159.9		34 %	1,321.7		17 %	1,637.3		19 %
2.5	Industry	48.1		1 %	20.9		0 %	122.7		1 %
2.6	Foundations	209.6		2 %	68.4		1 %	57.7		1 %
2.7	Other sponsors	1,430.4		15 %	2,145.4		28 %	2,501.8		28 %
3.	REVENUE FROM SERVICES	254.8	1 %		121.5	0 %		285.6	1 %	
3.1	Revenue from commissioned work	48.0			21.5			122.6		
3.2	Revenue from publications	200.0			0.0			0.0		
3.3	Revenue from exploitation of intellectual property for which the institution holds industrial property rights (patents, utility models etc.)	6.8			0.0			0.0		
3.4	Revenue from exploitation of intellectual property without industrial property rights	0.0			0.0			0.0		
3.5	Other services	0.0			100.0			163.0		
II.	**Miscellaneous revenue** (own revenues, cash residuals from previous year, self-managed funds)	**1,436.3**			**776.4**			**4,045.4**		
III.	**Revenue for construction projects** (institutional funding by Federal and *Länder* governments, EU structural funds, etc.)	**0.0**			**0.0**			**700.0**		

Expenditures		k€	k€	k€
Expenditures (excluding DFG fees)		**26,598.6**	**29,735.8**	**34,938.6**
1.	Personnel	14,743.5	15,529.7	15,278.7
2.	Material expenses	7,008.0	6,456.9	8,398.5
2.1	*Proportion of these expenditures used for registering industrial property rights (patents, utility models etc.)*	*56.1*	*54.3*	*88.8*
3.	Equipment investments	3,518.1	3,139.1	9,395.0
4.	Construction projects, acquisition of property	0.0	0.0	98.2
5.	Other operating expenses (externally managed third-party funds, cash residuals from previous year, self-managed funds, Leibniz competition fees, Leibniz contribution)	1,329.0	4,610.1	1,768.2
DFG fees (if paid for the institution – 2.5% of revenue from institutional funding)		421.4	517.2	511.6

[1] Preliminary data: no
[2] Figures I.1, I.2 and I.3 add up to 100 %. The information requested here is thus the percentage of "Institutional funding (excluding construction projects and acquisition of property)" in relation to "Revenue from project grants" and "Revenue from services".
[3] Figures I.2.1 to I.2.7 add up to 100 %. The information requested here is thus the percentage of the various sources of "Revenue from project grants".

Appendix 4

Staff

(Basic financing and third-party funding / proportion of women (as of: 31/12/2019)

	Full-Time Equivalents		Employees		Female Employees		Foreigners		
	Total	on third-party funding	Total	on temporary contracts	Total	on temporary contracts	Total		
	Number	Percent	Number	Percent	Number	Percent	Number		
Research and Scientific Services	**122.9**	**54.8 %**	**151**	**69.0%**	**52**	**70.8 %**	**57**		
Directors *(1st leadership level)*	2.0		2		1				
Department Heads *(2nd leadership level)*	4.0		4						
Group Leaders or Equivalent *(3rd leadership level)*	9.0	22.2 %	9	22.2 %	1		1		
Junior Research Group Leaders *(3rd leader. level)*	3.0	25.0 %	3	66.6 %	1	1.0 %			
Further Academic Staff in Executive Positions	1.0		1		1				
Scientists in Non-Executive Positions *(A13, A14, E13, E14 or equivalent)*	64.5	48.2 %	72	73.6 %	25	68.0 %	35		
Doctoral Candidates *(E13 2/3)*	39.4	85.0 %	60	85.0 %	23	86.0 %	21		
Service positions	**51.8**	**12.2 %**	**55**						
Laboratory *(upper-mid-level service, E9 to E12)*	30.5	14.7 %	33						
Laboratory *(mid-level service, E5 to E8)*	2.8	66.6 %	3						
Animal Care *(mid-level service, E5 to E8)*	7.0		7						
Workshops *(mid-level service, E5 to E8)*	7.0		7						
Information Technology *(IT, upper-mid-level service, E9 to E12)*	3.0		3						
Technical Staff *(large equipment, service, mid-level service, E5 to E8)*	1.5		2						
Administration	**18.6**	**0.0 %**	**19**						
Head of Administration	1.0		1						
Staff Positions *(senior service, from E13)*	4.0		4						
Internal Administration *(financial administration, personell, ..., senior service, from E13)*	1.0		1	1.0 FTE	JAd				
Internal Administration *(financial administration, personell, ..., upper-mid-level service, E9 to E12)*	3.8		4	3.8 FTE	JAd				
Internal Administration *(financial administration, personell, ..., mid-level service, E5 to E8)*	5.8		6	0.8 FTE	JAd				
Building Service *(E1 to E4)*	3.0		3						
Student Assistants	**5.0**	**40.0 %**	**10**						
Trainees	**3.0**		**3**						
Scholarship Recipients at the Institution	**9.0**	**100.0 %**	**9**		**1**		**9**		
Doctoral Candidates	3.0	100.0 %	3		1		3		
Post-Doctoral Researchers	6.0	100.0 %	6		1		6		

JAd: Joint Administration: part of the FMP administration is stationed at the joint administration of the Forschungsverbund in Berlin Adlershof. Indicated are the full-time equivalents of staff at the joint administration.

6 September 2021

Annex B: Evaluation Report

Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) within the Forschungsverbund Berlin e.V.

Contents

1. Summary and main recommendations

The Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) conducts excellent basic research in the field of molecular pharmacology to elucidate key biological processes and to gain a better understanding of the causes of disease.

In the run-up to drug research, target molecules (i.e. proteins and protein complexes) are identified, then their structure is characterised and ultimately modified with a view to further pharmacological development in the future. This approach is reflected very consistently in the structure of the institute, with its three sections: Molecular Physiology and Cell Biology, Structural Biology, and Chemical Biology. Within these highly productive units, the institute is currently organised into six departments, four research groups and five junior research groups. The FMP also has eight core facilities, which are integrated into the sections in a logical manner and provide access to world-leading methods.

Since the last evaluation, the FMP has developed extremely well. Leadership changes in two of the six departments and in a few research groups and junior research groups were used to make reasonable adjustments to the research portfolio. The institute has recruited excellent senior and junior scientists.

The FMP generates outstanding scientific output, which is published in leading international journals. It is also very successful in securing third-party funding, as is very clearly demonstrated by nine ERC grants since the last evaluation. In addition, significant funds were obtained for a 1.2 GHz NMR spectrometer, which is the most advanced instrument available. It is due to go into operation in 2023 and will be a hallmark for the FMP and its national and international standing in the NMR field.

The FMP is extremely well connected with the stimulating scientific environment in Berlin. Particularly worth highlighting is the institute's very fruitful collaboration with the neighbouring Max Delbrück Center for Molecular Medicine (MDC). The close collaboration with the three universities in Berlin and Charité – Universitätsmedizin Berlin can be seen in joint appointments to professorships and various joint projects, in which FMP employees also take on leadership roles. The institute, and especially its Chemical Biology Platform, plays a pivotal international role in coordinating the EU-OPENSCREEN Network.

Special consideration should be given to the following main recommendations in the evaluation report (highlighted in **bold face** in the text):

Changes and planning (chapter 3)

1. In 2018, EU-OPENSCREEN ERIC was founded as an independent entity with headquarters on Campus Berlin-Buch. It is welcomed that the FMP plays a key role in the network through the important services provided by its Chemical Biology Platform (CBP). The CBP research groups are led by young, talented researchers. The institute should make sure that the groups use their resources for research activities as well as scientific services.
2. The FMP combines its expertise in NMR spectroscopy and cell biology with cryogenic electron microscopy. This pioneering methodology is currently only available through devices of the Berlin Integrative Structural Biology Network (BIS) that are located at Freie

Universität Berlin and on Campus Berlin-Buch. Now the FMP intends to apply for additional institutional funding from Federal and *Länder* governments (temporary extraordinary item of expenditure) to establish a facility of its own, including cryogenic electron microscopy (cryo-EM), cryogenic electron tomography (cryo-ET) and correlative light and electron microscopy (CLEM). The facility is due to be housed in an MDC building on Campus Berlin-Buch from 2025 onwards. These plans are well integrated in the institute's research strategy and in the scientific environment in Berlin. They are meaningful and should be pursued further. In doing so, the institute should take the personnel capacity required to run the facility into account.

3. Successors will need to be found in the coming years for two excellent researchers. The FMP and its official bodies need to work with the relevant university partners in Berlin and initiate the recruitment processes for internationally renowned scientists in order to fill these positions quickly. Extended periods with vacant positions, as occurred a few years ago when replacing department heads, should certainly be avoided.

Controlling and quality management

4. At the moment, only two out of eight members of the Scientific Advisory Board (SAB) are women. The FMP should work towards a more balanced gender ratio.

Human resources (chapter 5)

5. All doctoral candidates are integrated in the FMP Graduate School programme and a well-executed mentoring programme for early-career scientists. However, the average doctoral period of 4.7 years is too long. It is recommended that the institute takes action to reduce the doctoral period.
6. Among scientific staff, the proportion of women remains at the same low level as at the time of the last evaluation. Some improvements are visible at leadership level, but here too, the proportion of women is still too low. When staff need to be replaced, this should be used as an opportunity to make improvements, so that the target quotas set in the programme budget are actually achieved. The institute's equality work needs a clearly defined strategy, which should be supplemented with measures to promote an inclusive, diverse working environment.

2. Overall concept, activities and results

The Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) conducts excellent basic research in the field of molecular pharmacology to elucidate key biological processes and to gain a better understanding of the causes of disease.

In the run-up to drug research, target molecules (i.e. proteins and protein complexes) are identified, then their structure is characterised and ultimately modified with a view to further pharmacological development in the future. This approach is reflected very consistently in the structure of the institute, with its three sections: Molecular Physiology and Cell Biology, Structural Biology, and Chemical Biology.

Within these very productive units, the institute is currently organised into six departments, four research groups and five junior research groups. The FMP also has eight core facilities,

which are coherently integrated into the sections and provide access to world-leading methods.

Activities and results

Research

All the FMP departments were rated excellent seven years ago, and the FMP continues to generate outstanding scientific output. The publication output reflects this, with numerous publications in high-ranking interdisciplinary journals, including *Nature*, *Science* and *Cell*.

Highlights in the Molecular Physiology and Cell Biology section include the identification of new ion channels and novel gating mechanisms, and numerous seminal contributions in the field of membrane trafficking. Important achievements in the field of structural biology include the development and application of solid-state NMR methods, mass spectrometry and the characterization of complex biological systems. This approach has been used to characterise the atomistic structure and functional dynamics of ion channels, among other things. In the field of chemical biology, the institute has earned a very good international reputation through its work on the synthesis and biochemical function of inositol polyphosphates, as well as protein bioconjugation chemistry (see below and chapter 7 for details).

Infrastructure and transfer

By coordinating the EU-OPENSCREEN Network, the institute's Chemical Biology Platform (CBP) provides high- and medium-throughput screening for academic and non-academic collaboration partners. Moreover, the EU-OPENSCREEN compound library established on site has an impressively large collection of 75,000 compounds and is maintained within the CBP (see chapters 3 and 7). The compound library can be accessed by all screening sites in Europe.

The results obtained have led to a range of registered patents and the successful founding of two spin-off companies (Tubulis GmbH and Prosion GmbH). Another company is currently in the start-up phase. The institute cooperates closely with the two spin-off companies and others ranging from small biotechnology to pharmaceutical companies.

The FMP organized the world's largest NMR conference in 2019 at the Freie Universität Berlin with over 1,100 participants. The conference was a tremendous success, underlining the worldwide recognition of NMR research at the institute.

Activities and results of the three sections (for details on the departments and other units in the sections, see chapter 7)

The **Molecular Physiology and Cell Biology** Section excels in research on ion channels and the cell biology of membrane trafficking, with a particular emphasis on synaptic transmission. With the focus on biological membrane processes the section works in a field in which only a few groups are active worldwide. This contributes significantly to the FMP's international visibility.

Results are published regularly in the leading journals. Revenue from third parties is very high and includes prestigious grants, i.e. a Reinhart Koselleck grant from the DFG and three ERC grants from the EU.

The two department heads are world-leading and serve as mentors for the excellent newly recruited scientists. One of the department heads will reach retirement age in 2021 (see chapter 3), but will continue to work at the FMP beyond then. In this respect, the section is well prepared for the future, with excellent cell and *in vivo* biology and computational groups working together. The plans for combining methods from cell biology and structural biology also make excellent sense. Nevertheless, the institute should work quickly towards finding a replacement for the department head (see chapter 3).

The **Structural Biology** Section conducts outstanding research on the structural characterisation of proteins and complexes, ranging from single proteins to large assemblies and even organelles. A common theme is the mechanistic analysis of proteins, their structure, function and dynamics, preferably in their native (or near-native) environment. The studies are conducted using some of the most advanced techniques worldwide, such as solid-state and solution NMR, crosslinking-mass spectrometry (XL-MS), proteomics, cryogenic electron microscopy (cryo-EM) and computational methods.

Since the last evaluation, the section has seen substantial employee turnover. It succeeded in recruiting excellent junior staff, who have brought in new expertise, e.g. in mass spectrometry and single particle cryo-EM. The section was able to maintain its outstanding productivity, which is documented by high-ranking publications. In 2020, Prosion GmbH, a joint spin-off with the University of Cologne, was set up. It develops and produces novel chemical entities for pharmaceutical uses.

The two departments are led by world-renowned NMR scientists. One of them will reach retirement age in 2022, but will be integrated into FMP research activities beyond then. Nevertheless, the institute should work quickly towards finding a replacement (see chapter 3). The future plans to find a senior scientist in the field of cryo-EM and a junior scientist in solid-state NMR are reasonable and will strengthen cryo-EM development, while at the same time maintaining the institute's leading position in solid-state NMR.

Revenue from third parties is very high and includes substantial collaborative research funding as well as an ERC grant from the EU and a Reinhart Koselleck grant from the DFG.

The **Chemical Biology** Section has developed extremely well since the last evaluation. With three new people recruited to leadership positions (two of them female), it has gained a high reputation in the field of bioorganic chemistry, medicinal chemistry and chemical biology. The section is a central and integral part of the institute and has produced a wide range of important research results. In the field of medicinal chemistry and drug screening in particular, the section is unique and plays an instrumental role in the context of research institutions in the local community. The Chemical Biology Platform, which is part of this section, is a key part of the EU-OPENSCREEN network.

The two department heads are internationally renowned experts in their field with an excellent scientific network. Results and techniques are often produced in a wide range of

collaborative projects and are regularly published in the leading journals. Revenue from third party funding is very high and includes numerous collaborative research projects funded by the DFG. The section has successfully established a spin-off company (Tubulis GmbH). A second company, a joint venture with the MDC, is currently in the start-up phase.

3. Changes and planning

Development since the previous evaluation

Since the last evaluation, the FMP has developed extremely well. Leadership changes in two of the six departments and in a few research groups and junior research groups were used to make reasonable adjustments to the research portfolio. The institute has recruited excellent senior and junior scientists.

The head of the Department of Chemical Biology I, who was appointed in 2015 and is also a director of the institute (see chapter 4), is a widely recognised expert in the field of synthesis and biochemical characterisation of inositol polyphosphates. This research focus completes the FMP's portfolio in the field of chemical biology. The head of the Department of Molecular Biophysics, who was appointed in 2014, and also heads the Structural Biology section, is a pioneer of modern solid-state NMR techniques in combination with other structural and biophysical methods. This allows research into biophysical processes of membrane proteins in particular environments, e.g. native-like lipid bilayers at room temperature.

The FMP has also recruited very good staff at the research group and junior research group level. The newly established Research Group on Structural Interactomics fits very well into the overall approach of integrated structural biology. The Research Group on Structural Chemistry and Computational Biophysics provides expertise in molecular dynamics simulations. The combination of these computational techniques with NMR experiments is powerful when it comes to studying novel biological targets. The Junior Research Group on the Structure and Mechanism of Microbiome-Driven Diseases extends the institute's expertise in the field of cryogenic electron microscopy.

The FMP's leading role in the establishment of the European infrastructure for high- and medium-throughput screening, EU-OPENSCREEN, received a very positive acknowledgement in the last evaluation report. Since then, the institute has continued to be involved in developing and implementing the infrastructure through other important measures. **In 2018, EU-OPENSCREEN ERIC was founded as an independent entity with headquarters on Campus Berlin-Buch. It is welcomed that FMP plays a key role in the network through the important services provided by its Chemical Biology Platform (CBP)** (see chapters 2 and 7). **The CBP research groups are led by young, talented researchers. The institute should make sure that the groups use their resources for research activities as well as scientific services.**

Strategic work planning for the coming years

The strategic plans for the next few years are welcomed: The concept of using pharmacological, biophysical and physicochemical profiling of potential drug candidates for future drug discovery is highly appreciated. The institute aims to apply new technologies, e.g. novel magnetic resonance and light electron microscopy approaches. It has ordered a 1.2 GHz NMR spectrometer (for which it is receiving additional funds, see chapter 4). The spectrometer, one of the largest and most powerful in the world, is due to go into operation in 2023 in a new, purpose-built NMR building in close proximity to the other NMR buildings.

The FMP combines its expertise in NMR spectroscopy and cell biology with cryogenic electron microscopy. This pioneering methodology is currently only available through devices of the Berlin Integrative Structural Biology Network (BIS) that are located at Freie Universität Berlin and on Campus Berlin-Buch. Now the FMP intends to apply for additional institutional funding from Federal and *Länder* governments (temporary extraordinary item of expenditure) to establish a facility of its own, including cryogenic electron microscopy (cryo-EM), cryogenic electron tomography (cryo-ET) and correlative light and electron microscopy (CLEM). The facility is due to be housed in an MDC building on Campus Berlin-Buch from 2025 onwards. These plans are well integrated in the institute's research strategy and in the scientific environment in Berlin. They are meaningful and should be pursued further. In doing so, the institute should take the personnel capacity required to run the facility into account.

These plans, as well as the operation of the 1.2 GHz NMR spectrometer, are closely linked to the head of the Department of NMR-Supported Structural Biology, who will reach standard retirement age in 2022. The recruitment of a successor with appropriate expertise in NMR and cryo-EM approaches will be a challenge, in view of the high demand for this kind of expertise and the high level of expertise of the current department head, and must be tackled in good time. Additionally, it is crucial for the institute to finally develop a concept for the succession of the internationally outstanding head of the Department of Physiology and Pathology of Ion Transport, who will retire in 2021. It is very welcomed that he will continue to make his expertise available to the FMP to conclude the projects under his ERC advanced grant. **This means that successors will need to be found in the coming years for two excellent researchers. The FMP and its official bodies need to work with the relevant university partners in Berlin and initiate the recruitment processes for internationally renowned scientists in order to fill these positions quickly. Extended periods with vacant positions, as occurred a few years ago when replacing department heads, should certainly be avoided.**

4. Controlling and quality management

Facilities, equipment and funding

The institutional funding provision is sufficient for the FMP's current portfolio of activities. The institute's core budget has increased from €15.1m in 2012 to €20.5m in 2019. From 2018 to 2023, the core budget includes additional funding amounting to €14.2m to establish

the 1.2 GHz NMR spectrometer (see chapter 3). It is appreciated that the federal and *Länder* governments are making this investment possible.

In the same period, third-party funding increased significantly from €5.8m (38% of the budget) in 2012 to €8.8m (30%) in 2019[1]. The fact that the institute has secured nine ERC grants (3 starting, 3 consolidator, 3 advanced) since 2014 is evidence of its outstanding work. The FMP also obtains significant funds from the DFG (€2.9m in 2019), i.a. as part of Clusters of Excellence, Collaborative Research Centres, Research Training Groups and Priority Programmes.

The FMP is housed in a main research building on Campus Berlin-Buch and shares space with the neighbouring MDC. The NMR Spectroscopy facility is housed in two separate buildings and there are plans for a third NMR building. In its three sections, the FMP has very productive core facilities, which are available to the entire institute and to external partners (see chapter 7 for details). The in-house Animal Facility offers access to laboratory animals. The institute is now able to use the (semi-) specific-pathogen-free animal housing and breeding facilities of the nearby MDC, which means it now has sufficient capacity available, as recommended seven years ago.

Organisational and operational structure

The appointment of a new head of department in 2015 expanded the Board of Directors to three members. It now consists of two scientific directors, who take turns acting as Managing Director for periods of three years, and the Managing Director of the Forschungsverbund Berlin (FVB, administrative management). They manage the FMP very capably.

Quality Management

The institute's quality management is aligned with the established standards. The rules in place to ensure good scientific practice are based on the DFG guidelines. They are supplemented by the FVB's specific rules of procedure. The institute has an ombudsperson.

The publication strategy focusing on peer-reviewed, high-impact journals is outstandingly well implemented (see chapter 2). As a result, the FMP and its work are highly recognised internationally.

Quality management by advisory board and supervisory board

The Scientific Advisory Board (SAB) meets annually and fulfils its function as an external advisory body very effectively. In between two external evaluations, the SAB conducts an audit of the institute as a whole and of its individual units. **At the moment, only two out of eight SAB members are women. The FMP should work towards a more balanced gender ratio.**

[1] The core budget in 2019 includes €3.1m for establishing the temporary extraordinary item of expenditure (NMR spectrometer); when this is deducted, third-party funding accounts for 43% of the total budget.

5. Human resources

As of 31 December 2019, the FMP employed 225 people (193.3 FTE). This number has increased from 199 (166.8 FTE) at the time of the last evaluation. All executive scientists and scientific staff are appointed based on public advertisements and an active recruitment strategy.

Leading scientific positions

All department heads are jointly appointed with Berlin universities (HU, FU, Charité), which strongly supports the FMP's integration in the Berlin research landscape. The department heads and research group leaders alike fulfil their duties excellently.

At the time of the last evaluation, two of the six department head positions were vacant. It was extremely important that they were filled in 2014 and 2015 after being unfilled for a long time. With regard to the upcoming replacements, longer periods with vacant positions should certainly be avoided (see chapter 3).

Postdoctoral staff and doctoral candidates

The FMP offers very good development opportunities for researchers. Since the last evaluation, five junior group leaders have left the institute to take up tenured professorships at universities. Three of them were female, two male.

In December 2019, 63 doctoral candidates were working at the FMP (including 3 scholarship recipients). Between 2017 and 2019, 45 doctoral candidates completed their doctorates. **All doctoral candidates are integrated in the FMP Graduate School programme and a well-executed mentoring programme for early-career scientists. However, the average doctoral period of 4.7 years is too long. It is recommended that the institute takes action to reduce the doctoral period.** It is good to see plans for an alumni network, which can be used, among other things, to identify and aid career paths of former FMP researchers.

Equal opportunities and work-life balance

At the time of the last evaluation, an increase in the number of women was recommended, especially at leadership level. In December 2019, the proportion of women in research and scientific services was 34% (2012: 33%). At leadership level, the FMP has achieved a slight improvement: one of the six departments is now headed by a woman. She also holds one of the two scientific director positions. At the next level (research groups, junior research groups, core facilities), three (out of 13) leadership positions were held by women at the end of 2019, and four (out of 15) at the end of 2020 (compared with two at the last evaluation). In addition, in 2020 a female research group leader was jointly appointed to a W2 professorship with Charité – Universitätsmedizin Berlin.

Among scientific staff, the proportion of women remains at the same low level as at the time of the last evaluation. Some improvements are visible at leadership level, but here too, the proportion of women is still too low. When staff need to be replaced, this should be used as an opportunity to make improvements, so that the target quotas set in the programme budget are actually achieved. The institute's equality work needs a

clearly defined strategy, which should be supplemented with measures to promote an inclusive, diverse working environment.

6. Cooperation and environment

The FMP is extremely well connected with the stimulating scientific environment in Berlin. Particularly noteworthy is the institute's very fruitful collaboration with the adjacent Max Delbrück Center for Molecular Medicine (MDC). The close collaboration with the three universities in Berlin and with Charité – Universitätsmedizin Berlin is impressive and evident in seven joint appointments to professorships (6 department heads, 1 research group leader) as well as in numerous joint projects. Worth highlighting here are two Clusters of Excellence, two Collaborative Research Centres (CRCs), one Transregional CRC, and two Research Training Groups, in which members of the institute also have leading roles. In addition, the institute collaborates closely with university and non-university partners in the use of research infrastructure within the Berlin Integrative Structural Biology Network (BIS).

Within the Leibniz Association, the FMP participates in the Leibniz Research Alliances "Bioactive Compounds and Biotechnology" and "Healthy Ageing" and plans to become a member of "Infections '21".

The institute, and especially its Chemical Biology Platform, plays a pivotal role in international science by coordinating the EU-OPENSCREEN Network. Within the *iNEXT* collaborative research projects financed through the EU's Horizon 2020 programme, the FMP successfully provides expertise in biological NMR applications, including instrumentation for solid-state and solution NMR. It is closely linked to *INSTRUCT-Ultra*, a broader European infrastructure initiative focused on structural biology.

7. Subdivisions of FMP

Molecular Physiology and Cell Biology Section

[58.7 FTE, of whom 29.1 FTE research and scientific services staff, 18.6 FTE doctoral candidates, and 11 FTE scientific support staff]

Department of Physiology and Pathology of Ion Transport [9.8 FTE]

This department conducts world-leading research in the field of ion channel transport across membranes. Using human genetics and mouse models, several new ion channels and novel gating mechanisms have been identified in the last few years. Of particular interest is the work on volume-regulated channels that are very promising drug candidates. In this context, there are plans for very interesting studies on mutations in anion/proton exchangers, as well as the plasma membrane chloride channel, and their influence on specific organs and cellular homeostasis. It is welcomed that the internationally outstanding head of department will continue at the institute past retirement age (see chapter 3). He is currently funded by an ERC grant that he secured.

Department of Molecular Pharmacology and Cell Biology [22.3 FTE]

This internationally renowned department headed by the Managing Director of the FMP conducts outstanding research on cellular membrane trafficking processes that are related to numerous diseases (e.g. of the nervous system). Since the last evaluation, highly visible contributions have been made, e.g. to the discovery of lipid-based switches in the control of exo-endocytosis. The dissection of actin-based presynaptic endocytosis and the investigation of the role of phosphoinositide molecules are further achievements. In the future, the department has enormous potential to obtain important results by combining its renowned *in vivo* and cell biology expertise with the drug discovery and design approaches that are available in the other sections.

Heisenberg Guest Research Group on Molecular Neuroscience and Biophysics [7.9 FTE]

This research group, which has been supported since 2017 through a DFG Heisenberg professorship, evolved from an FMP junior research group. It is a very positive sign that the institute was able to hold onto this expertise in the field of glutamate receptors and other aspects of synaptic transmission, which complements its portfolio in neurobiology very well. The group will move to HU Berlin in 2022.

Junior Research Group (Emmy Noether) on Molecular and Theoretical Neurosciences [6 FTE]

Established in 2015, this mostly third-party funded Junior Research Group has made several important contributions in the field, studying the fly neuromuscular system to understand fundamental principles of synaptic transmission. The special characteristic of this research group is the combined application of super-resolution imaging and electrophysiology with innovative computational methods. The head of this group will leave the FMP soon to continue his research career at Copenhagen University. It will be important for the institute to replace the computational biology capacity that will be lost after the group's relocation.

Junior Research Group on Synapse Biology [2 FTE]

Established in 2020 and still in a build-up phase, the Junior Research Group aims to apply an array of specialized technologies and mouse genetic models to study the very promising topic of synaptic specialisation and to understand mechanisms of neuronal diseases. It will be important for this group to focus on a defined number of research questions, so it is good to see that the group is supported by a strong mentoring team.

Cellular Imaging core facility [7 FTE]

This core facility is well equipped with the latest imaging technology, including correlative light electron microscopy (CLEM). It not only provides services, but is also involved in method development. These activities are critical for the section and for the institute as a whole. Particularly noteworthy are the developments leading towards higher-resolution and higher-throughput CLEM. A dedicated budget to support such developments is recommended.

Cell Engineering core facility [3 FTE]

Established in 2020, this core facility emerged from the research group on Protein Trafficking. It focuses on CRISPR/Cas gene editing techniques and cellular models for drug screening – services which are essential to the institute. It is welcomed that there are plans to extend activities in cooperation with the Screening Unit and the Animal Facility by developing protocols for the manipulation of induced pluripotent stem cells.

Animal Facility [5 FTE]

This facility is critical to the FMP. It is adequately organised for current needs (see chapter 4).

Structural Biology Section

[46.1 FTE, of whom 30.1 FTE research and scientific services staff, 7.5 FTE doctoral candidates, and 8.5 FTE scientific support staff]

Department of Molecular Biophysics [11.2 FTE]

The department head is a pioneer in the field of modern solid-state NMR techniques in combination with cryo-EM structure determination. Highlights include studies on ion channels and rhomboid proteases. The group applies solid-state NMR to particular environments, e.g. lipid bilayers at room temperature and flexible parts of proteins. Important biophysical insights which are not obtainable by other methods have been gained in recent years and were published in excellent journals.

Department of NMR-Supported Structural Biology [10.3 FTE]

The department is led by a pioneer in solid-state NMR of proteins who, in the last 25 years, has built up the entire FMP NMR section and secured excellent funding from German and EU funding bodies. He is the driving force behind the acquisition of the 1.2 GHz NMR spectrometer that will be installed in 2023. The department investigates biological questions of the highest relevance. Recent achievements include theoretical descriptions and applications of dynamic nuclear polarization (DNP) in magic-angle spinning (MAS), the structural characterisation of macromolecules in intact biofilms and lipid bilayers. Further studies focused on collagen degradation in osteoarthritic cartilage and protonation dynamics in bacteriorhodopsin. Results are published in high-ranking journals. The department's plans to study further membrane proteins, e.g. channel rhodopsin, and liquid phase separation by solid-state NMR, promise unique insights.

Research Group on Structural Interactomics and the Mass Spectrometry core facility [6.3 FTE]

This research group and the associated core facility were integrated in the section's research activities in 2018. Since then, excellent results have been obtained, developing and applying cross-linking mass spectrometry (XL-MS) to resolve protein interactions in synapses and in various organelles. Further achievements are the development of MS-based structural proteomics to improve detection of XL products, and the implementation of hydrogen deuterium exchange mass spectrometry (HDX-MS) to analyse structural changes and dynamics of

proteins and complexes. The group leader was appointed in a joint procedure with Charité – Universitätsmedizin Berlin, supported by the *Leibniz Association's Programme for Women Professors* (*Professorinnenprogramm*).

Junior Research Group on Molecular Imaging [5 FTE]

This group develops new approaches in NMR-based diagnostics. It is at the forefront of this technology and has, for instance, established novel magnetic resonance reporters for imaging (MRI). The group was established at the FMP already in 2009, when the group leader brought an Emmy Noether group and an ERC starting grant to the institute. Since 2016, the group has been funded by a Reinhart Koselleck grant from the DFG. It is an important step that the group leader now moves on to continue his career in a tenured leadership position at the DKFZ.

Junior Research Group on Structure and Mechanism of Microbiome-Driven Diseases [2 FTE]

Established in November 2020, this group investigates microbiome-driven diseases, in particular the mechanisms of cancer progression. This topic is highly relevant from a biomedical point of view. The group leader combines expertise in biology with excellent training in biochemistry. His appointment is of strategic importance for strengthening cryo-EM at the institute.

NMR Spectroscopy core facility [3.6 FTE]

This core facility maintains the FMP's world-leading NMR infrastructure, providing invaluable support and services for internal and external partners. Different NMR methods are combined to study proteins, complexes and small molecules. The highly experienced head leads the facility extremely successfully.

Chemical Biology Section

[51.2 FTE, of whom 23.1 FTE research and scientific services staff, 14.3 FTE doctoral candidates, and 13.8 FTE science support staff]

Department of Chemical Biology II [11.5 FTE]

This department is internationally renowned in the field of bioorganic chemistry and chemical biology. The research focuses on antibody-drug conjugates that can be used in cancer therapy to selectively target tumours. The plan to further expand the work on delivery of proteins into the cell cytoplasm has the potential to produce pioneering results, since it enables researchers to specifically address intracellular disease-related targets with tailor-made bio-macromolecules. This would also expand the scope of the FMP, which is currently mainly focused on small molecule drugs.

Department of Chemical Biology I [8.4 FTE, since 2015]

Established in 2015, this department is led by a director of the FMP. The research focuses on the synthesis and biochemical characterisation of inositol polyphosphates and pyrophosphates. Research on the signalling events mediated by this class of molecule paves

the way for a better understanding of, and, in the long term, better treatment of several metabolic diseases. The aim to use small molecules that have shown promising bioactivity *in vitro*, and to investigate them in living cells, model organoids and organisms is excellent. There is great potential in the in-depth collaboration with the Research Group on Medicinal Chemistry, for example in the area of the design and synthesis of probe molecules with appropriate physicochemical properties for use *in vivo*.

Research Group on Structural Chemistry and Computational Biophysics [4 FTE]

This research group was established in October 2020 as part of the Chemical Biology Platform. The research focuses on molecular modelling and molecular dynamics (MD) simulations to design novel bioactive molecules and to characterize their interactions with biological targets. Combining these methods with NMR, the group has a wide range of internal collaboration partners, especially in the Structural Biology Section. The future research plans will be complementary to the requested cryo-EM equipment. It will be important, though, to ensure an independent research agenda, investigating key biological questions.

Research Group on Medicinal Chemistry [9.7 FTE]

This research group develops chemical probes and methods, e.g. imaging technologies for the identification and investigation of new biological target molecules. As a pivotal component of FMP's contribution to EU-OPENSCREEN, the group has grown significantly with the third-party funding secured through this initiative. The group is involved in a large number of projects, whereby it is recommended that a clearer focus be placed on the research aspect in the future. Building on its services, the group could consider making probes available to the wider community, either commercially or through collaboration.

Junior Research Group on ChemBioProbes [3.1 FTE]

This junior research group, established in March 2020, works on chemical probes as biological sensors. The new group leader has an impressive track record. He complements the institute's research excellently, particularly in the fields of imaging and high-resolution microscopy. The group's research work results in novel, valuable probes for the visualisation and manipulation of biomolecules, which are also used by partner organisations. With regard to the further career development of the group leader, the group is recommended to conduct advanced independent research beyond its important work on these probes. The FMP should actively support this.

Screening Unit core facility [7 FTE]

The Screening Unit is a key facility for the institute, offering, in combination with EU-OPENSCREEN, impressively large compound libraries for use by academics. The facility contributes to a wide range of projects and regularly publishes papers in collaboration with internal and external partners. Consequently, it is an asset to the institute that could be made even more visible. The plan to conduct 3D cellular high-content screening with automated microscopes and machine learning routines for pattern recognition is highly promising.

Peptide Synthesis core facility [2.2 FTE]

The facility is part of the Department of Chemical Biology II. It provides about 150 synthesised peptides per year for a wide range of projects within the institute, as evidenced by collaborative publications. The plan to develop novel peptide synthesis strategies and technologies is very much appreciated.

Compound Management core facility [1 FTE]

This core facility split off from the Screening Unit in March 2020 and supports EU-OPENSCREEN. The facility already manages more than 75,000 compounds, with the aim of reaching 110,000 compounds during the next evaluation period.

8. Handling of recommendations of the last external evaluation

The FMP successfully addressed the recommendations made by the Leibniz Association Senate in 2014 (see status report, p. A-22f). The recommendation to increase the proportion of women in the scientific sector and especially at leadership level (recommendation 4) still applies.

Appendix

1. Review Board

Chair (Member of the Leibniz Senate Evaluation Committee)

Annette G. **Beck-Sickinger**	Institute of Biochemistry, University of Leipzig

Deputy Chair (Member of the Leibniz Senate Evaluation Committee)

Tanja **Weil**	Max Planck Institute for Polymer Research, Mainz

Reviewers

Chiara **Cabrele**	Department of Biosciences, University of Salzburg
Stuart **Conway**	Chemistry Research Laboratory, University of Oxford
Stephan **Grzesiek**	Biozentrum, University of Basel
Manfred **Heckmann**	Institute of Physiology, Department of Neurophysiology, University of Würzburg
Harald **Kolmar**	Applied Biochemistry, Technical University of Darmstadt
Irmgard **Sinning**	Biochemistry Center (BZH), Heidelberg University
Nina Henriette **Uhlenhaut**	Metabolic Programming, Technical University of Munich
Patrik **Verstreken**	VIB Center for Brain & Disease Research, KU Leuven

Representative of the federal government

Anja **Niedworok**	Federal Ministry of Education and Research, Bonn

Representative of the Länder *governments*	[absent with apologies]

28 September 2021

Annex C: Statement of the Institution on the Evaluation Report

Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) within the Forschungsverbund Berlin e. V.

The Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP) highly appreciates the efforts of the review board in taking the time to evaluate the institute and welcomes its helpful and constructive comments. We are delighted to learn that the basic research performed at the FMP is rated excellent, its units are considered highly productive, and the institute is considered to have developed extremely well.

The institute will continue to strive for excellence in molecular pharmacology research and will implement the recommendations made by the review board as follows:

1. The FMP agrees that the groups involved in the activities of the Chemical Biology Platform should combine strong research and excellent service to the best of their abilities. As recommended, the institute encourages these groups in further developing their own research programs.
2. The institute welcomes the enthusiastic support concerning the implementation of cryogenic electron microscopy by means of applying for a temporary extraordinary item of expenditure. It shares the view, that this technique should be sustainably implemented at the institute and that its implementation is considered a must for the further successful development of the future research strategy of the FMP.
3. In agreement with the recommendation of the review board the institute has initiated its search for the recruitment of outstanding scientists to succeed two excellent senior researchers who will retire.
4. The FMP proactively works together with its Scientific Advisory Board (SAB) to increase the representation of leading women scientists in the SAB.
5. The FMP agrees that the average doctoral period should be reduced and has already implemented measures towards reaching this goal.
6. The FMP has implemented an extensive portfolio of measures (e.g. proactive search for excellent female scientists, career advice and mentoring, re-entry position after parental leave, measures to improved work-family balance) to increase the proportion of women scientists with the ultimate goal of reaching a balanced gender ratio on all levels. FMP will continue to proactively search for excellent female scientists to be appointed to leadership positions at the institute. In this respect, the institute has been recently successful in jointly appointing Dr. Han Sun as professor together with the TU Berlin.

Finally, the FMP wishes to express its gratitude to its scientific and non-scientific staff, the past and present members of its Scientific Advisory Board, the Forschungsverbund Berlin, the Senate of Berlin and the Federal Ministry of Education and Research (BMBF) for financial support, and last not least the Division Senate Evaluation Committee of the Leibniz Association for guiding the evaluation process.