Leibniz Gemeinschaft

Der Senat

18. März 2025

Stellungnahme zum Weierstraß-Institut für Angewandte Analysis und Stochastik, Leibniz-Institut im Forschungsverbund Berlin (WIAS)

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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 außerhalb einer Hochschule 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.

Vor diesem Hintergrund besuchte eine Bewertungsgruppe am 18. und 19. Juni 2024 das WIAS in Berlin. Ihr stand eine vom WIAS erstellte Evaluierungsunterlage zur Verfügung. Die wesentlichen Aussagen dieser Unterlage sind in der Darstellung (Anlage A dieser Stellungnahme) zusammengefasst. Die Bewertungsgruppe erstellte im Anschluss an den Besuch den Bewertungsbericht (Anlage B). Das WIAS nahm dazu Stellung (Anlage C). Der Senat der Leibniz-Gemeinschaft verabschiedete am 18. März 2025 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 WIAS widmet sich sowohl der mathematischen Grundlagenforschung als auch der anwendungsorientierten Entwicklung von Algorithmen und wissenschaftlicher Software. Das Arbeitsspektrum reicht von der mathematischen Modellierung über die theoretische Analyse der Modelle bis zur numerischen Simulation der Lösungen. Mit seinen Forschungsergebnissen leistet das WIAS wichtige Beiträge zur Lösung komplexer mathematischer Probleme in Wissenschaft, Technik und Industrie. Die Anwendungsgebiete reichen von der Entwicklung neuer Materialien oder medizinischer Bildgebungsverfahren über die Optimierung in der Energiewirtschaft bis hin zur Modellierung von Finanzmärkten.

Das WIAS ist in acht Forschungsgruppen gegliedert, deren Leitungen in der Regel in gemeinsamer Berufung mit jeweils einer der drei Berliner Universitäten besetzt werden. Die **Leistungen** der Forschungsgruppen werden zwei Mal als „exzellent“, dreimal als „sehr gut bis exzellent“, zweimal als „sehr gut“ und einmal als „gut bis sehr gut“ bewertet. In der Forschung erzielt das WIAS regelmäßig hervorragende Arbeitsergebnisse, die international Beachtung finden; zu nennen sind insbesondere zahlreiche Beiträge auf dem Gebiet der partiellen Differentialgleichungen. In den vergangenen Jahren wurden dabei zielführend neue Technologien wie das *Maschinelle Lernen* einbezogen. Der Technologietransfer erfolgt im

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

Rahmen gemeinsamer Forschungsprojekte mit Industriepartnern, speziell im Bereich der Simulation und Optimierung. Für die Arbeiten am Institut sind vielfach neue Softwarelösungen nötig, die das WIAS selbst entwickelt. Diese werden durch Lizenzen oder als Open Source auch Dritten verfügbar gemacht. Zudem gab es zwei Ausgründungen. Die Softwarestrategie wurde empfehlungsgemäß weiterentwickelt. Eine für die Fachgemeinschaft wichtige forschungsinfrastrukturelle Leistung erbringt das Institut mit der Koordination des 2021 eingerichteten NFDI-Konsortiums MaRDI (*Mathematical Research Data Initiative*), an dem 14 Partnereinrichtungen beteiligt sind.

Unter dem seit 2016 tätigen Wissenschaftlichen Direktor hat sich das WIAS **seit der letzten Evaluierung** hervorragend entwickelt. Herauszuheben ist die Einrichtung des Exzellenzclusters *Berlin Mathematics Research Center MATH+* im Jahr 2019, gemeinsam mit den drei Berliner Universitäten und dem Zuse-Institut. Ein großer Erfolg ist zudem, dass das seit 2011 zunächst temporär am WIAS beheimatete Sekretariat der *International Mathematical Union* (IMU), die u. a. die Fields-Medaille verleiht, nun dauerhaft an das Institut angebunden ist. Insgesamt trägt das WIAS nach wie vor erheblich zur Strahlkraft des Wissenschaftsstandorts Berlin in der Mathematik bei.

Die sehr gute gruppenübergreifende Zusammenarbeit erfolgt über sechs *Hauptanwendungsgebiete* sowie drei explorativ ausgerichtete Themenfelder, in denen auch risikoreiche Ansätze verfolgt werden. Diese Struktur bietet einen sehr guten Rahmen für die weitere Entwicklung des Instituts **in den kommenden Jahren**. Die genauere Ausgestaltung der künftigen Arbeiten hängt jedoch von mehreren Neubesetzungen auf Leitungsebene ab: Ruhestandsbedingt sind derzeit zwei Forschungsgruppenleitungen vakant bzw. kommissarisch besetzt (eine davon seit 2016), zwei weitere werden zudem in Kürze frei. Leitung und Aufsichtsgremium des WIAS sollten gemeinsam mit den kooperierenden Berliner Universitäten nun zügig die zwei vakanten Stellen besetzen und die Verfahren für die beiden weiteren freiwerdenden Positionen in die Wege leiten und ohne Verzug vorantreiben.

Dem WIAS standen in den Jahren 2021–2023 durchschnittlich 10 M€ p. a. der Bund-Länder-Förderung zur Verfügung. Als Resultat einer sehr überzeugenden **Drittmittelstrategie** konnten die Zuwendungen zur Projektförderung seit der letzten Evaluierung gesteigert werden auf im Schnitt 3,9 M€ jährlich. Insbesondere die starke Beteiligung des Instituts am DFG-Exzellenzcluster MATH+ und die Einwerbung von zwei *Leibniz-Junior Research Groups* sind sehr zu begrüßen.

Als Mitglied im **Forschungsverbund Berlin e. V. (FVB)** hat das WIAS eine gemeinsame Verwaltung mit sechs weiteren Berliner Leibniz-Instituten. Die Kommunikation zwischen WIAS und FVB funktioniert ausgesprochen gut. Das Kuratorium des FVB, das auch Aufsichtsgremium des WIAS ist, sowie der **Wissenschaftliche Beirat** begleiten das Institut sehr gut. In den zurückliegenden Jahren waren einzelne Mitglieder des Beirats bei Institutionen tätig, die mit dem WIAS eng kooperieren. Bei künftigen Berufungen sollte dies nicht mehr der Fall sein.

Für die **berufliche Qualifizierung** bietet das WIAS ein sehr gutes Umfeld. Innerhalb der Wissenschaft zeigt sich dies u. a. daran, dass zwischen 2021–2023 zwölf Beschäftigte des WIAS auf Professuren berufen wurden. Zudem habilitierten sich sechs Personen. Derzeit

arbeiten vier erfolgreiche Nachwuchsgruppen am Institut. Die Promovierenden werden ebenfalls sehr gut betreut. In den Jahren 2021-2023 wurden insgesamt 22 Promotionen in der angemessenen Zeit von im Schnitt 3,9 Jahren abgeschlossen. Auch das wissenschaftsunterstützende Personal ist sehr gut in die Arbeiten des WIAS integriert und es bestehen angemessene Weiterbildungsmöglichkeiten. Es wird begrüßt, dass im Personalentwicklungskonzept neben den verschiedenen Verfahrenswegen künftig auch die Kriterien für eine Entfristung wissenschaftlicher Stellen festgehalten werden.

Bei der **Gleichstellung der Geschlechter** besteht am WIAS nach wie vor Verbesserungsbedarf. Unter den wissenschaftlichen Beschäftigten liegt der Anteil an Frauen bei nur 22,3 %. Von den 19 Positionen mit Leitungsaufgaben sind drei mit Frauen besetzt (15,7 %), unter den darin enthaltenen 8 Forschungsgruppenleitungen ist nur eine Wissenschaftlerin (12,5 %); sie nimmt diese Aufgabe kommissarisch wahr. Möglichkeiten für zeitnahe Verbesserungen bieten insbesondere die vier anstehenden Besetzungen von Forschungsgruppenleitungen. Sie müssen nun genutzt werden.

Das WIAS ist sehr gut in die Berliner Forschungslandschaft eingebunden. Auch innerhalb der Leibniz-Gemeinschaft ist das WIAS gut vernetzt, z. B. durch das Leibniz-Forschungsnetzwerk „Mathematische Modellierung und Simulation“. Darüber hinaus unterhält das Institut vielfältige und sehr fruchtbare **Kooperationen** auf nationaler und internationaler Ebene, darunter insbesondere auch mit namhaften Industrieunternehmen.

2. Zur Stellungnahme des WIAS

Der Senat begrüßt, dass das WIAS 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 WIAS als Einrichtung der Forschung und der wissenschaftlichen Infrastruktur auf der Grundlage der Ausführungsvereinbarung WGL weiter zu fördern.

21 May 2024

Annex A: Status report

Weierstrass Institute for Applied Analysis and Stochastics, Leibniz Institute in the Forschungsverbund Berlin (WIAS)

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:	1995
Last statement by the Leibniz Senate:	2018

Legal form:	One of seven Leibniz institutes of the *Forschungsverbund Berlin e. V.* (a registered non-profit association under private law)
Responsible department at *Länder* level:	Senatsverwaltung für Wissenschaft, Gesundheit und Pflege, Berlin
Responsible department at Federal level:	Federal Ministry of Education and Research (BMBF)

Total budget (2023)

€ 10.2m institutional funding

€ 3.6m revenue from project grants

€ 0.1m revenue from services

Number of staff (2022)

112 individuals in “research and scientific services”

25 individuals in “science supporting staff (laboratories, technical support etc.)”

12 individuals in “science supporting staff (administration)”

Mission and structure

Statutory mission *(Statutes, § 2)*: “(1) WIAS's task is to carry out project-orientated research in applied mathematics, in particular in applied analysis and applied stochastics. The research results are to be published. (2) Prior to their publication, they must be examined for their commercial usability and, if necessary, registered for the granting of a property right […]. (3) The Institute shall support the transfer of knowledge and technology to society, industry and politics […]. (4) The Institute co-operates closely with universities in research and teaching. […] (5) The Institute promotes young academics and participates in university courses. (6) The Institute runs a guest programme. […] (7) The Institute is committed to the principles of gender equality and actively promotes family-friendly working and research conditions. […]. ”

Structure:

WIAS is one of seven Berlin based Leibniz institutes, that are organised within the ***Forschungsverbund Berlin*** *e. V.* (FVB). The FVB as a non-profit association is managed by its Executive Board, consisting of the Scientific Directors of its member institutes and the Managing Director of the FVB. The WIAS itself is managed in tandem by its Director and the Managing Director of the FVB as legal representatives. The Managing Director of the FVB leads the FVB

Administration as joint administration for all member institutes. At the institutes, there is only a small administration, that fulfills its tasks in cooperation with the joint administration of the FVB. The supervisory body of the FVB is the supervisory body for all member institutes.

The **scientific structure** of the institute is mainly shaped by eight discipline-oriented permanent Research Groups (RGs), which are supplemented by a Flexible Research Platform (FRP) promoting smaller time-limited units focused on new research directions:

- Research Groups (RG)
  - RG1: Partial Differential Equations
  - RG2: Laser Dynamics
  - RG3: Numerical Mathematics and Scientific Computing
  - RG4: Nonlinear Optimization and Inverse Problems
  - RG5: Interacting Random Systems
  - RG6: Stochastic Algorithms and Nonparametric Statistics
  - RG7: Thermodynamic Modelling and Analysis of Phase Transitions
  - RG8: Nonsmooth Variational Problems and Operator Equations
- Flexible Research Platform (currently consisting of 2 Weierstrass Groups, 2 Leibniz Groups and 1 Focus Platform)
- Secretariat of the International Mathematical Union (IMU)

2. Overall concept and core results

WIAS is a research institute in applied mathematics with a focus on project-oriented research, especially in applied analysis and stochastics. At the institute, these disciplines are combined along with numerical and optimization methods, for solving complex, application-driven problems in technology, science and economy in close cooperation with users, e.g. from engineering, or medicine, and the industry. Beyond its research scope, the institute provides services and infrastructure to the national and international scientific community in hosting and operating headquarters of major mathematical associations and a consortium of the *National Research Data Infrastructure* (NFDI).

Research at WIAS covers the entire process from mathematical modelling and the theoretical study of the problem using analytical and stochastic methods via the design and implementation of efficient and robust numerical algorithms to the simulation of the underlying phenomena and optimization in relation to specific objectives. In order to guarantee optimal results, this process may need to be iterated in exchange with all partners involved.

WIAS's research concept is based on a pyramid structure: (i) Right at the bottom, basic mathematical research dedicated to new mathematical problems resulting from real-world issues as well as research for broadening mathematical areas of competence for developing new, strategically important fields of application. (ii) Based on this foundation is pre-competitive research, where WIAS cooperates in interdisciplinary joint projects with partners from the natural

sciences, engineering, economy, and life sciences. (iii) On top, there are cooperations with industry in R&D (Research and Development) projects and the development of prototypical software.

The research strategy of the institute is structured by Main Areas of Application (MAAs), that are regularly adapted to technological and societal needs. There are currently six MMAs:

- (1) Energy: Technology, Markets, Networks: The research on modelling and simulation of electrochemical systems ranges from fundamental material models for electrolytes, thermodynamic consistent models for lithium and post-lithium batteries, to electrocatalytic models for electrolysis and fuel cells. Another research direction evolves around optimization problems in energy management.
- (2) Flow and Transport: The main theoretical work consists in developing and analysing discretizations with special properties, often related to physical consistency. Concerning biomedical applications, WIAS addresses problems related to biological flows and tissues from different perspectives.
- (3) Materials Modelling: Research in this area aims at a structural understanding of materials that show multi-functional capabilities, and that, to a large extent, exhibit multiple phases and abrupt phase transitions, triggered by fluctuations on the micro-scale.
- (4) Nano- and Optoelectronics: Modern nano- and optoelectronic devices are crucial for biomedical, communication, or sensing applications and include also novel solar cell designs, components for quantum sensors, or quantum computing devices. Their thermodynamic-consistent modelling and efficient simulations at WIAS benefit from the mathematical analysis of the underlying systems of partial differential equations and the derivation and implementation of robust numerical schemes. The focus is on the consistent coupling of interacting physical processes, using e.g. variational structures such as gradient-flow.
- (5) Optimization and Control in Technology and Economy: Research focuses on multi-scale topology optimization especially for additive manufacturing and the analysis and control of anisotropic fluids, as well as on optimal control of unilateral problems under uncertainties. Concerning Finance and Energy markets, WIAS continued research on theory and numerics of rough volatility models.
- (6) Quantitative Biomedicine: This MMA addresses the modelling, analysis, simulation, or optimization of complex systems in clinical and biological applications. These topics concern the understanding of cellular, biochemical, and biomolecular processes, as well as the solution of relevant problems in medical engineering.

Since 2021, the work in the six main application areas has been supplemented by the following three strategic exploration topics:

- Quantum Technology: On the hardware side, this topic includes modelling of novel functional components (spin-qubit shuttles) of semiconductor quantum processors as well as narrow-linewidth laser diodes for quantum metrology applications. On the software side, the institute has recently started to engage in variational quantum algorithms. Theoretical investigations on Bose-Einstein condensation phenomena complement these activities.

- Data-driven Applications: Machine Learning and Optimization: Future research will include optimal transport applications to Machine Learning (ML), optimization subject to learning-informed PDEs, multilevel solvers for ML, particle-based optimization and inference algorithms in high dimensions, interfacing dynamical systems and learning, and robustification of learning under distribution shifts in the training data.
- Electrochemistry: WIAS is aiming to contribute to the ongoing development of future electrochemical systems by a seamless integration of modelling, the implementation of corresponding numerical methods, and analytical techniques such as homogenization, which are of fundamental importance for the ongoing development of electrochemical systems.

WIAS uses different **transfer** channels: The institute strives for generating partnership opportunities with industry (in particular joint R&D projects) and is a member of the *European Consortium on Mathematics in Industry* (ECMI). On format of these cooperations, that will be further expanded, are Study Groups; for such a practical workshop, companies submit descriptions of problems to be solved by the study group. Participants work in groups on each problem and discuss their results with company representatives at the end of the workshop week. Often the outcome of the scientific work during such a study week is in the form of a mathematical model of a state system or an optimization problem with complex constraints.

WIAS supports promising spin-off initiatives in applying for funding (e.g. EXIST business start-up grants) and through the provision of infrastructure. Two such spin-off projects have been carried out since 2018. In addition, scientific software is successfully licensed to partners from academia as well as from industry; see appendix 2 on the number of patents and other property rights.

As an infrastructure **service**, WIAS hosts the Secretariat of the International Mathematical Union (IMU) as well as the German Mathematical Society (DMV) and the Society for Didactics of Mathematics (GDM). Since 2020, WIAS has been coordinating the Mathematical Research Data Initiative (MaRDI), a consortial initiative of mathematical science in Germany within the National Research Data Infrastructure (NFDI) (see below).

Results

In 2021–2023, WIAS published an average of 120 articles p. a. in peer-reviewed journals, one monograph and 26.6 individual contributions to edited volumes. In addition, the institute had the editorship of 3.3 edited volumes p. a. WIAS refers to the following most important results since the previous evaluation:

Research:

- The institute highlights the development of a new class of Logarithmic-Entropy Transport problems between arbitrary nonnegative and finite Radon measures. This special class of unbalanced transport problems provides a static formulation of the so-called Hellinger–Kantorovich distance and turns the space of measures into a geodesic metric space. A study of these geodesics enabled a complete characterization of geodesically semiconvex integral functionals.
- The twelve-year work of the DFG-funded *Collaborative Research Centre* 787 “Semiconductor Nanophotonics” culminated in a volume of the same title with four chapters contributed

by WIAS. The primary result was a hybrid quantum-classical modelling approach that self-consistently combined device-scale models (drift-diffusion system) with cavity quantum electrodynamics models (Jaynes-Cummings-type models, Lindblad master equation), ensuring thermodynamic consistency.

Besides classical semiconductor devices, multi-physics models were investigated for organic, i.e., carbon-based semiconductors, where disorder at the microscopic level leads to a strong interplay of temperature-activated hopping transport and self-heating. To capture this electrothermal feedback in organic semiconductors, a p(x)-Laplace thermistor model, an electrothermal drift-diffusion model and hybrid models for organic semiconductors were established and their analytic properties were studied. New thermal effects in large-area organic light-emitting diodes (OLEDs) were explained.

- A new physics-based method for quantitative Magnetic Resonance Imaging (qMRI) was published. The conventional two-step method of magnetic resonance fingerprinting, computing a series of magnetization maps and matching to parameters with the help of a precomputed dictionary, was overcome with a novel dictionary-free model that incorporates the physical setting of MRI into one single nonlinear equation. In a following paper, differential equation constrained optimization problems with constituents that are only accessible through data-driven techniques were studied with a particular focus on the analysis and numerical methods for problems with machine-learned components.
- In a paper entitled “A regularity structure for rough volatility”, a new theoretical foundation of analysis of rough volatility models was presented, based on Hairer’s theory of regularity structures. Hence, a connection between the analysis of singular, nonlinear SPDEs and rough volatility was established. Beyond the theoretical appeal, this framework has also led to the development of new numerical schemes and highly accurate asymptotic expansions.
- The institute highlights a paper with results on an optimal control problem with uncertain initial data and probabilistic terminal constraints. The problem consisted in finding a cost-optimal Neumann-boundary control for a vibrating string, such that it is steered with high probability from random initial states to a state of small energy within a given time horizon. The numerical and analytical challenge of dealing with such constraints within nonlinear optimization or optimal control lies in the fact that no explicit formulae for their values and gradients are available.
- At the interface of MAAs “Materials Modelling” and “Flow and Transport”, work on mathematical modelling and numerical algorithms for interfacial dynamics and pattern formation of highly viscous flows has been published. There, the mechanism causing the emergence of different droplet patterns in liquid polymer films by an effective Navier-slip boundary condition was revealed.
- Concerning random networks WIAS develops and adapts powerful probabilistic methods from the theory of large deviations for interacting random point clouds. This enables the study of critical behaviour by means of analytic methods like variational analysis. As a highlight, using this path, various key phase transitions in interacting random networks have been identified and characterized, for example in the rigorous analysis of gelation in spatial

coagulation processes, and in a comprehensive description of all the clusters in a spatial version of the Erdoős–Rényi graph.

Transfer

- Between 2017 and 2023, research was conducted within the scope of five different R&D contracts with and for Orange S. A., the largest telecommunications company in France. Topics were routing, i.e., the determination of paths for data streams during data transmission in tightly meshed multi-hop networks, capacity problems in dynamic spatial relay networks, and stochastic geometric models for the distribution of malware in spatial telecommunication models.

Service and Infrastructure

- The Mathematical Research Data Initiative was established. The MaRDI consortium is coordinated by WIAS and consists of more than 15 members plus further partners. It was successful in the competition within the framework of the National Research Data Infrastructure (NFDI) and will be funded until 2025, with the possibility of extension for another five years. The goal of MaRDI is the building of a sustainable, permanent research infrastructure for all the mathematical sciences as well as creating interfaces to similar data infrastructures in other fields. Currently, most of the available knowledge, research data and services are hosted as individual solutions. The so-called MaRDI Portal shall offer a user-friendly way to make mathematical knowledge, research data and services digitally available and accessible to the scientific community.

3. Changes and planning

Since the previous evaluation, two **Research Group leaderships** became vacant:

- After the retirement of the head of **RG 7** in March 2016, a first joint appointment procedure with HU Berlin was unsuccessful. A new appointment procedure together with TU Berlin with a different focus on data-driven mathematical modelling is currently underway; negotiations with a candidate are ongoing.
- Ant**icipating** the retirement of the head of **RG 1** in September 2023, a joint appointment procedure with FU Berlin was initiated with the scope on the analysis of partial differential equations. Legal prerequisites for the joint appointment are being finalized and the advertisement of the post is ready.

Two further leadership changes are due in the coming years:

- In 2025, the head of **RG 6** will retire; an **appointment procedure** has already stated jointly with HU; the scientific scope of the position has been expanded slightly to mathematical statistics.
- The current head of **RG 4** will retire in 2026; WIAS started to discuss the perspectives of RG4. The focus on mathematical optimization and inverse problems will continue to be important at WIAS. The future orientation of RG4 will also depend on the appointments in RG1 and 6, as both of these groups currently consider several aspects of variational analysis, optimization, and inverse problems.

In the **Flexible Research Platform**, there were different structural and personnel changes:

- There are currently two Weierstrass Groups (WG). A WG on “Modelling, Analysis, and Scaling Limits for Bulk-Interface Processes” (WG BIP) ended in July 2023.

  Motivated by the growing importance of data-driven approaches and machine learning, the WG “Data-driven Optimization and Control” (WG DOC) was created in June 2021. A further new WG on “Multi-species Balance Laws” (WG MBaL) was established in November 2023.

- There are currently two Leibniz Groups (LG). Based on successful applications for Leibniz Junior Research Groups in the Leibniz Competition, the LG “Numerical Methods for Innovative Semiconductor Devices” (NUMSEMIC) and “Probabilistic Methods for Dynamic Communication Networks” (DYCOMNET) were established in January 2020 as a kind of internal spin-off from RG5 and RG3, respectively. Both groups run for five year.

  In the meantime, both LG heads have received offers for professorships; the head of LG NUMSEMIC decided to stay at WIAS; the other one accepted an offer, but maintains a 20-percent commitment at WIAS including the leadership of the corresponding LG for the next few years.

- There is currently one Focus Platform (FP). The FP “Quantitative Analysis of Stochastic and Rough Systems” (QASRS) was terminated in December 2023 and reintegrated into RG6 as a research focus.

  The (FP) “SemQuTech”, established in March 2023, grew out of one of the strategic exploration topics identified in the Research Program 2022–2024 and is integrated in RG 1 and 2.

In the coming years, WIAS will expand or supplement various **research goals** within the Main Application Areas in combination with the Strategic Exploration Topics (see chapter 2). For example, stochastic effects in nano- and optoelectronic device models will be investigated, and research on optimal control of weakly coupled minigrids (e.g. in rural areas of Africa) as well as hydrogen networks coupled with electricity grids will be done. For details concerning the future development of the RGs and the FRP see chapter 7.

4. Controlling and quality management

Facilities, equipment and funding

In the years 2021–2023, **institutional funding** amounted to an average of € 10m p. a. WIAS received **project grants** totalling of € 3.9m p. a. The majority of this, amounting to €3.2m p. a., came from the DFG. Other sponsors were the Leibniz Association (∅ €356k p. a.), Federal and *Länder* governments (∅ €88k p. a.), industry (∅ 63 k€ p. a.), foundations (∅ 54 k€ p. a.) and the EU (∅ €53k p. a.). In addition, the institute received income from **services** (software licences, consulting services) averaging € 0.1m p. a.

In addition to the main **building** WIAS uses office space in two neighbouring buildings. The rental contract for the office space, which also hosts the IMU secretary, was recently prolonged for another ten years, starting from March 2022. A permanent solution for the accommodation of the secretariat has not yet been found (see chapter 8).

The institute’s **IT** serves scientific purposes such as scientific computing or handling of mathematical research data. The core of the computing facilities is a central file server with backup

system and a number of shared memory parallel computer servers dedicated to complex computational tasks. Together with the other institutes of the *Forschungsverbund Berlin* (FVB), WIAS runs a joint corporate network which facilitates high speed communication between the institutes and the use of a common internet access point and perimeter firewall. Services provided by the corporate network include email, domain name system, SAP and human resources management systems.

Defense against cyberattacks requires an increasing share of resources. Attack surface minimization is facilitated by maintaining one central account management system for all authentication with WIAS servers and minimization of the number of access points from the outside via the FVB firewall system. The firewall system is also used to compartmentalize the intranet into subnetworks in order to suppress threat escalations. Network and servers are continuously monitored for security incidents. Email is scanned for malware and spam using services provided by the DFN.

All data of central computing facilities and servers, as well as of desktop computing facilities are physically located on the central file server and accessed via Network File System (NFS). Backups of these data are done via a state-of-the-art commercial backup system.

Organisational and operational structure

The scientific staff of the institute is organized in eight long-term Research Groups (see chapter 1) and a Flexible Research Platform, which promotes smaller temporary groups encompassing

- Weierstrass Groups (WG): Decisions on opening new independent WGs, which complement the eight long-term RGs, depend on general trends of research fields and on the personal development of promising early-career researchers at WIAS. New WGs are initially established for three years and, after a successful mid-term evaluation, they can be extended by three more years
- Leibniz Groups (LG): In general, an independent LG is established on the basis of a successful application for a Leibniz Junior Research Group in the Leibniz Competition.
- Focus Platforms are installed to highlight important research lines of the institute, typically also to promote and support early-career scientist. In contrast to the groups mentioned above, platforms are structures under the umbrella of one or several RGs.

The basic management body of the institute is the monthly **Director's Meeting** where the director and the managing director meet the heads of the Research Groups, the Leibniz and Weierstrass Groups on the Flexible Research Platform, and the supporting departments to discuss all relevant management issues regarding both scientific and administrative questions.

The **administration** at WIAS fulfills its tasks in cooperation with the joint administration of the *Forschungsverbund Berlin e. V.* The team assistants of the eight Research Groups are responsible for administrative tasks within their groups and act as connecting links to the institute's administration.

The Representatives for Equal Opportunities and Disabled Employees are involved according to the relevant legislation.

Quality Management

The Institute applies the “Rules of Procedure in Cases of Suspected Scientific Misconduct” as well as the “Guidelines on Safeguarding Good Research Practice” adopted by the Executive Board of the *Forschungsverbund Berlin e. V.* on 27 October 2021. The WIAS has two elected ombudspersons. In 2019, the Committee for Ethics in Security-Relevant Research was established to provide assistance through consultation and evaluation of ethical and legal aspects for all security-relevant research activities.

The Institute’s strategy is to publish research results in high-quality, international journals with a peer review process (in mathematics as well as the various application fields). The institute allows unrestricted access to its research output via its own preprint server, and various preprint platforms like arxiv.org and hal.fr. WIAS explicitly supports gold and green Open Access publishing. Publication in hybrid journals, which receive income from both article processing charges and journal subscriptions, is not advised by WIAS because of the journals’ financing strategies, except for top publications of interdisciplinary value or in highly cited journals with a long embargo period.

Since 2022, WIAS has an own research data policy and strives to follow the FAIR-principles. WIAS has updated its software strategy based on the handout on the use of research software of the priority initiative Digital Information of the Alliance of German Science Organizations and the Software Engineering Recommendations of the German Aerospace Center (DLR). Visibility of software is made possible on the one hand, through software-related publications in peer-reviewed journals and, on the other hand, via the attribution of a persistent identifier (PID). WIAS research software is published under open source licenses. This approach is complemented by a dual licensing strategy, which can generate revenue from industry for selected software through the sale of commercial licenses. A long-term archiving-capable repository for storage and publication of research data and software is being established together with the institute’s own repository or publication server in the IT infrastructure of WIAS. Research data, on which a publication is based, shall be retained for at least ten years from the date of publication. Storage on premises does not exclude additional availability via recognized national or international (subject-specific) archives (such as arxiv.org).

Quality management by advisory boards and supervisory board

The **Scientific Advisory Board** (SAB) acts as a supervising body and advises the Director and the Board of Trustees on fundamental professional issues relating to the scientific work program and the national and international cooperations of the institute. It consists of six to twelve members from Germany and abroad, who are appointed for a maximum period of two four-year terms. The Advisory Board meets at least once a year. It currently consists of nine members, i.e. eight scientists and one representative from industry. In September 2022 the SAB conducted an audit, as it is usual for Leibniz institutes between two evaluations.

The supervisory board of WIAS is the **Board of Trustees** of the *Forschungsverbund Berlin e. V.* (FVB). It is responsible for supervising all science policy, programmatic and economic matters of the FVB, provided that they are not reserved to the General Meeting of the member institutes of the FVB. Members of the Board are (a) a representative of the Berlin Senate Department for Science, Health, Care and Equality, (b) a representative of the Federal Ministry

of Education and Research, (c) a representative of HU, FU and TU Berlin, (d) four scientists and (d) one to three representatives from the business sector. The members (c), (d) and (e) are appointed for a maximum period of two four-year terms. The board meets at least once per year.

According to the Articles of Association, for each member institute of the FVB there is an **Institute Committee**, which prepares institute-specific decisions of the Board of Trustees. It comprises a representative of the Land Berlin, a representative of the federal government, and the Chairperson of the SAB of the respective institute. The Board of Trustees may delegate certain types of legal transactions and matters to the Institute Committee for final resolution, provided that the rights of the financing bodies are not affected.

5. Human Resources

WIAS has a Personnel Development Concept that is structured regarding the different career levels. Every two to three years, a dedicated committee organizes an employee survey.

Leading scientific and administrative positions

The leading scientific positions at WIAS consist of the position of the Director who is also head of Research Group 8, the heads of the other research groups (RGs 1–7), and the heads of the temporary groups on the Flexible Research Platform (FRP). In accordance with the Statutes of the FVB, the Director of the institute is appointed for a five-year period jointly by the university and the Board of Trustees of the FVB. Reappointment is permissible.

Currently, five heads of RGs are appointed jointly with the Berlin universities (for details see chapter 6); two procedures for joint appointments of new RG heads are ongoing. In addition, three professors of FU Berlin, TU Braunschweig and TU Berlin are each employed at WIAS with 20% working time.

The administrative management of the institute consists of the positions of the Managing Director of the FVB and the head of WIAS Administration. The Managing Director is appointed for a five-year term in accordance with the Statutes of the FVB by the Board of Trustees in consultation with the directors of the institutes. Reappointments are permissible. The managing director is responsible for the administrative management of the research institutes and is in charge of the budgets of the research institutes and the FVB. The Director and the Managing Director of FVB decide on the appointment of the head of WIAS Administration (see chapter 4).

Staff with a doctoral degree

According to the institute's personnel development concept, the career of postdocs at the institute is structured according to the research profiles R2–R3 according to the classification of EURAXESS (for R1 including doctoral students see below and R4 classifying leading researchers see above): Junior postdocs start in an orientation phase ("recognized researcher" – R2), followed by a consolidation phase ("established researcher" – R3). All postdoctoral researchers have annual performance appraisal interviews with their group leaders, during which they obtain feedback and mentoring. They also discuss and agree on future goal.

During the orientation phase (R2), postdocs further develop their competencies (if applicable, in a new research area), as well as proficiency regarding presentation and dissemination of their scientific results. They hone their research skills, learn to develop new research proposals, and increase their visibility and their network. They are also trained in the mathematical modelling of real-world problems and in the cooperation with researchers from other disciplines. In addition, there is an internal mentoring network, and regular career development events are organized. The institute prepares early-career postdocs also for industry positions.

The consolidation phase (R3) aims to provide postdocs with the necessary standing and visibility to obtain leadership positions in academia or industry. This entails a substantial publication record showing a clear and independent scientific agenda. Additionally, postdocs in the consolidation phase obtain support to gain teaching and leadership experience, as well as experience in acquiring research grants.

WIAS has two paths for postdocs to obtain permanent positions at WIAS: On the one hand, the heads of the research groups submit applications to the Director's Meeting to make a specific position within the research group permanent. On the other hand, WIAS internally advertises a maximum of one to two permanent positions per year open to all scientific employees for application. The announcement of permanent positions and the criteria for application are announced to the employees in due time. This second way of implementing permanent positions at WIAS was established in 2023, initially for a pilot period of 3–4 years, and will subsequently be evaluated.

Doctoral Candidates

As of December 31, 2023, there were 35 doctoral candidates working at WIAS. In 2021–2023, 22 doctorates were completed. The average length of a doctorate is 46.3 months. As a rule, direct supervision is provided by the heads of the research groups as well as the topic-related staff members or project leaders, and in the case of interdisciplinary projects also by external cooperation partners, where applicable. Ph.D. students are enrolled at the Berlin universities with which the supervisor is associated. Doctoral students are integrated into suitable umbrella organizations with a structured doctoral program such as graduate schools close to the subject or the "Berlin Mathematical School" (BMS), which was established already in 2006 and is since 2019 the graduate school in the *Cluster of Excellence* MATH+. The supervisor provides regular feedback on the quality and quantity of the progress of the work and the planning of the next steps.

Science supporting staff

The group of science-supporting employees consists of the team assistants of the research groups as well as the staff of the Administration, the IT Department, the Director's Office, and the IMU Secretariat. WIAS supports the science-supporting staff in taking advantage of advanced training and education measures. This includes internal offers within the framework of the FVB and externally organized training courses, further education, or advanced seminars. For several years now, employees in the science-supporting area have been benefiting from English language courses.

WIAS trains mathematical-technical software developers (MaTSE). In 2020, WIAS obtained a certificate from the Berlin Chamber of Industry and Commerce (IHK) as a recognized training institute. This apprenticeship with an overall duration of three years focuses on mathematics, computer science, and programming and includes, for example, the implementation of numerical methods, the programming of graphical user interfaces (GUIs), or the visualization of simulation results. If the opportunity arises, the apprentices are also involved in scientific projects. Since the last evaluation in 2017, WIAS had six apprentices. Currently, WIAS has three apprentices.

Equal opportunities and work-life balance

The institute is committed to the “Leibniz Equality Standards” as well as to the DFG’s “Research-Oriented Standards on Gender Equality”; the institute has an Equal Opportunities Officer. The proportion of women among academic staff is currently 22%, and 16% at management level. Among the eight Research Group leaders, there is one woman; besides, one of seven deputy heads is female. One of four groups on the FRP is led by a woman.

WIAS supports female researchers within the Iris Runge Program: For female scientists, WIAS offers two plus one year postdoctoral positions in one of its research groups. On January 1, 2024, two postdocs have started their work in this program. Eligible female researchers are specifically encouraged to participate in the Leibniz Mentoring program and the leadership training program of the FVB, as well as in workshops for career development and soft skills organized by the FVB’s equal opportunity officers. Besides, WIAS familiarizes young female scientists with the institute’s research in a targeted manner, reducing possible hurdles, and pointing out future perspectives as Ph.D. students.

Since 2013, WIAS has been certified by the *audit berufundfamilie*. The concrete provisions regarding compatibility of career and family are fixed in a formal agreement with the works council (“Betriebsvereinbarung”) concluded in 2015. All regular events at WIAS take place at family-friendly times in order to make it possible for employees with family and care commitments to attend. Employment contracts of WIAS employees on fixed-term contracts with children are extended by the amount of parental leave taken, including staff funded by third-party research grants. A special “Eltern-Kind-Zimmer” (room for parents and kids) is available at the institute for taking care of children. Using the service provider benefit@work, WIAS offers free-of-charge support to find services related to family, house, and further fields for its employees as well as consultation, including some psychosocial ones, and organizes workshops on topics related to compatibility of career and family.

6. Cooperation and environment

WIAS closely collaborates with the **three major universities in Berlin** – Freie Universität (FU), Humboldt-Universität (HU) and Technische Universität (TU) –, with which currently five joint appointments to C4 or W3 positions are realized (one with FU Berlin, two with TU Berlin, and two with HU Berlin). Relationships also exist via teaching activities, the Graduate School *Berlin Mathematical School* as well as projects like the *Berlin Mathematics Research Center MATH+* (a DFG-funded Cluster of Excellence). WIAS is also part of BR50, a joint initiative of Berlin research institutes with the goal to strengthen Berlin’s role as an international science hub.

In **Germany**, there are various cooperations within the Leibniz Association. WIAS especially coordinates the Leibniz Research Network *Mathematical Modelling and Simulation*, comprising a total of 35 Leibniz institutes. Besides, WIAS is a member of the Research Alliance *Leibniz Health Technologies* aiming at solving pressing problems in medicine with respect to diagnostics and therapy in an interdisciplinary way. Cooperations to other research institutions exist especially via DFG-funded *Collaborative Research Centres* (CRCs), *Priority Programmes* (PPs) or *Research Units* (FORs). In particular, both the PPs 1962 “Non-smooth and Complementarity-based Distributed Parameter Systems: Simulation and Hierarchical Optimization” and 2265 “Random Geometric Systems” are coordinated by WIAS members. The institute collaborates with seven university and seven non-university partners via the NFDI consortium MaRDI (Mathematical Research Data Initiative), which is coordinated by WIAS.

EU-wide partnerships include the participation of WIAS in the EU EMPIR project “Traceable Metrology of Soft X-ray to IR Optical Constants and Nanofilms for Advanced Manufacturing (ATMOC)” coordinated by the German National Metrology Institute PTB and carried out by a consortium of European metrology institutes and industry partners from Germany, France, Belgium, the Netherlands, and Austria.

An important partner from **industry** is Orange S. A., one of the major European communication network providers. Since 2016, WIAS is collaborating with Orange on a variety of research topics centered around device-to-device communications. There is also a long-standing informal collaboration of the institute with Bosch GmbH leading to joint projects (also including Ph.D. students).

Institution’s status in the specialist environment

WIAS identifies five institutions as most similar in orientation and mode of work:

- Zuse Institute Berlin (ZIB), an interdisciplinary research institute for applied mathematics and data-intensive high-performance computing.
- Fraunhofer Institute for Industrial Mathematics (ITWM) in Kaiserslautern, whose mission is especially to create virtual models for industrial and economic processes and services implemented by computer simulations. Fundamental research as starting point to applied research projects is not a priority at ITWM.
- Max Planck Institute for Mathematics in the Sciences (MiS) in Leipzig, which performs research in pure and applied mathematics and to promote the interlinking of ideas between mathematics and the sciences in both directions. Research activities at MiS are very much concentrated on theoretical analysis and less organized by concrete application projects.
- Johann Radon Institute for Computational and Applied Mathematics (RICAM) in Linz (Austria) focusing on basic research in applied mathematics and concentrating on the common core areas in mathematical modelling, simulation, inverse problems and optimization, including geometry, symbolic computation and data science.
- Basque Center for Applied Mathematics (BCAM) in Bilbao (Spain), working in the research areas computational mathematics, mathematical modelling with multidisciplinary applications, mathematical physics, analysis of partial differential equations and data science.

7. Subdivisions of WIAS

Research Group 1 – Partial Differential Equations

(14.5 FTE, of which 11.2 FTE Research and scientific services, 2.3 FTE Doctoral candidates, and 1 FTE Service staff)

RG1 works on the mathematical modelling of physical phenomena based on partial differential equations (PDEs) and on the related mathematical analysis of the latter. Its focus is on processes in (opto)electronic and electrochemical devices, as well as dissipative processes in elastic materials. RG 1's research connects modelling of processes in physics, chemistry, and continuum mechanics with rigorous mathematical analysis of evolution equations in terms of well-posedness and regularity. Methods based on the calculus of variations are used and further developed. The research is mainly based on continuum models and respects thermodynamical principles, which are exploited for mathematical analysis. RG1 is working with RGs 2, 3, 4, 7, WGBIP and LGNUMSEMIC on the consistent modelling of processes in quantum-mechanical systems, semiconductor structures, and electrochemical systems in the MAAs NanoOpto, FlowTrans, Energy, and MatMod. The developed systems of PDEs exhibit unique physical structures like conservation laws and gradient structures and feature mathematical challenges such as heterostructures and mixed boundary conditions. RG1 also delves into deriving effective models for multiscale systems, contributing to the development of a Γ-convergence theory for gradient systems. In addition to deterministic problems, RG1 investigates stochastic effects, like random alloy fluctuations in semiconductor materials and randomly perforated domains in elasticity, collaborating with RGs 5 and 6, and LGDYCOMNET. These findings enhance physical understanding and aid efficient numerical and optimization methods. Together with RGs 2 and 3, and LGNUMSEMIC, RG1 constructs robust numerical schemes implemented in software tools, which are used for simulation studies. RG1 has been involved in standardizing mathematical descriptions across disciplines, jointly with RG6, which paved the way for the MaRDI consortium.

As the former head retired in September 2023, the future development of RG 1 is planned with taking some flexibility into account. Nevertheless, it is the desire of WIAS to maintain the orientation of RG 1 in current areas of research. The RG will provide a central position in the institute in the derivation and analysis of nonlinear complex PDE models that are relevant for other research groups.

Between 2021 and 2023 RG1 published on average 26.6 articles p. a. in peer-reviewed journals and 6.6 individual contributions to edited volumes. The revenue from project grants totalled approx. € 1.9m (ø € 619k p. a.). € 1.7m (ø € 581k p. a.) thereof were obtained from the DFG and € 109k (ø € 36k p. a.) from the Leibniz Association (competitive procedure). In the three-year period, 3 doctoral degrees and 2 habilitations were completed.

Research Group 2 – Laser Dynamics

(11 FTE, of which 8 FTE Research and scientific services, 2.3 FTE Doctoral candidates, and 0.8 FTE Service staff)

The research of this group is devoted to the study of nonlinear dynamical processes occurring in optical and quantum technologies. RG2 essentially contributes to the MAA NanoOpto and

to the focus platform SemQuTech. In particular, RG2 addresses the topics dynamics of semiconductor lasers and quantum devices, optical pulses in nonlinear media, and theory of dynamical systems. The research activities include mathematical modelling, theoretical investigation and qualitative understanding of physical effects, the implementation of numerical methods, and the development of software tools for efficient simulation of complex devices. This is accompanied by the development of related mathematical theory, mainly in the field of dynamical systems, where analytical investigations for a theoretical understanding of the nonlinear effects are performed. The theory of dynamical systems represents an overarching mathematical-disciplinary topic, with a special focus on complex dynamical effects in large coupled systems and systems with delayed feedback.

RG 2 plans to continue its research on high-power semiconductor lasers in cooperation with applied partners, e.g. by developing novel stochastic models for semiconductor lasers with non-Markovian noise for a more realistic description of the laser linewidth. With respect to nonlinear optical fibers, RG 2 plans to look closer at dispersive optical systems that are strongly affected by wave-mixing instabilities. In the field of mathematical theory of nonlinear dynamical sytems, RG 2 will further investigate the theory of delay differential-equations with large delay.

Between 2021 and 2023 RG2 published on average 11 articles p. a. in peer-reviewed journals and 3.3 individual contributions to edited volumes. The revenue from project grants totalled approx. € 817k (ø € 272k p. a.). € 686k (ø € 229k p. a.) thereof were obtained from the DFG and € 77k (ø € 26k p. a.) from the Leibniz Association (competitive procedure).

Research Group 3 – Numerical Mathematics and Scientific Computing

(16.7 FTE, of which 11 FTE Research and scientific services, 3.3 FTE Doctoral candidates, and 2.5 FTE Service staff)

RG3 studies physically consistent and efficient numerical methods for the solution of partial differential equations, their numerical analysis, and their implementation. Building on decades of expertise in scientific computing, the group develops and maintains research software for utilizing these methods in real-world problems, and for supporting projects in engineering, natural, and life sciences. In particular, equations from fluid and solid dynamics (MAAs FlowTrans, QuantBio) and equations appearing in connection with semiconductor device and electrolyte simulations (MAAs NanoOpto, FlowTrans) are investigated. Concerning discretizations, the physical consistency, i. e., the transfer of important physical properties from the continuous problem to the discrete one, is a central goal of the research. A further goal of research is the development of efficient numerical schemes for the treatment of multi-physics and multiscale problems. In cooperation with RG1, RG2, RG7 and LGNUMSEMIC, the group develops, analyses and implements physically consistent numerical methods for drift-diffusion problems in simulations of semiconductors and electrolytes. Main foci are the consistent handling of constraints for charge carrier concentrations and the coupling to additional physics (flow, elasticity) and simulation modes (impedance spectroscopy, path following). Applications in biomedicine are related to the modelling and simulation of biological flows and tissues, in particular concerning multiscale methods and reduced-order models. A major objective is to integrate efficient and robust forward models with available clinical data, which is done in collaboration with RG6 and RG8.

RG 3 plans to pursue research at the interface between physically consistent and efficient discretizations, scientific computing, and complex applications. Future research topics include e.g. open problems concerning finite element methods, in particular their analysis, for scalar convection-diffusion equations and incompressible flow equations, as well as discretizations for the compressible Navier-Stokes equations with respect to higher-order schemes.

Between 2021 and 2023 RG3 published on average 15.6 articles p. a. in peer-reviewed journals and 3.3 individual contributions to edited volumes. The revenue from project grants totalled approx. € 731m (ø € 244k p. a.). € 704k (ø € 229k p. a.) thereof were obtained from the DFG and € 6k (ø € 2k p. a.) from the Leibniz Association (competitive procedure). In the three-year period, three doctoral degrees were completed.

Research Group 4 – Nonlinear Optimization and Inverse Problems

(13 FTE, of which 7.6 FTE Research and scientific services, 4.5 FTE Doctoral candidates, and 0.9 FTE Service staff)

The research group investigates optimization and inverse problems occurring in current engineering and economic applications. A specific focus of research in optimization and optimal control is the investigation of special structures resulting from the presence of uncertain and nonsmooth data. The group's work is related via cooperations with other research groups to the main application areas Energy (RG 7, RG8), FlowTrans (RG 1, RG3, WG BIP), NanoOpto (RG 2), and OptiCont (RG 8). RG4 cooperates with RG1 on stochastic homogenization and the analysis of nonlinear evolution equations using maximally dissipative as well as energy-variational solution concepts with a special focus on electrochemical fluids. With RG3 the group cooperates on numerical approximation of electro-rheological fluids and adaptive stochastic Galerkin FEM for high-dimensional PDEs. RG4 collaborates with RG6 on the simulation of stochastic processes and stochastic control problems, with RG7 on battery ageing dynamics, and with RG8 on machine learning and risk averse optimization in gas networks. With RG8, the group also investigates ways to efficiently train and use near-term noisy (hybrid) Quantum Computing systems. With WG DOC, RG4 cooperates on distributionally robust models in stochastic optimization and on the development of robust and reliable optimization algorithms for the training of deep network representations for the solution of parametric PDEs.

A major engagement of RG 4 will be related with the third phase of the *Collaborative Research Centre* 154 "Mathematical modelling, simulation and optimization using the example of gas networks", funded by the DFG until 2026. This will allow to round up a long-standing vision on holistic models for chance-constrained optimization problems including aspects of feedback and integrality. In 2026, the head of RG 4 will retire.

Between 2021 and 2023 RG4 published on average 11.3 articles p. a. in peer-reviewed journals and 0.6 individual contributions to edited volumes. The revenue from project grants totalled approx. € 1.1m (ø € 364k p. a.). € 934k (ø € 311k p. a.) thereof were obtained from the DFG, € 6k (ø € 2k p. a.) from the Leibniz Association (competitive procedure), € 72k (ø € 24k p. a.) from the EU and € 78k (ø € 26k p. a.) from industry. In the three-year period, three doctoral degrees and one habilitation were completed.

Research Group 5 – Interacting Random Systems

(9.9 FTE, of which 6 FTE Research and scientific services, 3 FTE Doctoral candidates, and 0.9 FTE Service staff)

RG5 studies the global behaviour of large interacting systems consisting of many random entities through probability theory. There are close connections with tools and topics from the fields of analysis and mathematical physics. The main application motivations stem from statistical physics and chemical engineering. RG5 is highly interested in the analysis of micro-macro phase transitions, like the emergence of macroscopic structures at high densities (e. g., gelation in coagulation processes in collaboration with RGs7 and 1, and condensation in the Bose gas). This contributes to the MAAs FlowTrans and MatMod. Furthermore, RG5 contributes to the MAA FlowTrans in the trade-off between large particle systems and differential equations for the evolution of averaged quantities in chemical engineering problems, partially in collaboration with RG1. Here numerical methods are developed in collaboration with RG3, and non-equilibrium thermodynamics is analysed in collaboration with RG1. Concerning RG5's expertise in the spectral analysis of random Schrödinger operators, the group joins forces with RGs1 and 6 and supports the MAA MatMod. This line of research has a number of links to stochastic partial differential equations and the exploration of modern methods like paracontrolled distributions and rough paths. Another line of research developed by RG5 in the years prior to 2020 was on spatial models for telecommunication with methods from stochastic geometry. This topic moved in 2021 to the newly founded Leibniz group "Probabilistic Methods for Dynamic Communication Networks".

RG 5 will continue and intensify its studies on random spatial systems within the PP 2265 "Random Geometric Systems", namely in the interacting Bose gas on one hand and spatial coangulating particle systems on the other. Further plans include the extension of existing work on large deviations of Freidlin-Wentzell type to include applications to lattice gas problems.

Between 2021 and 2023 RG5 published on average 9 articles p. a. in peer-reviewed journals and 0.6 individual contribution to edited volumes. The revenue from project grants totalled approx. € 1,4m (ø € 469k p. a.). € 1352k (ø € 451k p. a.) thereof were obtained from the DFG, € 6k (ø € 2k p. a.) from the Leibniz Association (competitive procedure), € 14k (ø € 5k p. a.) from Federal and Länder governments and € 35k (ø € 12k p. a.) from industry. In the three-year period, two doctoral degrees were completed.

Research Group 6 – Stochastic Algorithms and Nonparametric Statistics

(15 FTE, of which 11.8 FTE Research and scientific services, 2.3 FTE Doctoral candidates, and 1 FTE Service staff)

The Research Group 6 focuses on the research areas Statistical data analysis and Stochastic modelling, optimization, and algorithms. Applications are mainly in MAA OptiCont including economics, financial engineering, energy markets, and mathematical physics, in cooperation with RG4 and RG7, and in MAA QuantBio including medical imaging and life sciences, in cooperation with RG1, RG3, and RG8. The group also cooperates with RG8 on new optimization techniques in the area MAA FlowTrans. Special interest is in the modelling of complex systems

using methods from nonparametric statistics, statistical learning, risk assessment, and valuation in financial markets using efficient stochastic algorithms, and various tools from classical, stochastic, and rough path analysis developed in the Focus Platform “Quantitative Analysis of Stochastic and Rough Systems”, which has successfully completed its work and was reintegrated as a research focus of RG6 in autumn of 2023.

The head of the group has to retire in the first half of 2025. The procedure for filling the position of the head has been started; provisions for a temporary leadership of RG 6 have been initiated. Currently, research plans include a theoretical analysis of Bayesian optimization with the exploration of applications as well as further developments in the area of optimal stopping and control, in particular concerning concepts of randomization and reinforcement regression in combination with deep learning.

Between 2021 and 2023 RG6 published on average 22.3 articles p. a. in peer-reviewed journals, 6.3 individual contributions to edited volumes and 0.6 monographs. The revenue from project grants totalled approx. € 1.9m (ø € 629k p. a.). € 1.4m (ø € 481k p. a.) thereof were obtained from the DFG, € 6k (ø € 2k p. a.) from the Leibniz Association (competitive procedure), € 121k (ø € 40k p. a.) from the EU and € 120k (ø € 40k p. a.) from Federal and Länder governments. In the three-year period, five doctoral degrees and one habilitation were completed.

Research Group 7 – Thermodynamic Modelling and Analysis of Phase Transitions

(7.5 FTE, of which 5 FTE Research and scientific services, 1.5 FTE Doctoral candidates, and 1 FTE Service staff)

The research of RG7 concerns the multiscale and thermodynamically consistent modelling of complex materials including models with uncertain parameters. The main areas of expertise are systematic asymptotic analysis, in particular for singularly perturbed free boundary problems, and analysis of hysteresis properties. These expertises are used to investigate fundamental processes that drive phase transitions leading to micro- and nano-structuring of multiphase materials and their interfaces. Applications concern soft matter problems, where fundamental questions on the equilibrium contact angle at a liquid-gel interface are addressed, or the process of gelation in polymer solutions. Applications also concern living materials, where microscopically-informed continuum models for liquid-liquid phase separation of protein solutions are developed and experimentally validated. Furthermore, cell-hydrogel interactions are investigated for the purpose of biological tissue design. The resulting mathematical models undergo mathematical analysis, and strategies for their numerical solutions are developed. Within WIAS, this research is in close collaboration with RG1, RG3 and RG5. It contributes to MAA QuantBio as well as MAA MatMod and FlowTrans. Another main focus concerns the modelling and simulation of electrochemical systems, ranging from fundamental aspects of the electrochemical double layer to lithium-ion batteries and ion channels in biochemical systems. All of these aspects are modeled by partial differential equations (PDEs) within the framework of non-equilibrium thermodynamics. This research contributes apart from MAA MatMod also to MAA Energy and is conducted in collaboration with RG3, RG4 and RG1. For all the application problems in soft matter and living materials, electrochemical systems and hysteresis

properties, RG7 is connected to experimental research groups in these application fields, to achieve validation of the developed models and their predictions.

WIAS is currently hiring a new head of RG 7 as a joint professorship with TU Berlin and with the denomination “Data-Driven Mathematical Modelling”. For 2024–2025, research is focused on further development of a mathematical model framework for polyelectrolytes and polyampholytes. Concerning modelling electrochemical systems, the group will especially further develop its fundamental modelling framework and incorporate project-based extensions of the framework for specific applications.

Between 2021 and 2023 RG7 published on average 6.3 articles p. a. in peer-reviewed journals and 1.6 individual contributions to edited volumes. The revenue from project grants totalled approx. € 1m (ø € 332k p. a.). € 883k (ø € 294k p. a.) thereof were obtained from the DFG, € 6k (ø € 2k p. a.) from the Leibniz Association (competitive procedure), € 109k (ø € 36k p. a.) from Federal and Länder governments. In the three-year period, 1 doctoral degree was completed.

Research Group 8 – Nonsmooth Variational Problems and Operator Equations

(11.8 FTE, of which 7 FTE Research and scientific services, 3.8 FTE Doctoral candidates, and 1 FTE Service staff)

The research work of RG8 focuses on mathematical modelling, the analysis of the resulting variational problems or operator equations, as well as the design, analysis and computerbased realization of pertinent numerical solution methods. In this context, processes in medicine, nature, technology and economics which lead to nonsmooth mathematical phenomena play a pivotal role. RG8 concentrates on (a) nonsmooth models for energy resp. objective functionals or non-smooth state systems, (b) nonsmooth equilibrium or optimization problems under uncertainty; - mathematical games, (c) data-driven or neural network-based optimization and inversion involving nonsmooth constituents. RG8 contributes mainly to the MAAs QuantBio (through quantitative imaging), OptiCont (in multiphase materials, thermoforming, for instance) and Energy (by connecting the transport of energy sources and spot markets), and it worked on optimal shape design problems in fluid flow within MAA FlowTrans. In this context, methods from nonsmooth and set-valued analysis or geometry are advanced to treat nonsmooth systems with partial differential operators or non-smooth objective functionals on infinite dimensional spaces. The main goal is a precise analytical or numerical study of the effects on the underlying application due to not necessarily differentiable model elements. Within WIAS and along the theme of data-driven learning of (nonsmooth) regularizers with an emphasis on medical imaging, RG8 closely cooperates with RG6 and concerning transmission electron microscopy (TEM) for quantum materials to some extent also with RG1. Uncertain quantities in optimization, also in connection with applications in energy and markets, yield close links with RG4. Data-driven optimization and machine learning has recently become one of the new focal areas within WIAS. Here, RG8 is connected to RG4, RG6, and the new Weierstrass Group on “Data-driven Optimization and Control.” Moreover, through the work on optimal shape design subject to fluids, RG8 is connected to RG3.
RG 8 plans to mainly advance the following three directions: (i) study of hybrid models, combining ab initio components with data-driven ones, as constraints, (ii) accounting for

model/data uncertainties, (iii) physics-integrated reconstruction (with emphasis on applications in mathematical imaging).

Between 2021 and 2023 RG1 published on average 11.3 articles p. a. in peer-reviewed journals, 3 individual contributions to edited volumes and 0.3 monographs. The revenue from project grants totalled approx. € 1,3m (ø € 423k p. a.). € 1,1m (ø € 361k p. a.) thereof were obtained from the DFG, € 75k (ø € 25k p. a.) from the Leibniz Association (competitive procedure) and € 139k (ø € 46k p. a.) from foundations. In the three-year period, 5 doctoral degrees were completed.

Flexible Research Platform

(11 FTE, of which 8 FTE Research and scientific services, 2.3 FTE Doctoral candidates, and 0.8 FTE Service staff)

After the termination of the Weierstrass Group WG BIP “Modelling, Analysis, and Scaling Limits for Bulk-Interface Processes” in June 2023, there are currently two Weierstrass Groups (WGs) on the FRP. The WG “Data-driven Optimization and Control” (since 06/21) will continue the work on data-driven robust optimization, data-driven robus optimal control and computational optimal transport for machine learning for additional three years. WG “Multi-species Balance Law” (since 11/2023) will extend its scope from diffusive mixtures to models exhibiting multiple phases.
Furthermore, there are two Leibniz Groups (LGs). The LG “Numerical Methods for Innovative Semiconductor Devices” (since 01/2020) will focus on various extensions and further developments in its spectrum, like the numerical analysis for perovskite solar cells. LG DYCOMNET: “Probabilistic Methods for Dynamic Communication Networks” (since 01/2021) will further intensify its research in connectivity improvements in mobile urban Device-to-Device (D2D) augmented networks, data routing and malware propagation in D2D systems.

In December 2023, the Focus Platform (FP) QASRS “Quantitative Analysis of Stochastic and Rough Systems” was integrated in RG 6. A new FP SemQuTech “Simulation of Semiconductor Devices for Quantum Technologies” was established in January 2023. However, since its work is tightly connected to the work of RG1 and RG2, its work is presented as part of these RGs.

Between 2021 and 2023 the FRP published on average 11 articles p. a. in peer-reviewed journals and 3.3 individual contributions to edited volumes. The revenue from project grants totalled approx. € 817k (ø € 272k p. a.). € 686k (ø € 229k p. a.) thereof were obtained from the DFG, € 78k (ø € 26k p. a.) from the Leibniz Association (competitive procedure) and € 54k (ø € 18k p. a.) from industry. In addition, a total of € 61k (ø € 20k p. a.) was received from services. In the three-year period, neither doctoral degrees nor habilitations were completed.

Secretariat of the International Mathematical Union

(4.6 FTE, of which 2 FTE Research and scientific services and 2.6 FTE Service staff)

The International Mathematical Union (IMU) is a non-governmental and non-profit scientific organization, with the purpose of promoting international cooperation in mathematics. As a member of the International Science Council (ISC), it endorses ISC’s Principle of Freedom, Responsibility and Universality of Science. The Secretariat of the IMU was established as an

office at WIAS in 2011, following a decision of the IMU General Assembly. After a review in 2018, this decision was made permanent. Within WIAS, the IMU Secretariat is an independent unit and gives administrative support to the IMU President and the IMU Secretary General as well as the IMU Executive Committee. It maintains the archives and internet presence of the IMU and coordinates the International Commission on Mathematical Instruction (ICMI) and the Commission for Developing Countries (CDC). An important task of the IMU Secretariat is to support the organization of the quadrennial International Congress of Mathematicians (ICM) and the IMU General Assembly held in this context, as well as — with an offset of two years — the International Congress on Mathematical Education (ICME) and the ICMI General Assembly. Additional organizational and technical support is provided to the Committee for Women in Mathematics (CWM), the Committee on Electronic Information and Communication (CEIC), and the International Commission on the History of Mathematics (ICHM).

8. Handling of recommendations from the previous evaluation

WIAS responded as follows to the four recommendations of the last external evaluation (highlighted in italics, see also statement of the Senate of the Leibniz Association issued on 14 March 2012, pages B-2/B-3):

1) "Given the high personnel expenses that are usually associated with long-term software projects, the WIAS should – as part of a further development of its overarching strategy – define criteria, according to which the ***relationship between basic research and software development*** *and maintenance will be oriented in the future. Here, the WIAS should put stronger weight on the possibility of a spin-off for externalized further management of market-ready or already established software."*

The new Research Software Engineer and Steward helps WIAS scientists with technical issues resulting from the requirements of good scientific practice and at the same time contributes to the further strategy development. The software application classes introduced into the WIAS software strategy form the basis of a monitoring process which helps to decide the long-term status of codes developed at WIAS. Software which outlived its publication and commercialization potential will be conserved in a reproducible way. In recent years, WIAS software development became more focused towards open source software and its valuation similar to scientific publications. During the reporting period, WIAS received EXIST Business Start-up Grants for two projects: MSim and rDesign. MSim lead to the spin-off m4sim GmbH, rDesign to the spin-off Rafinex Ltd.

2 and 3) "For part of the own working space and for the IMU Secretariat, the WIAS relies on ***rented office space*** *in close proximity of the main building, which, however, is not sufficiently stable (e. g., because of time limits). The State of Berlin should swiftly reach appropriate solutions and, in doing so, provide the necessary coordination with FVB and other public institutions (e. g., HU Berlin) with ownership or user rights to buildings in the vicinity of the WIAS. […] The Federal and State governments should intensively support the WIAS to be confirmed*

as the permanent place of the IMU Secretariat in the 2018 examination by the IMU. In particular, the Land Berlin is asked to find as quickly as possible a permanent and sustainable solution for the placement of the Secretariat after termination of the renting contract in 2018."

In 2018, the General Assembly of the IMU unanimously endorsed the WIAS-hosted IMU Secretariat in a resolution. The renting contract for the premises of the IMU Secretariat in Markgrafenstraße terminated in 2018 and could not be extended anymore. The WIAS found a solution in its rented premises on Hausvogteiplatz (opposite to the main building) on floors 3 and 4, at the expense of a reduction of general office space. This is a mid-term solution that guarantees work space for the IMU Secretariat for a number of years. However, the need to find a permanent place for the IMU Secretariat in the immediate vicinity of WIAS's main building in Mohrenstraße 39 as well as additional office space for WIAS researchers is still on the agenda.

4) "The successes of WIAS in promoting young female scientists who have received calls for professorships are remarkable. At the institute itself, however, there is currently only one woman at the research group management level working on a temporary basis. The ***proportion of women among the scientific staff*** *is low at 20 %. In view of the internationally existing gender imbalance in mathematics, it is welcome that the Institute presented ambitious target quotas during the evaluation visit. These should now serve as an essential benchmark for the design of the cascade model in the program budget (40% in tariff group E13 and 20 % in E14). The supervisory board will critically accompany the implementation."*

According to WIAS, the proportion of female scientists in wage group E13 has increased from 21 to 27% and in wage group E14 from 10 to 12.5 % (see chapter 5). In order to close the current gap to the target quotas within the next few years, WIAS has been dedicated to continuously creating, optimizing and evaluating its instruments and measures for reaching these goals. Also, WIAS has the ambition to increase the number of females among the leaders of its RGs. WIAS has implemented several measures for supporting the careers of its female researchers (see chapter 5):

The Flexible Research Platform provides to more experienced and particularly promising young researchers the possibility to lead a research group; this instrument has been purposefully used for the promotion of female scientists:

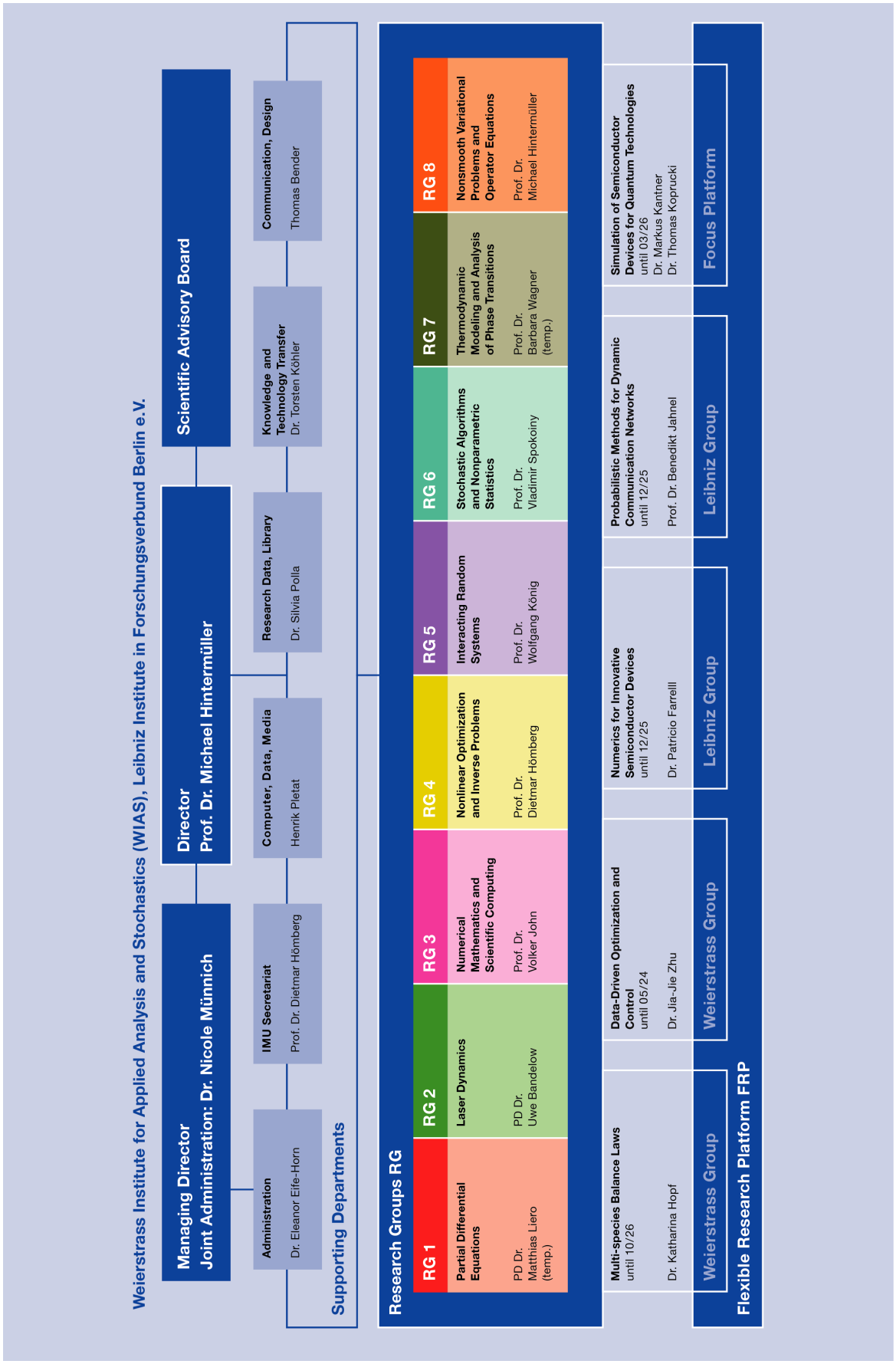
- The former female head of WG BIP received an offer of a W2-professorship at FU Berlin. She accepted the position in the summer of 2022, but still stays connected with WIAS to finish running projects.
- A newly founded WG, WG MBaL, with a female head is on track since November 2023.

On the highest scientific group leadership level at WIAS, the positions of RG heads, only one position (RG 7) has been vacant in the reporting period. Filling the position led to two rounds of the search process. The first one was together with HU Berlin and identified a female professor as the first-ranked candidate. Unfortunately, after intense negotiations the candidate decided to remain at her institution. The second round was with TU Berlin and, again, a female candidate has been identified to top the list. An offer has been made in November 2023; in January 2024, the candidate decided to turn down the offer for personal reasons. In both rounds of advertisement, WIAS carried out purposeful head-huntings to encourage promising

female candidates to apply; furthermore, the advertisements were disseminated on well-received platforms for female scientists. In the coming years, at least two more RG head positions (RGs 4 and 6) will become vacant.

Appendix 1

Organisational Chart



Appendix 2

Publications, patents, and expert reviews

	Period		
	2021	**2022**	**2023**
Total number of publications			
Monographs	-	-	3
Individual contributions to edited volumes	24	32	24
Articles in peer-reviewed journals	115	125	120
WIAS preprints	106	81	93
Preprints and reports published externally (excl. WIAS preprints)	29	36	36
Editorship of edited volumes	4	1	5

Patents	**2021**	**2022**	**2023**
Patents (applied/granted/patent families)	0 / 6 / 2	0 / 6 / 2	1 / 1 / 2
Other industrial property rights (applied/granted/IPR families)	-	-	-
Unregistered property rights: software licence contracts	3	5	4

Appendix 3

Revenue and Expenditure

Revenue		2021			2022			2023		
		k€	%	%	k€	%	%	k€	%	%
Total revenue (sum of I., II. and III.; excluding DFG fees)		**14,568**			**15,208**			**14,865**		
I.	**Revenue (sum of I.1., I.2. and I.3)**	**13,454**	**100 %**		**14,604**	**100 %**		**13,967**	**100 %**	
1.	INSTITUTIONAL FUNDING (EXCLUDING CONSTRUCTION PROJECTS AND ACQUISITION OF PROPERTY)	9,876	73 %		10,036	69 %		10,234	73 %	
1.1	Institutional funding (excluding construction projects and acquisition of property) by Federal and *Länder* governments according to AV-WGL	9,876			10,036			10,234		
1.2	Institutional funding (excluding construction projects and acquisition of property) not received in accordance with AV-WGL	0			0			0		
2.	REVENUE FROM PROJECT GRANTS	3,502	26 %	100 %	4,438	30 %	100 %	3,622	26 %	100 %
2.1	DFG	2,838		81 %	3,908		88 %	2,973		82 %
2.2	Leibniz Association (competitive procedure)	176		5 %	398		9 %	495		14 %
2.3	Federal, *Länder* governments	214		6 %	49		1%	0		0 %
2.4	EU	39		1 %	0		0 %	121		3 %
2.5	Industry	150		4 %	25		1 %	13		0 %
2.6	Foundations	85		2 %	58		1 %	20		1 %
3.	REVENUE FROM SERVICES	77	1 %		129	1 %		111	1 %	
3.1	Revenue from commissioned work	0			8			11		
3.2	Revenue from publications	0			0			0		
3.3	Revenue from exploitation of intellectual property for which the institution holds industrial property rights (patents, utility models etc.)	0			0			0		
3.4	Revenue from exploitation of intellectual property without industrial property rights	77			121			100		
II.	**Miscellaneous revenue** (e.g. transferred funds from the previous year for investments, construction measures, etc.)	**1,114**			**605**			**899**		
III.	**Revenue for construction projects** (institutional funding by Federal and *Länder* governments, EU structural funds, etc.)	**0**			**0**			**0**		

Expenditures		k€	k€	k€
Expenditures (excluding DFG fees)		**14,387**	**14,486**	**15,395**
1.	Personnel	10,490	10,893	11,455
2.	Material expenses	1,979	2,269	2,223
2.1	*Proportion of these expenditures used for registering industrial property rights (patents, utility models etc.)*	0	1	4
3.	Equipment investments	519	269	228
4.	Construction projects, acquisition of property	207	0	0
5.	Other operating expenses (membership fees, funds for specific measures, transferred funds, common (FVB) administration expenditures)	1,193	1,055	1,489
5.1	*of which: joint (FVB) administration expenditures (personnel, material expences + IT)**	618	667	721
DFG fees (if paid for the institution – 2.5% of revenue from institutional funding)		246	250	255

* includes personnel, IT, material, etc., but not local administration expenses.

Appendix 4

Staff

(Basic financing and third-party funding / proportion of women (as of: 31/12/2023)

	Full time equivalents		Persons		Women		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	**99.5**	**42.2**	**112**	72.3	**25**	84.0	**46**
1st level (scientific director)	1.0	0.0	1	0.0	0	0.0	1
2nd level (research group leaders)	7.0	0.0	7	0.0	1	0.0	0
3rd level (deputy research group leaders)	7.0	0.0	7	0.0	1	0.0	3
Junior research group leaders	3.2	0.0	4	25.0	1	0.0	1
Scientists in non-executive positions (A13, A14, E13, E14 or equivalent)	54.8	41.5	58	77.6	9	88.9	29
Doctoral candidates (A13, E13, E13/2 or equi.)	26.5	80.2	35	100.0	13	100.0	12
Science supporting staff * (technical support etc.)	**21.5**	**2.2**	**25**				
Workshops (E5 to E8, mid-level service)	1.0	0.0	1				
Library (E9 to E12, upper-mid-level service)	1.1	0.0	2				
Information technology – IT (from E13, senior service)	2.0	0.0	2				
Information technology – IT (E9 to E12, upper-mid-level service)	4.0	0.0	4				
Foreign language secretaries/science officers (E6-E9, mid-level service)	9.4	5.3	11				
Scientific Coordination & Division Manager (from E13, senior service)	2.0	0	2				
Transfer & Public Relations (from E13, senior service)	1.0	0	1				
Public Relations (E9 to E12, upper-mid-level service)	0.9	0	1				
Science supporting staff* (administration)	**9.9**	**15.2**	**12**				
Head of administration	1.0	0.0	1				
Staff positions (from E13, senior service)	3.0	33.3	3				
Internal administration (financial administration, personnel etc.) (E9 to E12, upper-mid-level service)	4.2	11.9	5				
Internal administration (financial administration, personnel etc.) (E5 to E8, mid-level service)	1.7	0.0	3				
Joint administration staff financed by WIAS (at FVB Adlershof)	9.7	0.0	**				
Student assistants	**1.8**	**42.0**	**6**				
Trainees	**3.0**	**0.0**	**3**				
Scholarship recipients at the institution	**2.8**	**100.0**	**3**		**0**		**3**
Doctoral candidates	0.8	100.0	1		0		1
Post-doctoral researchers	1.0	100.0	1		0		1
Master students	1.0	100.0	1		0		1

* science supporting staff includes 4.6 FTE in the IMU secretariat and 2 FTE in the MaRDI office

** the way how WIAS financially contributes to the Joint Administration and its current request for services do not allow meaningful assignment of individual personnel to the number of 9.7 FTE

24 September 2024

Annex B: Evaluation Report

Weierstrass Institute for Applied Analysis and Stochastics, Leibniz Institute in the Forschungsverbund Berlin (WIAS)

Contents

1. Summary and main recommendations

By combining application-driven research in stochastics, analysis and numerics, WIAS makes an important contribution to solving complex mathematical problems in science, engineering and industry. The range of activities covers the entire scientific solution process, from mathematical modelling and theoretical analysis of the models to numerical simulation of the solutions. The areas of application range from the development of new materials or medical imaging methods to optimisation in energy management and the modelling of financial markets.

WIAS is divided into eight Research Groups, which are generally led by scientists who are jointly appointed with one of the Berlin universities. In addition, there is a Flexible Research Platform, which is currently home to four independent junior research groups. Cross-group collaboration is successfully managed through six Main Application Areas (MAAs) that are regularly adapted to technological and societal needs, as well as three Strategic Exploration Topics, in which researchers continually explore the potential of new research topics. WIAS regularly achieves remarkable research results, including a wide range of contributions in the area of partial differential equations and their generalisation to different complex systems. In addition, the institute develops software for its own research work. This software is also available for external use, increasingly through open source instead of via licensing arrangements. WIAS has a close connection to practice, e.g. by several collaborations with industry partners. On average, the work of the Research Groups (RGs) is rated as “very good to excellent”.

The institute has progressed very well since the last evaluation under the leadership of its Scientific Director, who has been at WIAS since 2016. This can be seen, for example, in the successful establishment of a DFG Cluster of Excellence in 2019, the *Berlin Mathematics Research Center* (MATH+), for which WIAS secured funding together with the Berlin universities and the Zuse Institute Berlin (ZIB). It builds on the cross-institutional and interdisciplinary work of the DFG-funded *Matheon* research centre (2002–2012) and the *ECMath – Einstein Center for Mathematics Berlin* (2013–2018), in which WIAS also played a central role. In addition, the institute coordinates MaRDI, an NFDI consortium, which was set up in 2020 and involves 14 partner institutions. It is also very pleasing to see that the *International Mathematical Union* (IMU), which, in particular, is responsible for awarding the Fields Medal, decided in 2018 to base its secretariat at WIAS on a permanent basis, following a temporary arrangement that had been in place since 2011. This significantly increases the international profile of Berlin in the field of mathematics and underscores the importance of WIAS.

The scientific plans for the future are convincing. The Main Application Areas and Strategic Exploration Topics offer a very good framework for further development of the RGs over the coming years. More detailed plans for the institute’s future research will depend on who is recruited to fill the two current RG leadership vacancies and the two RG leadership positions that will become vacant shortly. Special consideration should be given to the following main recommendations (highlighted in **bold face** in the text):

Changes and planning (chapter 3)

1. In the interest of WIAS' continuous scientific development, the responsible parties must ensure that **joint appointments at the departmental leadership level** follow a much tighter recruitment timetable to avoid vacancies. Two RGs are currently led by acting heads, one of whom has been in this role since 2016. Joint appointment procedures were delayed for various reasons. The Director and the Board of Trustees should now work with the collaborating Berlin universities to fill vacancies quickly. They should set in motion the procedures for the other two RG leadership positions that will become vacant in the next years as soon as possible, and press ahead with the appointment procedures without delays.

Controlling and quality management (chapter 4)

2. The **Scientific Advisory Board** does a very good job of advising WIAS. When selecting SAB members, WIAS should keep in mind that an independent advisory role is incompatible with close scientific collaboration with the institute.

Human Resources (chapter 5)

3. WIAS has adopted a personnel development concept and a corresponding package of measures, both of which are accessible to all employees. These also set out the route to **permanent positions** for scientific staff. The concept should be supplemented by a clear description of the criteria for tenure.

4. In terms of **gender equality**, there is a considerable need for improvement at WIAS. Only 22.3% of employees in research and scientific services are women. Of the 19 positions with leadership responsibility, only three are held by women (15.7%). WIAS must take prompt, effective steps to make significant progress in terms of gender equality. The upcoming RG leadership appointments offer opportunities for this; however, the intention to appoint a female scientist should not lead to any longer lasting vacancy. Improvements are also needed at the level of non-executive scientists (currently 16% women).

2. Overall concept, activities and results

By combining application-driven research in stochastics, analysis and numerics, WIAS makes an important contribution to solving complex mathematical problems in science, engineering and industry. The range of activities covers the entire scientific solution process, from mathematical modelling and theoretical analysis of the models to numerical simulation of the solutions. WIAS develops its own software for its research work, which can also be used by external researchers. The areas of application range from the development of new materials or medical imaging methods to optimisation in energy management and the modelling of financial markets.

WIAS is divided into eight Research Groups and a Flexible Research Platform that is currently home to four time-limited groups led by early career researchers. Cross-group collaboration is successfully managed through six Main Application Areas (MAAs) that are regularly adapted to technological and societal needs, as well as three Strategic Exploration Topics, in which researchers constantly explore the potential of new research topics.

Results

Research

WIAS regularly produces remarkable research results that are visible at the international level. Some results worth highlighting include the wide range of contributions to partial differential equations and their generalisation to different complex systems, and new insights concerning constraints in optimisation. In recent years, new technologies such as machine learning have successfully been incorporated into the institute's work programme, e.g. in the case of data-driven mathematical modelling on thermodynamic consistency. WIAS also carries out high-risk research projects, which is welcomed and should stay part of the future activities.

Transfer

WIAS successfully translates its results into practice, particularly in the area of simulation and optimisation, and industry partners such as Orange, BMW and Bosch are involved in the research projects. In recent years, the institute has pushed ahead with the development of scientific software as an important element of its transfer activities and has realised new software packages and projects, particularly in the Julia programming language. New software has increasingly been made available through open source. In addition, WIAS granted 23 licences. As recommended, WIAS has further developed its software strategy in a convincing manner and documented it in a concept paper. In particular, the institute is now increasingly envisaging spin-offs: in recent years, it has received EXIST Business Start-up Grants for MSim, which led to the spin-off m4sim GmbH, and rDesign, which led to the spin-off Rafinex Ltd. WIAS' various efforts to further improve and professionalise its software activities are highly commendable and should be continued.

Scientific services

WIAS hosts and runs the headquarters of the *International Mathematical Union* (IMU), which is, in particular, responsible for awarding the Fields Medal. In an international competition between interested locations, the IMU General Assembly decided in 2018 to set up its permanent secretariat in Berlin. WIAS was also successful in a competition within the framework of the N*ational Research Data Infrastructure* (NFDI), which saw the *Mathematical Research Data Initiative* (MaRDI) established in 2021. The consortium of 15 German institutions is coordinated by WIAS, which was the lead applicant. The DFG-funded programme aims to develop a robust mathematical research data infrastructure.

3. Changes and planning

Development since the previous evaluation

In addition to the achievements mentioned in Chapter 2, WIAS has continued to develop the content of its research activities coherently. For instance, the Main Application Area on "Conversion, Storage, and Distribution of Energy" was transformed into "Energy: Technology, Markets, Networks" to strengthen research on optimising energy systems and their connection to markets. At the same time, the institute makes successful use of new methods and technologies, such as machine learning, in its research. The plans to expand work in this area, and in data science generally, are welcomed.

Strategic work planning for the coming years

The scientific plans for the future are convincing. The Main Application Areas and Strategic Exploration Topics offer a very good framework for further development of the RGs over the coming years. More detailed plans for WIAS's future research will depend on who is recruited to fill the two current RG leadership vacancies and the two RG leadership positions that will become vacant shortly.

In the interests of WIAS' continuous scientific development, the responsible parties must ensure that joint appointments at the departmental leadership level follow a much tighter recruitment timetable to avoid vacancies. Two RGs are currently led by acting heads, one of whom has been in this role since 2016. Joint appointment procedures were delayed for various reasons. The Director and the Board of Trustees should now work with the collaborating Berlin universities to fill vacancies quickly. They should set in motion the procedures for the other two RG leadership positions that will become vacant in the next years as soon as possible, and press ahead with the appointment procedures without delays.

Specifically, RG 7 has been led by an acting head since the previous group leader retired in 2016. An initial appointment procedure with HU Berlin was unsuccessful. A second procedure with TU Berlin has now led to an offer being made. However, since the acting head of RG 7 will also be retiring soon, the position needs to be filled urgently, not least in the interests of the group's future strategic development and other appointments within the group. The position of head of RG 1 has been vacant since October 2023, following the retirement of the previous group leader. Earlier plans for a joint appointment with HU Berlin were not pursued and the current plans for a joint appointment with FU Berlin have not yet led to a call for applications. In this group too, other appointments have been postponed awaiting this appointment.

Two other leadership positions will become vacant in the near future because the head of RG 6 will retire in the first half of 2025 and the head of RG 4 will retire in 2026. It makes sense to wait until the new appointments in RG 1 and 6 have been finalised before settling on the orientation of the RG 4 leadership position, in order to avoid content overlaps.

4. Controlling and quality management

Facilities, equipment and funding

In addition to the funding from the federal and *Länder* governments of €10m p.a. on average (2021–2023), WIAS received revenue from project grants of €3.9m on average in 2021–2023, largely from the DFG (€3.2m) and from the Leibniz Competition program (€0.4m). It is good to see that the proportion of third-party funding has increased strategically, including through the institute's strong involvement in DFG Cluster of Excellence MATH+ and the success in securing funding for two Leibniz Junior Research Groups. Given its innovative research, WIAS also has the potential to receive more funds again from the EU in future, particularly through ERC grants. WIAS generated €0.1m p.a. on average in revenue from services.

WIAS uses rooms in three buildings on Hausvogteiplatz in Berlin. The rent for these premises is now paid in full by the host *Land*, as is usual for Leibniz institutes. This includes rented

premises for the IMU secretariat until 2032, which means that this arrangement is secure, at least in the medium term. This city centre location is very beneficial to WIAS but the rented premises continue to pose a challenge that the institute and the State of Berlin need to keep a close eye on.

Organisational and operational structure

The Scientific Director, who was appointed in 2016 and who is also head of RG 8, leads the institute very successfully. As a member of the *Forschungsverbund Berlin e.V.* (FVB), WIAS shares a joint administration team, led by a Managing Director, with six other Berlin-based Leibniz institutes. Institute-specific administrative tasks are carried out by the Head of Administration at WIAS, who reports to the Managing Director of the FVB. Communication between WIAS and the FVB is extremely good and duplicate structures are avoided.

At WIAS, scientific and administrative issues are discussed in the regular Director's Meeting. Alongside the Scientific Director, this includes the Managing Director of the FBV and the heads of the other RGs, groups in the Flexible Research Platform and the science-supporting departments. It is good to see that the minutes of the Director's Meetings are available on the WIAS intranet.

Quality management

Quality management at WIAS is very good. The institute supplements the FVB guidelines, such as those on scientific misconduct that were adopted in 2021, with sensible internal guidelines, including a research data policy, which was introduced in 2022 and is based on the FAIR principles.

Quality management by advisory boards and supervisory board

The Board of Trustees of the FVB acts as the supervisory board of WIAS and supports the institute in a very committed manner. Like all member institutes of the FVB, WIAS has an Institute Committee, which prepares decisions taken by the Board of Trustees that relate specifically to WIAS.

The Scientific Advisory Board does a very good job of advising WIAS. When selecting SAB members, WIAS should keep in mind that an independent advisory role is incompatible with close scientific collaboration with the institute.

5. Human Resources

Leading scientific and administrative positions

The Scientific Director of WIAS is head of RG 8 and was appointed in a joint procedure with Humboldt-Universität Berlin (HU Berlin). The other RG leadership positions are also generally filled through joint appointments with universities. Currently, there is one additional joint appointment with HU Berlin, one with Freie Universität and two with Technische Universität Berlin (TU Berlin). Two appointment procedures are currently in progress to fill vacancies at RG leadership level (see Chapter 3). One RG is headed by a habilitated researcher.

As a member institute of the FVB (see chapter 4), WIAS makes use of the overarching administrative structures provided. It also has its own Head of Administration for institute-specific tasks, which is an efficient arrangement.

Staff with a doctoral degree

WIAS offers a very good training environment for early career scientists. As well as mentoring and financial support (e.g. for attending conferences), they receive, in particular, the opportunity to teach, which proves popular. The institute supports the professional development of early career researchers in a committed manner both inside and outside of academia. In its interdisciplinary environment, WIAS faces the challenge of helping its employees develop scientific profiles suitable for professorship appointments, which are usually tied to a single discipline. Evidence of the institute's success in this task is provided in particular by 12 appointments of postdoc WIAS employees to professorships in Germany and abroad in 2021–2023.

It is very good to see that six WIAS employees were awarded a habilitation in 2021–2023. An important and very successful support tool for early career scientists is the opportunity to lead their own research group within the Flexible Research Platform (see Chapter 7). WIAS is encouraged to approach the Berlin universities to make junior research group leaders eligible to supervise doctoral researchers.

WIAS has adopted a personnel development concept and a corresponding package of measures, both of which are accessible to all employees. These also set out the route to permanent positions for scientific staff. The concept should be supplemented by a clear description of the criteria for tenure.

Doctoral candidates

WIAS also offers very good working conditions for doctoral candidates, as is evidenced by the high number of doctorates completed. A total of 22 doctorates were completed in 2021–2023. The average time to completion was 3.9 years, which is reasonable. There are currently 23 doctoral candidates working at WIAS.

All doctoral researchers are enrolled at the Berlin universities and benefit strongly from being integrated into the *Berlin Mathematical School*, which has been the graduate school in the MATH+ Cluster of Excellence since 2019. One of the signs of the good collaboration between the RGs at WIAS is the fact that some doctoral researchers are supervised by employees from two different RGs.

Science supporting staff

Science supporting staff are very well integrated in the institute. They receive suitable internal and external professional development opportunities, including through the FVB.

It is very good to see that WIAS trains mathematical-technical software developers (MaTSE), offering two apprenticeships in this area every three years. WIAS has had six apprentices since the last evaluation.

Equal opportunities and work-life balance

In terms of gender equality, there is a considerable need for improvement at WIAS. Only 22.3% of employees in research and scientific services are women. Of the 19 positions with leadership responsibility (heads and deputy heads of the Research Groups and heads of junior research groups)**, only three are held by women (15.7%).** Apart from RG 7, whose acting head is a woman, none of the RGs is led by a female researcher. **WIAS must take prompt, effective steps to make significant progress in terms of gender equality. The upcoming RG leadership appointments offer opportunities for this; however, the intention to appoint a female scientist should not lead to any longer lasting vacancy. Improvements are also needed at the level of non-executive scientists (currently 16% women).** The proportion of women among the doctoral researchers is pleasingly high at 37%.

It is commendable that WIAS has set up the Iris Runge Programme, a dedicated tool for promoting female postdocs, which offers two-plus-one-year postdoc positions in one of the institute's Research Groups. Two postdocs took up positions through this programme on 1 January 2024.

The working conditions at WIAS are very family-friendly. Relevant events at the institute take place at family-friendly times, and WIAS provides a well-equipped room for parents and children ("Eltern-Kind-Zimmer"). WIAS offers its employees free support to find services relating to family, accommodation and other areas, as well as counselling.

6. Cooperation and environment

WIAS is very well integrated into the Berlin research landscape and there are joint appointments in place with all three universities. Another significant focus of collaboration is *Berlin Mathematics Research Center* MATH+, a Cluster of Excellence in which WIAS plays a central role.

The institute is very well connected at the national level, including through MaRDI, an NFDI consortium, which it coordinates and in which 14 partner institutes participate. In addition, it is involved in several collaborations with other national research institutes, especially via DFG-funded Collaborative Research Centres (CRCs), Priority Programmes (PPs) and Research Units (FORs). Within the Leibniz Association too, WIAS maintains various connections, some with institutes in other Sections, e.g. through the *Leibniz Research Network on Mathematical Modelling and Simulation*, and with individual institutes like the *Leibniz-Centre General Linguistics* (ZAS).

WIAS is also very well connected beyond Germany and has international partnerships with the Norwegian University of Science and Technology, the Centro di Ricerca Matematica Ennio De Giorgi (CRM), Kyoto University and others.

Key industry partners include Bosch, BMW and Orange, a French telecommunications company. Also worth highlighting is the EU EMPIR project on "Traceable Metrology of Soft X-ray to IR Optical Constants and Nanofilms for Advanced Manufacturing" (ATMOC), which is coordinated by the National Metrology Institute (PTB) and carried out by a consortium of

European metrology institutes and industry partners from Germany, France, Belgium, the Netherlands and Austria.

7. Subdivisions of WIAS

Research Group 1 – Partial Differential Equations

[14.5 FTE, of whom 11.2 FTE research and scientific services staff, 2.3 FTE doctoral candidates, and 1 FTE service staff]

Research Group 1 deals very successfully with a wide range of problems, from the analytical investigation of partial differential equations to the development and implementation of effective algorithms for numerical modelling. The focus on (opto)electronic and electrochemical devices as well as dissipative processes in elastic materials has produced a number of impressive insights and is also very promising for future research. After an ERC Advanced Grant ended in 2017, the group was successful in several other DFG funding programmes, which also led to very impactful results. These are regularly published in internationally visible outlets.

The group's theoretical PDE research often lays the foundations for work in the other groups, making RG 1 extremely important for WIAS. This is one of the reasons why the group leadership position, which became vacant in September 2023 when the previous group head retired, needs to be filled quickly. For the continuity of the group's activities, it is, however, good to see that a successful female scientist within RG 1, who was appointed to a professorship at FU Berlin in August 2022, continues to work at WIAS on a 20% contract.

Research Group 1 is rated "very good to excellent".

Research Group 2 – Laser Dynamics

[11 FTE, of whom 8 FTE research and scientific services staff, 2.3 FTE doctoral candidates, and 0.8 FTE service staff]

Research Group 2 achieved important results in the study of nonlinear dynamical processes occurring in optical and quantum technologies. The close connection to physics is good to see. For the theoretical investigation and a qualitative understanding of physical effects, including fibre laser systems based on semiconductor optical amplifiers (SOAs) and photonic crystal surface-emitting lasers, the group successfully applied for third-party funding from the DFG and through the Leibniz Competition. With its work, the group has the potential to be even more visible in its field in the future.

The group was also successful in developing software for efficient simulation of complex devices, e.g. the BALaser software kit that it developed in collaboration with RG 3, which is used to investigate various high-power laser and coupled laser system configurations with partners from industry. The group's other activities also benefit from a strong network with partners from the industry and connections to other research institutions. At the same time, the group is very well integrated into WIAS.

Research Group 2 is rated "very good".

Research Group 3 – Numerical Mathematics and Scientific Computing

[16.7 FTE, of whom 11 FTE research and scientific services staff, 3.3 FTE doctoral candidates, and 2.5 FTE service staff]

The largest Research Group at WIAS develops innovative numerical methods to solve partial differential equations. It is very successful at combining classical approaches, such as rigorous analysis, with novel approaches like machine learning. In this area in particular, the group also pursues novel and sometimes risky topics, which is very good to see. The strong connection to industry and medicine is extremely beneficial for the group's projects. Its outstanding achievements are highly visible internationally, in part because they are extremely relevant and topical. The group's DFG funding increased considerably in recent years, partly because of its involvement in several sub-projects of the MATH+ Cluster of Excellence.

An important component of the group's work involves developing and maintaining various software programs. In this context, it is very commendable that the group is currently concentrating on the new Julia programming language and has further improved its software work in a sustainable manner, as recommended in the previous evaluation (see Chapter 2).

Research Group 3 is rated "very good to excellent".

Research Group 4 – Nonlinear Optimization and Inverse Problems

[13 FTE, of whom 7.6 FTE research and scientific services staff, 4.5 FTE doctoral candidates, and 0.9 FTE service staff]

Research Group 4 delivers impressive solutions for optimisation and inverse problems in a range of engineering and economic applications, excellently combining the disciplines of analysis and numerics, and using novel data-driven approaches alongside classical methods in a convincing manner. The results of studies relating to high-dimensional problems, densities and tensors, among other subjects, are highly visible in the scientific community. The group is encouraged to make even more use of machine learning techniques in its work. As well as being involved in the MATH+ Cluster of Excellence, the group leader is responsible for a sub-project of a Priority Programme, resulting in a considerable increase in third-party funding from the DFG.

The group's work is of particular importance for the other units at WIAS, with which it interacts closely. This is one of the reasons why the group needs to quickly clarify who will succeed the head of the group when he retires in 2026, to avoid a vacancy and ensure stability.

Research Group 4 is rated "very good to excellent".

Research Group 5 – Interacting Random Systems

[9.9 FTE, of whom 6 FTE research and scientific services staff, 3 FTE doctoral candidates, and 0.9 FTE service staff]

The group successfully tackles a great many problems, mainly in the field of statistical physics and chemical engineering. All topics relate to each other very well and interact fruitfully. With its expertise in stochastics and geometry, the group has produced important results relating to various physical phenomena, e.g. raindrop gelation. It is closely involved in the work of DFG

Priority Programme 2265 on Random Geometric Systems, and the head of the Research Group is the spokesperson of this Priority Programme. The group's research is published in visible journals. However, the international recognition is focussed on the very successful group head; in future, the group should realise its potential to become more visible as a whole.

The systems studied by the group are particularly relevant for applications in materials science and telecommunications; the group has important collaborative relationships with practice in these areas, including international partners. At the same time, it is well integrated in WIAS and works particularly closely with RG 6.

Research Group 5 is rated "very good".

Research Group 6 – Stochastic Algorithms and Nonparametric Statistics

[15 FTE, of whom 11.8 FTE research and scientific services staff, 2.3 FTE doctoral candidates, and 1 FTE service staff]

The Research Group enjoys a high international reputation for its modelling of complex systems and is extremely successful at integrating statistics into its work. Besides data analysis for risk assessments in the financial and energy markets, the group has achieved outstanding results relating to, among other things, rough models and rough volatility in finance, and non-Markovian settings for stochastic optimal control. Since the last evaluation, the group has managed to significantly further increase its project funding from the DFG and EU.

The head of the group will retire next year and a process to replace him has already been set in motion. Although the institute has put in place precautionary measures for an interim group leader, and the current leader is prepared to see his projects through to the end, even after his retirement, it is important to fill the vacancy – which is almost inevitable given the timing – as quickly as possible.

Research Group 6 is rated "excellent".

Research Group 7 – Thermodynamic Modelling and Analysis of Phase Transitions

[7.5 FTE, of whom 5 FTE research and scientific services staff, 1.5 FTE doctoral candidates, and 1 FTE service staff]

For the past seven years, the Research Group has been led by an acting head. After the previous leader retired in 2016, the first joint appointment procedure to replace him in collaboration with HU Berlin proved unsuccessful; a new appointment procedure with TU Berlin is still ongoing. The acting group head has done a commendable job of leading the group over the past few years. Some important results have been achieved. The review board welcomes the fact that the research continues to be closely connected to electrochemistry and physics, in particular regarding research into hysteresis effects. The group's successes also include strengthening links to medicine, with biological applications being developed in collaboration with Charité.

The acting head of the group will retire next year. In these circumstances, it is understandable that the group has not been able to develop an overarching, long-term strategy. Because of the vacancy, the group also delayed other appointments, which meant that there was a

reduction in the number of staff. The leadership role needs to be filled quickly now. It is good to see that WIAS plans, under the new RG leader, to further expand its research on data-driven models.

Research Group 7 is rated “good to very good”.

Research Group 8 – Nonsmooth Variational Problems and Operator Equations

[11.8 FTE, of whom 7 FTE research and scientific services staff, 3.8 FTE doctoral candidates, and 1 FTE service staff]

This Research Group, which had only just been set up at the time of the last evaluation and is headed by the Director, who had just joined WIAS at the time, has developed extremely well. The group researches a broad range of nonsmooth phenomena in processes in medicine, nature, the economy and other fields. It is constantly exploring new research directions that complement its existing profile. Image processing and hybrid models are some of the innovative new areas of activity. The group regularly achieves outstanding results that are highly respected internationally, including in the field of randomness of models and its work linked to machine learning. It has achieved considerable success in securing competitive funding for its projects, especially from the DFG, and the group leader is involved in a DFG Priority Programme through several sub-projects. The group’s success in the area of academic training and qualification continues to be impressive: four former postdocs have been appointed to professorships since the last evaluation. There are close links to the other WIAS groups, particularly RG 4.

Research Group 8 is rated “excellent”.

Flexible Research Platform

[11.8 FTE, of whom 7 FTE research and scientific services staff, 3.8 FTE doctoral candidates, and 1 FTE service staff]

One very successful method of promoting young scientists is the Flexible Research Platform (FRP), which is currently home to four junior research groups. These include two “Leibniz groups”, i.e. Leibniz Junior Research Groups that secured funding through the Leibniz Competition procedure. WIAS also has Weierstrass Groups financed from the institute’s core budget. There are currently two of these. The Weierstrass junior groups are generally set up in a bottom-up process, i.e. early career researchers at WIAS can apply to start and lead a group. But groups can also be set up in a top-down process, in which the WIAS leadership team identifies a topic area and launches a public call for applications for the group leadership position. Both methods are appropriate and appreciated by the review board.

The leaders of these junior research groups have outstanding opportunities to further their training and achieve international visibility. Remarkable results have been achieved in several fields, including computer-related semiconductor design, data analysis, numerical research on PDE and machine learning. The FRP also has close contacts with practical applications, e.g. in the field of electrochemistry.

8. Handling of recommendations of the last external evaluation

WIAS has successfully addressed the recommendations made by the Leibniz Association Senate in 2017 (see Status Report, p. A-22–24).

Appendix

1. Review Board

Chair (Member of the Leibniz Senate Evaluation Committee)

Hannah **Bast**	Department of Computer Science, University of Freiburg

Deputy Chair (Member of the Leibniz Senate Evaluation Committee)

Anja **Bosserhoff**	Department of Biochemistry, University of Erlangen-Nuremberg

Reviewers

Virginie **Ehrlacher**	Center for Training and Research in Mathematics and Scientific Computing, École de Ponts ParisTech, Marne-La-Vallée
Eduard **Feireisl**	Institute of Mathematics, Czech Academy of Sciences, Prague
Martin **Grepl**	Institute of Geometry and Practical Mathematics, RWTH Aachen
Janine **Illian**	School of Mathematics and Statistics, University of Glasgow
Xue-Mei **Li**	Chair in Probability and Stochastic Analysis, Imperial College London
Maria **Lukácová-Medvidová**	Institute of Mathematics, University of Mainz
Fabio **Nobile**	Chair of Scientific Computing and Uncertainty Quantification, École Polytechnique Fédérale de Lausanne
Peter **Ochs**	Department of Mathematics and Computer Science, Saarland University
Ursula **Wurstbauer**	Institute of Physics, University of Münster

Representative of the federal government (member of the Leibniz Senate Evaluation Committee)

Volker **Wiesenthal**	Federal Ministry of Education and Research, Berlin

Representative of the Länder *governments (Member of the Leibniz Senate Evaluation Committee)*

Woldemar **Venohr**	Ministry of Science, Culture, Federal and European Affairs Mecklenburg-Vorpommern, Schwerin

17. Oktober 2024

Anlage C: Stellungnahme der Einrichtung zum Bewertungsbericht

Weierstraß-Institut für Angewandte Analysis und Stochastik, Leibniz-Institut im Forschungsverbund Berlin (WIAS)

Das Weierstraß-Institut für Angewandte Analysis und Stochastik (WIAS) spricht den Mitgliedern der Bewertungsgruppe sehr herzlichen Dank für die engagierte, fachlich intensive und überaus konstruktive Begutachtung aus und dankt den Mitarbeitern des Referats Evaluierung der Leibniz-Gemeinschaft für die versierte Begleitung im Evaluierungsprozess.

Der überaus positive Bewertungsbericht, der die hervorragende Entwicklung des WIAS seit der letzten Evaluierung hervorhebt, wurde am Institut mit Freude aufgenommen und bestärkt es in seiner strategischen Ausrichtung. Die Würdigung der national sowie international herausgehobenen Stellung und der damit verbundenen Bedeutung des WIAS in der Wissenschaftslandschaft, der Fähigkeit, regelmäßig erfolgreich Hochrisikoforschungsprojekte durchzuführen und der überzeugenden wissenschaftlichen Planung bestätigt das Institut in seiner fachlichen Arbeit. Insbesondere die Feststellung, dass das WIAS neue Methoden und Technologien, wie Maschinelles Lernen und Künstliche Intelligenz, sehr erfolgreich aufnimmt, bietet in Verbindung mit der Empfehlung, diese Bereiche weiter auszubauen, interessante Zukunftsperspektiven für das Institut.

Die umsichtigen und gezielten Hinweise und Empfehlungen der Bewertungsgruppe nimmt das WIAS dankend an. Die Umsetzung wird in bewährter Abstimmung mit seinem Wissenschaftlichen Beirat erfolgen.

Die sehr zügige Besetzung von strategisch wichtigen Stellen, insbesondere von Gruppenleitungsstellen, wird am WIAS aufgrund der hervorgehobenen forschungsstrategischen Bedeutung und der damit verbundenen Personalentwicklung durch einen umfangreichen Maßnahmenkatalog begleitet. Hinsichtlich der im Bewertungsbericht attestierten langen Dauer von gemeinsamen Berufungsverfahren mit den Berliner Universitäten wird das WIAS weiterhin gemeinsam mit dem Kuratorium des Forschungsverbundes Berlin e. V. alle Anstrengungen unternehmen, um Vakanzen idealerweise zu vermeiden bzw. so kurz wie möglich zu halten.

Wie bereits im vorigen Abschnitt hervorgehoben, begreift das WIAS eine gut strukturierte, fördernde und transparente Personalentwicklung als eine wesentliche Chance zur Nutzung und Weiterentwicklung seiner Ressourcen und zur Förderung seiner Forschungsagenda. Ein wesentliches Dokument dafür ist das Personalentwicklungskonzept des WIAS, welches mit einem flexiblen Maßnahmenkatalog verbunden ist. Beide Dokumente sind selbstverständlich allen Mitgliedern des Instituts zugänglich. Aufgrund ihrer strategischen Bedeutung und Langfristigkeit wird dabei Stellen mit entfristeten Arbeitsverträgen besondere Aufmerksamkeit beigemessen. Gerne nimmt das WIAS den Vorschlag der Bewertungsgruppe auf, die in den entsprechenden Stellenausschreibungen festgehaltenen Kriterien auch in den Maßnahmenkatalog aufzunehmen, um die Auffindbarkeit zu erleichtern.

In den vergangenen Jahren hat das WIAS verschiedene Maßnahmen zur Verbesserung der Geschlechterverteilung in den verschiedenen wissenschaftlichen Statusgruppen entwickelt. Die Bündelung dieser Maßnahmen erfolgt im *Iris-Runge-Programm* des WIAS und hat in den vergangenen Jahren zu einem sehr beachtlichen Frauenanteil von rund 40% im Bereich von Promotionsstellen geführt. Im Postdoc-Bereich und insbesondere auf der Ebene von Gruppenleitungen nimmt dieser Anteil leider sehr deutlich ab. Gemäß der Empfehlung der Bewertungsgruppe wird das WIAS sein *Iris-Runge-Postdoc-Programm* weiterentwickeln und

insbesondere versuchen, bei den nun unmittelbar anstehenden Besetzungen auf Gruppenleitungsebene den Anteil von Frauen deutlich zu heben.

Abschließend dankt die Leitung des WIAS seinem Wissenschaftlichen Beirat für die fachlich exzellente, unabhängige Beratung und die jederzeit zielorientierte Unterstützung, seinen Finanzierungsträgern für ihre umsichtige, wissenschaftsfördernde Haltung sowie nicht zuletzt seinen Mitarbeiterinnen und Mitarbeitern, die das Institut mit hoher Motivation mitgestalten.