LEIBNIZ SCIENCE CAMPUS
PHOSPHORUS RESEARCH
ROSTOCK

Activity Report 2018

Katalysis Leibniz-Institut für Katalyse e.V. LIKAT
INP Greifswald
Leibniz Institute for Baltic Sea Research Warnemünde IOW
IPK Gatersleben
FBN Leibniz Institute for Farm Animal Biology
Universität Rostock Traditio et Innovatio

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1 Development of the Leibniz ScienceCampus Phosphorus Research Rostock (Introduction)

The Leibniz-ScienceCampus Phosporus Research Rostock (LWC) is linking the phosphorus research of more than 100 scientists from 6 research institutes in different disciplines working in around 35 third-party funded projects. It focuses on three main areas in the support of phosphorus research by its members: strengthening of **networking**, **internationalization** and funding of **graduate students**.

In 2018, numerous events were initiated by the LWC to promote networking at all levels. Internal meetings and workshops took place to intensify both the networking of scientists at the ScienceCampus Rostock and scientific cooperation/exchange among them. Besides the events for the PhD-students being involved in phosphorus research, regular meetings took place between different groups of the ScienceCampus Rostock. In the winter semester 2018/2019 guest lectures were organized by the LWC (13.12.2018 Prof. M. Schloter (TU Munich) "The role of the barley seed microbiome for nutrient transformation and acquisition", 23.01.2019 Prof. J. Magid (University of Copenhagen) "Long-term experiments revealing impacts of phosphorus cycling on the agro-ecosystem"). Especially the international symposium (19.-20.11.2018), at which the international scientific advisory council of the ScienceCampus participated, can be highlighted as event for all members of the ScienceCampus. Furthermore, the ScienceCampus Rostock is an active member of the 'Deutsche Phosphor Plattform (DPP)' and the European Sustainable Phosphorus Platform (ESPP). Prof. P. Leinweber, member of the ScienceCampus Rostock, is member of the board of the DPP. Further networking activities were e.g. the integration of around 20 further PhD students of partner institutes with topics in the field of phosphorus research from various sources of funding. Regardless of the personal exchange the PhD students had e.g. the opportunity to exchange views in a bigger group during the organized P-breakfast and the ScienceCampus symposium.

Moreover, members of the ScienceCampus Rostock are internationally active all year round. The ScienceCampus Rostock has contributed to the financial support of young scientists in their **international activities**, e.g.: participation in the ESPC3 in Helsinki (Finland), in the AQUA 2018 in Montpellier (France) and other international conferences. Furthermore, the publications of results were financed as Open Access by the ScienceCampus. Without financial support of the ScienceCampus, these measurements, analyses and conference trips would not have been possible for the young scientists.

The **graduate school phosphorus research** is the core of the graduate concept of the ScienceCampus Rostock and has the overarching goal of an excellent graduate education. Thematic training and the lively exchange of information among PhD students were supported by different events such as thematic workshops, professional training and informal meetings.

In 2018, several important third party funded projects, which can be assigned to the ScienceCampus Rostock, were raised or started (Tab. 1). Two new projects started in March 2018. The second phase of the project "InnoSoilPhos, - **Inno**vative solutions to sustainable **Soil Phos**phorus management", focussing on P on different scales, started as well as the project "InFertRes: Innovative Fertilizers and Resource Efficiency in Agriculture".

In preparation to the follow-up application to the Leibniz Association, thematic concepts and projects for doctoral theses were already developed in workshops (internal competi-

tion procedure) during 2017. Seed projects, developed 2016 and financed by the Leibniz funding for the P-Campus, started 2018 and were administratively supported by the co-ordination office.

Some important publications for 2018 can be highlighted as examples of successful publications:

As part of the **IPW8** the ScienceCampus worked on a phosphor-themed **special edition** of the journal **Ambio** in 2017. 8 articles of members of the ScienceCampus were published (special edition Ambio – A Journal of the Human Environment 47 (1), see following list). As "Publication of the Year 2018" of the ScienceCampus Inga Krämer was appreciated for her merit to the publication of the Ambio special edition.

Berthold, M, Karsten, U, von Weber, M, Bachor, A, Schumann, R (2018) Phytoplankton can bypass nutrient reductions in eutrophic coastal water bodies.

Buczko, U, van Laak, M, Eichler-Löbermann, B, Gans, W, Merbach, I, Panten, K, Peiter, E, Reitz, T, Spiegel, H, von Tucher, S (2018) Re-evaluation of the yield response to phosphorus fertilization based on meta-analyses of long-term field experiments.

Cramer, M, Koegst, T, Traenckner, J (2018) Multi-criterial evaluation of P-removal optimization in rural wastewater treatment plants for a sub-catchment of the Baltic Sea.

Krämer, I, Bathmann, U, Eichler-Löbermann, B, Leinweber, P, Tränckner, J, Wimmers, K (2018) Special issue: Handling the phosphorus paradox in agriculture and natural ecosys-tems: Scarcity, necessity, and burden of P. ISSN: 0044-7447 (Print) 1654-7209 (Online)

Leinweber, P, Bathmann, U, Buczko, U, Douhaire, C, Eichler-Löbermann, B, Frossard, E, Ekardt, F, Jarvie, H, Krämer, I, Kabbe, C, Lennartz, B, Mellander, P.-E, Nausch, G, Ohtake, H, Tränckner, J (2018) Handling the phosphorus paradox in agriculture and natu-ral ecosystems: Scarcity, necessity, and burden of P.

Oster, M, Gerlinger, C, Heide, K, Just, F, Borgelt, L, Wolf, P, Polley, C, Vollmar, B, Muráni, E, Ponsuksili, S, Wimmers, K (2018) Lower dietary phosphorus supply in pigs match both animal welfare aspects and resource efficiency.

Robinson, JS, Baumann, K, Hu, Y, Hagemann, P, Kebelmann, L, Leinweber, P (2018) Phosphorus transformations in plant-based and bio-waste materials induced by pyrolysis.

Rupp, H, Meissner, R, Leinweber, P (2018) Plant available phosphorus in soil as predictor for the leaching potential: Insights from long-term lysimeter studies.

In 2018 several articles dealing with the plant protection product **glyphosate** were published. The publications are e.g. about glyphosate binding to surfaces (Ahmed et al. 2018 a, b) or the extent of glyphosate use in the agriculture (Andert et al. 2018 a, b).

Ahmed, AA, Gros, P, Kühn, O, Leinweber, P (2018a) Molecular level investigation of the role of peptide interactions in the glyphosate analytics. Chemosphere 196, 129-134

Ahmed, AA, Leinweber, P, Kühn, O (2018b) Unravelling the nature of glyphosate binding to goethite surfaces by ab initio molecular dynamics simulations. Physical Chemistry Chemi-cal Physics 20, 1531-1539

Andert S, Bürger J, Gerowitt B (2018a) Zusammenhang zwischen der Intensität selektiver Herbizidmaßnahmen und dem Einsatz von Glyphosat zur Vorerntebehandlung. Julius-Kühn-Archiv 458, 237-244

Andert S, Bürger J, Mutz J-E, Gerowitt B (2018b) Patterns of pre-crop glyphosate use and in-crop selective herbicide intensities in Northern Germany. Europ J Agron 97, 20-27

According to the main topic phosphorus in the environment in cluster 1 and especially to the concentration of phosphorus in the Baltic Sea, five publications have to be highlighted:

Berthold, M, Zimmer, D, Reiff, V, Schumann, R (2018) Phosphorus contents re-visited after 40 years in muddy and sandy sediments of a temperate lagoon system. Front Marine Sci 5, 305

Braun, P.D, Schulz-Vogt, H.N, Vogts, A, Nausch, M (2018) Differences in the accumulation of phosphorus between vegetative cells and heterocysts in the cyanobacterium Nodularia spumigena. Nature Scientific Reports 8

Koch, S, Kahle, P, Lennartz, B (2018) Spatio-temporal analysis of phosphorus concentrations in a North-Eastern German lowland watershed. J Hydrol: Regional Studies 15, 203-216

Nausch, M, Achterberg, E. P, Lennart Bach, L.T, Brussaard,C.P.D, Crawfurd, K.J, Fabian, J, Riebesell, U, Stuhr, A, Unger, J, Wannicke, N (2018) Concentrations and uptake of dissolved organic phosphorus compounds in the Baltic Sea. Front Marine Sci 5, 1-17

The ScienceCampus considers the difficulty of phosphorus not only from a scientific point of view, but also in terms of environmental law. Especially the publications of the PhD students B. Garske and J. Stubenrauch can be highlighted:

Garske, B, Ekardt, F, Douhaire, C (2018) Ordnungsrechtliche Instrumente der Phos-phor-Governance. Natur und Recht 40, 73-81

Stubenrauch, J, Garske, B, Ekardt, F (2018) Sustainable Land Use, Soil Protection and Phosphorus Management from a Cross-National Perspective. Sustainability 10, 1988.

Stubenrauch, J, Garske, B, Ekardt, F (2018) Landnutzung und Phosphor in der EU, Deutschland und Mittelamerika – rechtsvergleichende Perspektiven; Zeitschrift für Europäisches Umwelt- und Planungsrecht, 16, S. 325-335

Members of the ScienceCampus of LIKAT and of the department of chemistry of the University of Rostock published significant contributions to the chemical research in 2018, e.g.:

Longwitz, L, Steinbauer, J, Spannenberg, A, Werner, T (2018) Calcium-Based catalytic system for the synthesis of bio-derived cyclic carbonates under mild conditions. ACS Ca-talysis 8: 665-672, DOI: 10.1021/acscatal.7b03367

Steinbauer, J, Kubis, C. , Ludwig, R. , Werner, T. (2018) Mechanistic study on the addition of CO2 to epoxides catalyzed by ammonium and phosphonium salts: A combined spectroscopic and kinetic approach. ACS Sustainable Chem. Eng. 6, 10778–10788

The public relations work of the ScienceCampus Rostock in 2018 included beside text writing and publishing, presentations and maintenance of the website also the representation of the ScienceCampus Rostock by an information stand at the University of Rostock during the Long Night of Sciences.

2 Goals and concept

The overarching goal of interdisciplinary cooperation at the Leibniz ScienceCampus Phosphorus Research Rostock is, through a thematically oriented integrated network, to explore options for the more sustainable management of phosphorus. Further focuses of the ScienceCampus, in addition to the sufficient and efficient use and recycling and recovery of phosphorus, are phosphorus cycles and fluxes in the environment and the environmental problems, in particular in aquatic systems, caused by inefficient phosphorus use or a lack of phosphorus recycling. Expertise in various aspects of research into the essential and irreplaceable element phosphorus, diverse phosphorus-containing chemical compounds, and specific modes of action of phosphorus in agricultural and environmental systems as well as in technical and industrial processes are brought together at the ScienceCampus Rostock. Cooperation and research are intensified and strong national and international networks established.

The following institutes are partners of the ScienceCampus Rostock:

- Leibniz Institute for Catalysis (LIKAT) at the University of Rostock
- Leibniz Institute for Farm Animal Biology (FBN), Dummerstorf
- Leibniz Institute for Baltic Sea Research Warnemünde (IOW)
- Leibniz Institute for Plant Genetics and Crop Plant Research (IPK), Satellite Collections North, Groß Lüsewitz
- Leibniz Institute for Plasma Research and Technology (INP), Greifswald
- University of Rostock (UoR; Faculty of Agricultural and Environmental Sciences, Interdisciplinary Faculty, Faculty of Law, Faculty of Mathematics and Natural Sciences, Rostock University Medical Centre)

3 Research

3.1 Research foci

The research foci of the ScienceCampus Rostock are:

- Cluster I: Phosphorus cycles and fluxes in the environment
- Cluster II: Sufficiency and efficiency of phosphorus utilisation, phosphorus recycling
- Cluster III: Syntheses of and with Phosphorus-Containing Compounds (former: Phosphorus as an element in and as result of catalytic processes)
- Cross-cutting activity: The development of advanced phosphorus analysis methods

3.1.1 Cluster I: Phosphorus cycles and fluxes in the environment

Phosphorus ends up in the environment through open-ended industrial cycles and along river flows, reaching the sea. The aim is a better understanding of P fluxes and cycles in the environment in order, on the one hand, to analyze the effects of high P inputs and, on the other, to enable discussion of protection and/or rehabilitation measures. This starts at the "sources", for example with the application of fertilizer on agricultural land and the effects of artificial drainage (drain systems), but also at the river outlets of small and large wastewater treatment plants. And it continues through phosphorus fluxes in different ecosystems, from special soil crusts to coastal waters and into the large Baltic Sea basin. Methodological approaches in Cluster I include measurements on the smallest

scale up to the Baltic Sea ecosystem modelling over a wide range of scales and instrumentation.

3.1.2 Cluster II: Sufficiency and efficiency of P utilization, P recycling

The goal is to formulate a scientific basis with which to derive the necessary legal framework and policy recommendations for the sustainable management of regional and global closed P-fluxes in accordance with the principles of sufficiency and efficiency. Sufficiency means to limit the application rates of P for the production of plant and animal foods to the level actually required. This requires critical evaluations of existing P-fertilization and feed recommendations with the aim of reducing P-use in agriculture. Research to improve P-efficiency includes:
(1) Elucidation of the genetic basis of P-efficiency (uptake and utilization efficiency)
(2) Unlocking the accumulated but not available or not used P-stores in topsoil and the subsoil
(3) Utilization of alternative P sources and development / refinement of practice-relevant P-recovery technologies including research into the properties and potential of alternative P sources and technically recovered phosphates and extending to recommendations for practical applications.
The interdisciplinary nature of the Cluster, which covers all sub-areas of the agricultural P cycle (soil, plant, animal, water, process engineering ...), enables a realistic assessment of the portion of the P application rates that in the future are replaceable with renewable P sources.

3.1.3 Cluster III: Syntheses of and with phosphorus-containing compounds

This cluster is primarily concerned with research into underlying structural and reactive properties as well as theoretical issues in phosphorus chemistry. This reflects the formally possible oxidation states, which for phosphorus range from −3 to +5, the extraordinarily high structural diversity of phosphorus compounds. As a central element in achiral and chiral ligands for organometallic and coordination chemistry catalytic processes, phosphorus plays a unique role in catalysis research and as a reagent in organic syntheses. This is also true for some areas of industrial chemistry, mainly in the manufacture of fine chemicals, which often have a high added value. In addition, phosphorus-based organocatalysts are gaining increasing importance.

3.1.4 Cross-cutting activity: The development of improved P analysis methods

The cross-cutting activity (Cluster: Q) has as its focus on the provision and development of diverse methods needed for carrying out the main areas of research of the entire Phosphorus Campus. On the other hand, it is the objective of this Cluster to approach the question of relevant phosphorus compounds in the environment and their dynamics through its own projects. The spectrum of available methods includes the most modern chemical analytical methods, such as coupled gas (GC-MS) and liquid chromatography (HPLC-MS/MS) and colourimetric methods. In addition, at the IOW, with its CAMECA NanoSIMS 50L, a secondary ion mass spectrometer is available with which the elementary and isotopic composition of the smallest particles and single cells can be investigated. P metabolism by microorganisms from the Baltic Sea and soil have already been analyzed here and the presence of P-storage vacuoles in cyanobacteria depicted.

3.2 Research projects

Within the research clusters, 32 disciplinary and interdisciplinary, externally funded projects were thematically assigned to the ScienceCampus Rostock in 2018 (Table 1). Two of these projects started newly in 2018 and one project (InnoSoilPhos) was approved for the second phase. The graduate school Phosphorus research, funded by the Leibniz Association, conducts research in 11 thematically affiliated individual projects, which are listed in table 2. Additionally, ten seed projects - applied by projects partners from Leibniz institutes together with partners of the University of Rostock and funded by the LWC - started in 2018 (Table 3).

Table 1: Research projects thematically assigned to the ScienceCampus Rostock (status as of December 2018; *italics: phosphorus not a subject of the total project or members of the LWC only in parts of the project active*)

Project name	Term	Sponsor	Participating Partners of the ScienceCampus	Cluster
Anschubprojekte im Rahmen der Förderung des Leibniz-WissenschaftsCampus Phosphorforschung Rostock	04/2017-12/2018	WGL	FBN, IOW, INP, IPK, LIKAT, University of Rostock	I, II, III, Q
BACOSA II: Baltic Coastal System Analysis and Status Evaluation	*04/2016 - 03/2019*	*BMBF*	*University of Rostock (MNF, AUF)*	*I*
BaltCoast: A Systems Approach Framework for Coastal Research and Management in the Baltic	*04/2015-03/2018*	*EU-Bonus*	*IOW (Biological Oceanography)*	*I*
Baltic TRANSCOAST: Baltic TRANSCOAST	*01/2016-06/2020*	*DFG*	*University of Rostock (AUF, MNF), IOW*	*I*
Biomasse-Asche-Monitoring (BAM): Teilvorhaben 2: Agronomische Bewertung	11/2016-10/2019	BMELV	University of Rostock (AUF)	II
CLIMARCTIC: Einfluss des Klimawandels auf arktische Boden- und See-Mikrobiome	*03/2017 - 02/2020*	*DFG*	*University of Rostock (MNF)*	*I*
CRUSTFUNCTION II: Biodiversität und funktionelle Rolle von biologischen Bodenkrusten II	*07/2017-06/2020*	*DFG*	*University of Rostock (MNF, AUF)*	*I*
CRUSTWEATHERING: Structure and function of biocrusts in weathering, soil formation and erosion processes	*01/2016-12/2018*	*DFG*	*University of Rostock (AUF, MNF)*	*I, II*
DachKüNO II: Wissens- und Datentransfer in der Küstenmeerforschung	*01/2017-12/2019*	*BMBF*	*IOW*	*I*
Ernährung für Gesundheit: Fischfuttermittelinduzierte Qualitätssteigerung von Fisch- und Pflanzenprodukten aus Aquaponiksystemen in MV	*11/2015-10/2018*	*EU*	*University of Rostock (AUF)*	*II*
Glyphosat: Untersuchungen der Eigenschaften und Wirkungsweisen von Glyphosat im Boden	2016-2019	Landesgraduiertenstipendium MV	University of Rostock	I, II, Q

Graduiertenschule: Leibniz-WissenschaftsCampus Phosphorforschung Rostock	04/15-03/19	WGL	FBN, IOW, INP, IPK, LIKAT, University of Rostock	I, II, III, Q
InFertRes: Innovative Fertilizers and Resource Efficiency in Agriculture	03/2018–02/2021	BMBF	University of Rostock (AUF)	II
InnoAquaTech: Cross-border development and transfer of innovative and sustainable aquaculture technologies in the South Baltic area	*07/2016-06/2019*	*Interreg South Baltic*	*University of Rostock (AUF)*	*II*
InnoSoilPhos: Innovative solutions to sustainable soil phosphorus management	03/2015-02/2018	BMBF	University of Rostock (AUF)	I, II, Q
InnoSoilPhos II: Innovative solutions to sustainable soil phosphorus management	03/2018 – 02/2021	BMBF	University of Rostock (AUF)	I, II, Q
INTEGRAL: Integrated carbon and trace gas monitoring for the Baltic Sea	*07/2017-06/2020*	*BONUS*	*IOW*	*I*
KataPlasma: Hydroformylierung mit homogenen Katalysatoren geträgert auf Plasma funktionalisierten Materialien	*06/2016 – 05/2019*	*BMBF*	*LIKAT, INP*	*III*
Kogge: Kommunale Gewässer gemeinschaftlich entwickeln im urbanen Raum	*2015-09/2018*	*BMBF*	*University of Rostock (AUF)*	*I*
Mephor: Cellular mechanisms of phosphorus regulation in filamentous cyanobacteria	05/2015-04/2018	Forschungsstiftung Ostsee	IOW (Biological Oceanography)	I
MOSSCO II: Modular System for Shelves and Coasts	*04/2016-03/2019*	*BMBF*	*IOW*	*I*
NuReDrain: Innovative Nutrient Catching Reactive Barrier and Controlled Drainage Technologies for Sustainable Growth of the Agriculture Sector	*2017-2020*	*North Sea Region Programme (EU)*	*University of Rostock (AUF)*	*I, II*
OPTIMUS: Optimierung von Muschelfarmen zur Eutrophierungsvermeidung und zur Fischfutterproduktion in der Ostsee	*04/2017-03/2020*	*BONUS*	*IOW*	*I*
P FOWL: Inositolphosphate und Myo-Inositol beim Geflügel	*09/2017-08/2020*	*DFG*	*FBN*	*II*
PEGaSus: Phosphorus efficiency in Gallus and Sus scrofa: Bridging the gaps in the phosphorus value chain	*09/2017-08/2020*	*ERA-NET SUSAN*	*FBN*	*I, II*
Phosphor-Deposition: Entwicklung ausgewählter Indikatoren und Bewertungssätze für die Meeresumwelt im Rahmen der Umsetzung der Meeresstrategie-Rahmenrichtlinie	09/2015-06/2018	Umweltbundesamt	IOW (Marine Chemistry)	I, Q
PhosWaM: Phosphor von der Quelle bis ins Meer - Integriertes Phosphor- und Wasserressourcenmanagement für nachhaltigen Gewässerschutz	03/2016-02/2019	BMBF	IOW, University of Rostock	I, II

PRODIVA: Crop diversification and weed management	*03/2015-02/2018*	*ERA-net Core Organic Plus*	*University of Rostock (AUF)*	*II*
Scientific Resurvey of the wet grassland restoration project „Osterfeiner Moor"	*09/2016-08/2018*	*BfN*	*University of Rostock (AUF)*	*II*
SECOS: The Service of Sediments in German Coastal Seas	*04/2016-03/2019*	*BMBF*	*IOW*	*I*
SPP1685: Untersuchungen zum Verständnis des Phosphorzyklus in Wald-Ökosystemen auf molekularer Ebene	11/2016-10/2019	DFG	University of Rostock (MNF)	I, II
WETSCAPES: Stoffumsetzungsprozesse an Moor- und Küstenstandorten als Grundlage für Landnutzung, Klimawirkung und Gewässerschutz	*01/2017-12/2020*	*Europäischer Sozialfond*	*University of Rostock (AUF)*	*I, II, Q*

Table 2: Subprojects of the Graduate School Phosphorus Research Rostock (financed by the Leibniz Association and partners of the ScienceCampus Rostock): 2015–2019

Project	Participating Partners of the ScienceCampus	Research focus
Quality, quantity and transformation of P losses from diffuse sources to the Baltic Sea	IOW, University of Rostock	I
Phosphatases – Development of new quantitative assays along terrestrial-aquatic gradients	University of Rostock, IOW	I
Natural and anthropogenic organic P compounds – inositol-phosphates, phospholipids and glyphosate	IOW, University of Rostock	I, II, Q
Mechanisms of P mobilization in the rhizosphere involving weeds and crop plants	University of Rostock, IPK	II
Genetic regulation of phosphatase production and activity to increase P uptake from deficient soils	University of Rostock, IPK	II
Genetic and nutritional effects on the efficiency of P use of monogastric animals	FBN, University of Rostock	II
The P cycle and its application in land-based integrated aquaculture systems	University of Rostock, FBN	II
Political-legal P governance by means of certificate markets and charges	University of Rostock, IOW	II
Processing of alternative P sources for fertilization in agriculture	INP, University of Rostock	II, III
Synthesis of new heterocyclic ring systems containing P	LIKAT, University of Rostock	III
Large scale application of P based organocatalysts in batch and flow for the synthesis of fatty acid derived cyclic carbonates	LIKAT, University of Rostock	III

Table 3: In 2018 10 seed projects (partly from 2017) started in cooperation between partners of the ScienceCampus Rostock (condensed reports of the projects can be provided on request).

Project	Participating Partners of the Science-Campus
The role of reversible phosphorylation in regulation of mitochondrial bioenergetics (MitoP) (03/2017-03/2018)	UoR, FBN
Unraveling molecular signaling pathways involved in phosphorus acquisition of potato (PIPAPo) (04/2017-04/2018)	UoR, IPK
P-Recycling in the context of farm animal husbandry (09/2017-07/2018)	UoR, IOW

Evaluation of novel P-based organocatalysts in the activation of small molecules and P(III)/P(V)-redox catalysis (P-Aktiv) (06/2017-05/2018)	LIKAT, UoR
Immobilization of P-based organocatalysts by plasma techniques (H-POP) (08/2017-06/2018)	LIKAT, UoR
Desalting of marine water through electrodialysis (04/2017-06/2019)	IOW, UoR
31-P-NMR Spectroscopy: method improvements and applications to P compounds and -fluxes in the environment (P-NMR) (06/2017-06/2018)	UoR, LIKAT; IOW
Evaluation of different P-digestion methods for diverse environmental materials (EvaPhoN II) (04/2018-12/2018)	UoR, IOW
Abtrennung von organischen Phosphaten durch Kristallisation (CrysPhos) (06/2018-08/2018)	UoR, LIKAT
Plasmabasierte Methoden zum Aufschluss von biologischen Substraten für die P-Analytik (PAS) (08/2018-09/2018)	INP, UoR, IOW

Abbreviations: AUF = Faculty of Agricultural and Environmental Sciences, IOW = Leibniz Institute for Baltic Sea Research Warnemünde, LIKAT = Leibniz Institute for Catalysis, MNF = Faculty of Mathematics and Natural Sciences, UoR = University of Rostock

3.3 Graduate Concept/Graduate School Phosphorus Research

The structured training concept of the ScienceCampus Rostock (see Figure 1) is realized by graduate studies at the Graduate School of Phosphorus Research and the involvement of other young scientists (BSc and MSc students, doctoral students, and postdocs) whose thesis or project concerns phosphorus research. All relevant information are provided to young scientific members of the ScienceCampus. In addition to their inclusion in events involving the ScienceCampus Rostock and in scientific and thematic networks, for example, those of the DPP and ESPP, they can apply to the Campus for grants and for financial support for internationalization (travel, publications, and visiting scientists, including longer stays).

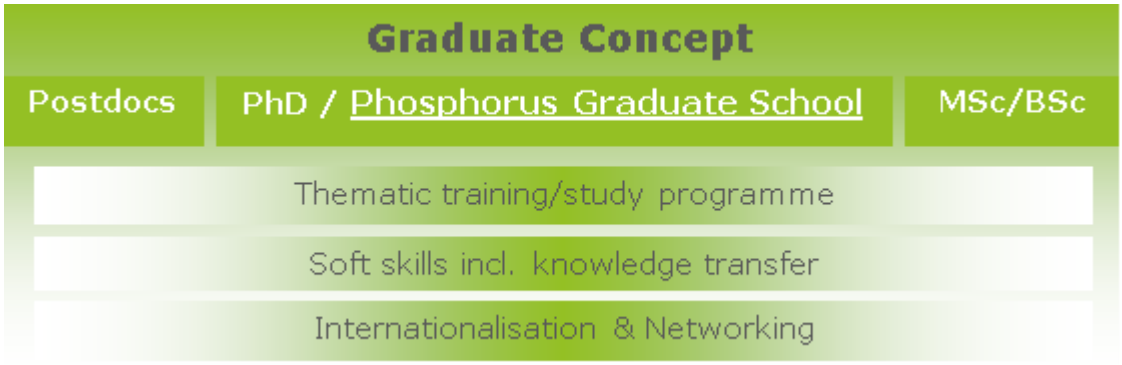

Figure 1: Graduate concept of the Leibniz ScienceCampus Phosphorus Research Rostock

The Graduate School of Phosphorus Research is the core of the graduate concept of the ScienceCampus Rostock. Its overall objective is to provide excellent graduate education, to encourage new and innovative phosphorus research topics, and to foster networking among partners. The 11 currently ongoing doctoral projects cover important areas of knowledge and research (Table 2). BSc and MSc thesis topics in phosphorus research have also been developed.

All doctoral students are supervised by a committee of scientists from at least two partner organizations of the ScienceCampus (e.g., the Leibniz Institute for Baltic Sea Re-

search and the University of Rostock). In 2016, the students presented their work at the annual ScienceCampus Rostock Symposium, held in March, and at the IPW8. Lively exchanges of information between doctoral students are promoted through various events, such as workshops and the regularly held "Phosphorus Breakfast" (see Section 5). Positive support for these activities has come from opening up the events to other doctoral students with thesis topics in phosphorus-related research.

3.4 Publications

Publications of the members of the ScienceCampus Rostock in 2018:

Ahmed, AA, Gros, P, Kühn, O, Leinweber, P (2018) Molecular level investigation of the role of peptide interactions in the glyphosate analytics. Chemosphere 196, 129-134.

Ahmed, AA, Leinweber, P, Kühn, O (2018) Unravelling the nature of glyphosate binding to goethite surfaces by ab initio molecular dynamics simulations. Physical Chemistry Chemical Physics 20, 1531- 539.

Andert, S, Bürger, J, Gerowitt, B (2018) Zusammenhang zwischen der Intensität selektiver Herbizidmaßnahmen und dem Einsatz von Glyphosat zur Vorerntebehandlung. Julius-Kühn-Archiv 458, 237-244.

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3.5 Theses

Thesis	Insititution
Habilitations	
Werner, T (2018) Phosphorbasierte Organokatalyse und stoffliche Nutzung von CO_2	MNF, UoR + LIKAT

Dissertations	
Koch, S (2018) Phosphorus transport processes from soil to surface waters: case studies from a north-eastern German lowland catchment	AUF, UoR
Steinbauer, J (2018) Entwicklung neuartiger Katalysatorsysteme zur Synthese zyklischer Carbonate aus Epoxiden und CO_2	MNF, UR + LIKAT
Douhaire, C (2018) Rechtsfragen der Düngung - Eine steuerungs- und rechtswissenschaftliche Analyse vor dem Hintergrund unions- und völkerrechtlicher Verpflichtungen und politischer Zielsetzungen zum Umwelt- und Ressourcenschutz	UoR
Master theses	
Kaatz, B (2018) Ermittlung und Optimierung der P-Elimination von SBR-Kläranlagen der Größenklasse (GKL) 1 und 2	AUF, UoR
Barenthien, P (2018) Quantifizierung von Stoffeinträgen urbaner Fließgewässer (2. Ordnung) durch hochauflösende online Messtechnik	AUF, UoR
Schwinkendorf, L.-M (2018) Bodenbiologische Effekte der Schmalblättrigen Lupine (*Lupinus angustifolius*) und von Seradella (*Ornithopus sativus*)und deren Bedeutung für die P-Mobilisierung	AUF, UoR
Amm, T (2018) Interaktive Wirkung von Pilzen und Krümelstabilität auf die P-Mobilisierung in unterschiedlichen landwirtschaftlichen Nutzungstypen	AUF, UoR
Köhn, L (2018) Einfluß der Aktivität von Regenwürmern auf die P-Mobilisierung unter Weiden (*Salix* spp.) im Kurzumtrieb	AUF, UoR
Schuldt, J (2018) Influence of phosphorus fertilization on soil nitrogen transformations	AUF, UoR
Bickel, U (2018) Uso de plagicidas por productores familiares en Bolivia	AUF, UoR
Lemke, A (2018) Wirkung von organischer und mineralischer Düngung auf Nährstoffaufnahme und -ertrag von verschiedenen Kulturen in einem Langzeitfeldversuch	AUF, UoR
Tralau, F (2018) Der Einfluss differenzierter Bodenbearbeitung auf die Wirtschaftlichkeit einer Fruchtfolge unter Berücksichtigung pflanzenbaulicher Aspekte	AUF, UoR
Winklhofer, P (2018) Langfristige Entwicklung der Phosphor-Fraktionen im Boden in Abhängigkeit mineralischer und organischer Düngungsvarianten	AUF, UoR
Rohde, H (2018) Phosphoraufnahme in einem Langzeitfeldversuch mit verschiedenen Düngevarianten	AUF, UoR
Riebe, K (2018) Die Aktivität von Enzymen des Phosphorkreislaufes unter besonderer Berücksichtigung des Mischanbaus	AUF, UoR
Reimers, S. M (2018) Veränderungen der Wurzelarchitektur von phosphoreffizienten und –ineffizienten Kartoffelgenotypen (*Solanum tuberosum* L.) unter Phosphormangel im Zeitverlauf	AUF, UoR
Sievers, M (2018) Untersuchungen zur Wiederfindung von Bulk Parametern (DOC, DOP, DON) nach Elektrodialyse von Meerwasser	MNF, UoR + IOW

Abbreviations: AUF = Faculty of Agricultural and Environmental Sciences, IOW = Leibniz Institute for Baltic Sea Research Warnemünde, LIKAT = Leibniz Institute for Catalysis, MNF = Faculty of Mathematics and Natural Sciences, UoR = University of Rostock

4 Networking

Besides interactions among its individual scientists and research groups, the ScienceCampus Rostock is a member of the ESPP and DPP. In addition, the ScienceCampus Rostock is connected with other Leibniz ScienceCampi as well as through its scientists and their thematic networks.

Deutsche Phosphor Plattform (DPP) – Participation in general assembly (18.09.2018; Prof. P. Leinweber, Dr. Carsten Mönnig) and annual forum (19.09.2018; Prof. P. Leinweber, Dr. Carsten Mönnig) in Frankfurt/Main.

Networking meeting of the coordinators of the Leibniz-ScienceCampi, Berlin, 27.11.2018 (Prof. K. Wimmers and Dr. D. Zimmer)

5 Events

Different kind of events were held, e.g. to promote networking and interdisciplinary cooperation within the ScienceCampus Rostock but also with external scientists, authorities, and the general public. Events are listed in the following.

5.1 Public events

Phosphor-Dialog MV. Rostock, 21.08.2018, hosted by the Chair of Water Management (University of Rostock) and the DPP e.V.

International Symposium of the Leibniz ScienceCampus Phosphorus Research Rostock (IOW, Warnemünde), 19.-20.11.2018, at the Leibniz Institute for Farm Animal Biology (FBN) Dummerstorf

5.2 Internal meetings and workshops

Internal meetings and workshops facilitate intensive networking and thematic exchanges between scientists of the ScienceCampus. In addition to various events for graduate/doctoral students, an annual campus-symposium is held in which all scientists introduce their new projects, present their work, and discuss the results. The Steering Group of the ScienceCampus meets roughly every 3 months to discuss overarching issues as well as the strategic orientation and further development of the ScienceCampus.

Meetings of the steering group of the ScienceCampus: 06.03., 12.04., 27.04., 14.05., 05.09., 05.11. (at different partner institutes)

To promote exchanges among PhD students working on phosphorus-related issues within the ScienceCampus Rostock, a "Phosphorus Breakfast" gathering took place, during which phosphorus research and related updates were presented and discussed: 06.04.2018 (IOW Warnemünde)

6 Public relations

The ScienceCampus Rostock and the research of its members have been introduced to external research groups, politicians, government, and the general public. A selection of the related events is provided below.

6.1 Oral presentations (selection)

Bathmann, U.: Baltic Earth Research: Challenges in the international context. 2nd Baltic Earth Conference "The Baltic Sea in Transition" in Helsingør, Denmark, 11-15 June 2018

Ekardt, F.: Klima-, Ozean- und Landnutzungs-Governance nach dem Paris-Abkommen: Warum IPCC und Klimaökonomik noch zu unambitioniert sind. IOW/Rostock, 24.10.2018

D. Zimmer, U. Bathmann, B. Eichler-Löbermann, S. Koch, Peter Gros, F. Bitschowski, M. Nausch, P. Leinweber, G. Jurasinski Vortrag vor Vertretern des Bildungsministeriums und des Landwirtschaftsministeriums MV zum aktuellen Stand der Forschung im P-Campus am 19.12.2019

6.2 Posters (selection)

Zimmer, D.: Presentation of the Leibniz-ScienceCampus Phosphorus Research Rostock. At the Research Camp of the University of Rostock, 22.11.2018, Rostock

6.3 Press

Ohne Phosphor haben wir keine Chance, article in „Welt am Sonntag - SPEZIAL Welt der Zukunft", 30.09.2018, pp. 4-5

Phosphor - Ein wichtiges Element in allen Lebens- und Forschungsbereichen, article in „Traditio et Innovatio", special edition of the University of Rostock 2018, pp. 40-43

Phosphor-Paradox. article in „Meer & Küste" 7: pp. 6-7, https://eucc-d-inline.databases.eucc-d.de/files/documents/00001202_MuK_2018_web.pdf

Phosphor-Management auf dem Acker verbessern, article on biooekonomie.de, 30.07.2018, https://biooekonomie.de/phosphor-management-auf-dem-acker-verbessern

Zuviel Phosphor im Meer, article in „Leibniz Nordost" no. 26-2018, pp. 12-13

Universität stärkt Kooperation mit Kuba, article in „Ostsee-Zeitung", 06.03.2018, p. 12

2,5 Mio. Euro für Phosphorforschung, article on t-online.de, 13.02.2018, https://www.t-online.de/region/id_83223630/2-5-millionen-euro-fuer-phosphorforschung.html

Erkenntnisorientierte Forschung auf höchstem Niveau, Interview with Prof. Kleiner on Deutschlandfunk, 31.01.2018, https://www.deutschlandfunk.de/forschungstrends-2018-erkenntnisorientierte-forschung-auf.676.de.html?dram:article_id=409665

6.4 Websites

Leibniz-WissenschaftsCampus Phosphorforschung Rostock: www.wissenschaftscampus-rostock.de (www.sciencecampus-rostock.de; www.p-campus-rostock.de)

Leibniz-Association/ScienceCampi: https://www.leibniz-gemeinschaft.de/en/research/leibniz-sciencecampi/phosphorous-research/

6.5 Others

Long Night of Sciences, University of Rostock, 26.04.2018. Information point & presentation of the Leibniz-ScienceCampus Phosphorus Research Rostock. Inga Krämer, Peter Gros, Marisa Wirth.

7 Structure and committees

7.1 Structure

The ScienceCampus Phosphorus Research Rostock is assigned to the University of Rostock's Interdisciplinary Faculty (INF), Department of Maritime Systems.

The organisation of the ScienceCampus Phosphorus Research Rostock is as follows: The **Directorship** is made up of the Directors of the participating Leibniz Institutes and the Rector of the University of Rostock. They can be represented by members of their institutions. Through the **Steering Committee** representatives of the Leibniz Institutes and the University of Rostock assume direct leadership of the ScienceCampus. They are represented by a **Spokesperson**. Direct **coordination** is carried out by a staff scientist, supported by a secretary. An international **Scientific Advisory Council** oversees the ScienceCampus Phosphorus Research and in addition to advising has the task of evaluating the scientific work of the ScienceCampus. Currently, more than 70 scientists and 20 PhD students from 40 Working Groups are **Members** (see Partners and Members) of the ScienceCampus Rostock.

The Institute for Baltic Sea Research Warnemünde acts as beneficiaries and provides the coordination office.

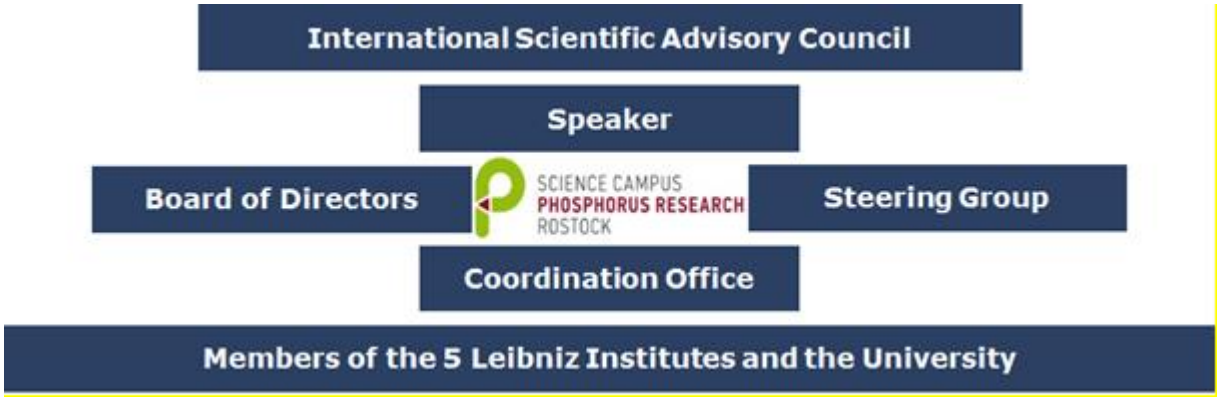

Fig.2: Structure of the ScienceCampus Rostock

7.2 Committees

7.2.1 Scientific Advisory Council

Prof. Dr. Emmanuel Frossard, ETH Zürich
Prof. Dr. Ellery D. Ingall, Georgia Institute of Technology
Prof. Dr. Christian Müller, FU Berlin
Prof. Dr. Helen Jarvie, Centre for Ecology & Hydrology (CEH), UK (since 06/2018)
Prof. Dr. Heidrun Steinmetz, TU Kaiserslautern (since 07/2018)
Prof. Dr. Hisao Ohtake, Osaka University Japan (until 06/2018)
Prof. Dr. Paul Withers, Prifysgol, Bangor University/UK (until 06/2018)

7.2.2 Directorship

Prof. Dr. Ulrich Bathmann, IOW
Prof. Dr. Matthias Beller, LIKAT
Prof. Dr. Andreas Graner, IPK
Prof. Dr. Wolfgang Schareck, UoR
Prof. Dr. Klaus-Dieter Weltmann, INP
Prof. Dr. Klaus Wimmers, FBN

7.2.3 Spokesperson / Deputy

Prof. Dr. Ulrich Bathmann, IOW

Prof. Dr. Peter Leinweber, Universtity of Rostock (spokesperson of the university)

7.2.4 Steering committee

Dr. Marion Kanwischer
Prof. Dr. Ulrich Bathmann, IOW
Dr. Volker Brüser, INP
Dr. Klaus Dehmer, IPK
Prof. Dr. Ulf Karsten, University of Rostock
Dr. Inga Krämer, ScienceCampus (until 06/2018)
Dr. Carsten Mönnig, P-Campus, (08/2018 - 01/2019)
Dr. Dana Zimmer, P-Campus (since 10/2018)
Prof. Dr. Udo Kragl, University of Rostock
Prof. Dr. Peter Leinweber, University of Rostock (spokesperson of the university)
Dr. Thomas Werner, LIKAT
Prof. Dr. Klaus Wimmers, FBN

Substitutes:
Dr. Silvia Bachmann-Pfabe, IPK
PD Dr. Tom Goldammer, FBN
Dr. Christian Hering-Junghans, LIKAT
Dr. Stephan Reuter, INP
Prof. Dr. Axel Schulz, University of Rostock/LIKAT

7.2.5 Coordination office

(Work and tasks 2018: see Appendix)
Dr. Inga Krämer (until 30 June 2018), Dr. Carsten Mönnig (21 August 2018 – January 2019), Dr. Dana Zimmer (since 15 October 2018) (coordinator)
Daniela Derlet-Eichler (Secretary)

7.2.6 Members

(Status: Updated during 2018)

Leibniz Institute for Catalysis (LIKAT) at the University of Rostock

Prof. Dr. Matthias Beller	Applied Homogeneous Catalysis	Cluster III
Prof. Dr. Armin Börner	Asymmetric Catalysis	Cluster III
Dr. Marko Hapke	Cycloadditions and Transition Metal Catalysis	Cluster III
Dr. Christian Hering-Junghans	Small Molecule Activation	Cluster III
Yuya Hu	Organocatalysis	Cluster III
Lars Longwitz	Organocatalysis	Cluster III
Dr. Dirk Michalik	Analytical Service	Cluster III
Prof. Dr. Uwe Rosenthal	Coordination Chemistry and Catalysis	Cluster III
Dr. Thomas Werner	Organocatalysis	Cluster III

Leibniz Institute for Farm Animal Biology (FBN), Dummerstorf

Christian Gerlinger	Genome Biology	Cluster II
PD Dr. Tom Goldammer	Genome Biology	Cluster II
Franziska Just	Genome Biology	Cluster II
Prof. Dr. Cornelia Metges	Institute of Nutritional Physiology "Oskar Kellner"	Cluster II
Dr. Michael Oster	Genome Biology	Cluster II
Prof. Dr. Klaus Wimmers	Genome Biology / Director	Cluster II
Dr. Siriluck Wimmers	Functional Genome Analysis	Cluster II

Leibniz-Institute for Baltic Sea Research (IOW)

<u>Directorate</u>		
Prof. Dr. Ulrich Bathmann	Director	Cluster I
Dr. Evgeny Sokolov	Directorate	Cluster IV
Dr.Dana Zimmer	Coordination Office	Cluster II
<u>Department Biological Oceanography</u>		
Franziska Bitschofsky	Microbial Processes and Phosphorus Cycle	Cluster I
Philipp Braun	Microbial Processes and Phosphorus Cycle	Cluster I
Dr. Monika Nausch	Microbial Processes and Phosphorus Cycle	Cluster I
Dr. Angela Vogts	NanoSIMS Lab	Q
<u>Department Marine Geology</u>		
Prof. Dr. Michael Böttcher	Geochemistry and Stable Isotope Biogeochemistry	Cluster I, Q
Dr. Thomas Leipe	Microanalysis	Cluster I, Q

Department Marine Chemistry

Dr. Marion Kanwischer	Organic Contaminants	Cluster I, Q
Lisa Felgentreu	General Marine Chemistry	Cluster I, Q
Dr. Günther Nausch	General Marine Chemistry	Cluster I, Q
Constantin Recknagel	Organic Contaminants	Cluster I, Q
Dr. Oliver Schmale	Biogeochemistry Trace Gases	Cluster I, Q
Prof. Dr. Detlef Schulz-Bull	Organic Contaminants	Cluster I, Q
Marisa Wirth	Organic Contaminants	Cluster I, Q

Department Physical Oceanography and Instrumentation

Dr. Daniel Neumann	Marine biogeochemical modeling	Cluster I
Dr. Thomas Neumann	Baltic Sea system dynamics	Cluster I
Dr. Hagen Radtke	Baltic Sea system dynamics	Cluster I

Leibniz Institute for Plant Genetics and Crop Plant Research (IPK), Satellite Collections North, Groß Lüsewitz

Dr. Silvia Bachmann-Pfabe	Genebank, Satellite Collections North	Cluster II
Dr. Klaus Dehmer	Genebank, Satellite Collections North	Cluster II
Prof. Dr. Andreas Graner	Director	Cluster II
Mousumi Hazarika	Genebank, Satellite Collections North	Cluster II
Evelin Willner	Genebank, Satellite Collections North	Cluster II

Leibniz Institute for Plasma Research and Technology (INP), Greifswald

Dr. Volker Brüser	Catalytic Materials	Cluster II
Sina Jahanbakhsh	Catalytic Materials	Cluster II
Prof. Dr. Klaus-Dieter Weltmann	Director	

University of Rostock

Faculty of Agricultural and Environmental Sciences

PD Dr. Christel Baum	Soil Science	Cluster II
Dr. Karen Baumann	Soil Science	Cluster II
Dr. Adrian Bischoff-Lang	Aquaculture and Sea-Ranching	Cluster I, II
Dr. Uwe Buczko	Landscape Ecology and Site Evaluation	Cluster I
Dr. Jörg Burgstaler	Agricultural Technology and Process Engineering	Cluster II
Michael Cramer	Water Resources Management	Cluster II
Dr. Carsten Croonenbroeck	Agricultural Economics	Cluster II
apl. Prof. Dr. Bettina Eichler-Löbermann	Agronomy	Cluster II
Beatrice Garske	Research Unit Sustainability and Climate Policy	Cluster II
Prof. Dr. Bärbel Gerowitt	Crop Health	Cluster II
Dr. Manuela Görs	Soil Science	Cluster II
Peter Gros	Soil Science	Cluster II
Sebastian Heller	Grassland and Fodder Sciences	Cluster I

Katharina Heyl	Research Unit Sustainability and Climate Policy	Cluster V
Prof. Dr. Florian Jansen	Landscape Ecology and Site Evaluation	Cluster I
Dr. Petra Kahle	Soil Physics	Cluster I, II
Dr. Mareike Kavka	Agronomy	Cluster II
Prof. Dr. Norbert Kanswohl	Agricultural Technology and Process Engineering	Cluster II
Dipl. Agr.-Ing. Ulrich Knaus	Aquaculture and Sea-Ranching	Cluster I, II
Philipp Koal	Agronomy	Cluster II
Stefan Koch	Soil Physics	Cluster I
Prof. Dr. Peter Leinweber	Soil Science	Cluster II,Q
Prof. Dr. Bernd Lennartz	Soil Physics	Cluster I, II
Barbara Mahnke	Grassland and Fodder Sciences	Cluster I
Dr. Gert Morscheck	Waste Management and Material Flow	Cluster II
Mohsen Morshedizad	Soil Science	Cluster II
Dr. Jürgen Müller	Landscape Ecology and Site Evaluation	Cluster I
Prof. Dr. Michael Nelles	Waste Management and Material Flow	Cluster II
Prof. Dr. Harry Palm	Aquaculture and Sea-Ranching	Cluster I, II
Julia Prüter	Soil Science	Cluster I, Q
Sebastian Strauch	Aquaculture and Sea-Ranching	Cluster I, II
Jessica Stubenrauch	Research Unit Sustainability and Climate Policy	Cluster II
Prof. Dr. Jens Tränckner	Water Resources Management	Cluster II
Prof. Dr. Ralf Uptmoor	Agronomy	Cluster II
Jutta Wieding	Research Unit Sustainability and Climate Policy	Cluster II
Paul Winklhofer	Crop Health	Cluster II
Prof. Dr. Petra Wolf	Nutrient Physiology and Animal Nutrition	Cluster II
Prof. Dr. Nicole Wrage-Mönnig	Grassland and Fodder Sciences	Cluster II
Annika Zacher	Soil Science	Cluster II
Theresa Zicker	Agronomy	Cluster II

Faculty of Law

Caroline Douhaire	Research Unit Sustainability and Climate Policy	Cluster II
Prof. Felix Ekardt	Research Unit Sustainability and Climate Policy	Cluster II

Faculty of Mathematics and Natural Sciences

Dr. Ashour Ahmed	Institute of Physics, Molecular Quantum Dynamics	Cluster Q
Martin Albrecht	Applied Ecology & Phycology	Cluster I
Maximilian Berthold	Institute for Biological Sciences, Applied Ecology & Phycology	Cluster I, Q
Dr. Jonas Bresien	Institute for Chemistry, Anorganic Chemistry	Cluster III
PD Dr. Stefan Forster	Institute for Biological Sciences,	Cluster I

	Marine Biology	
Dr. Karin Glaser	Applied Ecology & Phycology	Cluster I
Prof. Ulf Karsten	Institute for Biological Sciences, Applied Ecology & Phycology	Cluster I, II
Prof. Udo Kragl	Institute for Chemistry, Analytical & Technical Chemistry; Technical Chemistry	Cluster III
Prof. Oliver Kühn	Institute of Physics, Molecular Quantum Dynamics	Q
Iris Schaub	Institute for Biological Sciences, Applied Ecology & Phycology	Cluster I
Prof. Dr. Axel Schulz	Institute for Chemistry, Anorganic Chemistry	Cluster III
PD Dr. Rhena Schumann	Institute for Biological Sciences, Applied Ecology & Phycology, Biological Station Zingst	Cluster I, Q
Prof. Dr. Inna Sokolova	Marine Biology	Cluster II
Dr. Jan von Langermann	Institute for Chemistry, Biocatalysis	Cluster III

Rostock University Medical Center

PD Dr. Hugo Murua Escobar	Hematology, oncology and palliative care	Cluster III
PD Dr. Dagmar-Christiane Fischer	Pediatric Clinic, Experimental Pediatrics Group	Cluster II
Dr. Catrin Roolf	Hematology, oncology and palliative care	Cluster II
Prof. Brigitte Vollmar	Institute for Experimental Surgery, University Medicine Rostock	Cluster II

8 Funding

In 2018, the ScienceCampus Rostock was funded by the Ministry of Education Mecklenburg-Vorpommern, by the Leibniz Association and by substantial contributions from the participating Leibniz Institutes and the University of Rostock. External funding by third parties for phosphorus research at the ScienceCampus Rostock was obtained as well (see Table 1).

Funds from the Ministry of Education Mecklenburg-Vorpommern (€ 80,000 in 2018) were used mainly to finance the Coordination Office of the ScienceCampus Rostock. Since 2014, the Coordination Office, located at the IOW, has consisted of two employees: a scientist and a secretary.

In 2015, the ScienceCampus Rostock was awarded a total of € 1.2 million to be distributed over a period of 4 years to partially fund 11 interdisciplinary PhD projects.

APPENDIX

Leibniz ScienceCampus Phosphorus Research Rostock

Tasks of the Coordination Office 2018

In the following, the activities and thematic foci of the Coordination Office of the Leibniz ScienceCampus Phosphorus Research Rostock in 2018 are described. The Office was staffed by Dr. Inga Krämer until June 2018, by Dr. Carsten Mönnig since mid-August 2018, by Dr. Dana Zimmer (scientific coordinators) since mid-October 2018 and an administrative assistant (continuously Daniela Derlet-Eichler). The focus of the Coordination Office's work was, as before, the coordination of the partner institutions of the ScienceCampus Phosphorus Research and its individual members, research foci and projects, but additionally the application for the second phase of the graduate school (Dr. Inga Krämer) and consequently the successful organization of the start of the new funding phase of the Leibniz Association from June 2019 on (Dr. Dana Zimmer).

Other tasks included i.a. the external representation of the ScienceCampus (e.g. Long Night of Sciences on 25 April 2019), the preparation of reports and emails providing information to interested parties, the organization of other events of different formats (e.g. lecture series summer semester 2019 "Die Wege des Phosphors in der Umwelt und Möglichkeiten der P-Nutzung") and financial management (together with the administration department of the IOW). The work was carried out in close coordination with the spokesperson and the Steering Group of the ScienceCampus.

In the following, the priorities of the Coordination Office, including its function as a contact point, provider of support in the development of research project proposals, coordinator of the graduate school, event organizer as well as its public relations tasks are described in detail.

Contact point

The Coordination Office of the ScienceCampus is the linchpin for networking, both within the ScienceCampus and externally, at national and international levels.

In 2018/2019, the Coordination Office continued to serve as a contact for all members of the ScienceCampus, new members and external persons and handled external inquiries, and forwarded targeted information to the relevant members/member groups. By mediating both internal and external contacts, the office supported networking among scientists. Moreover, in 2019, the admission of so-called associated members to the ScienceCampus was organized (i.a. preparing application for admission and contract for associated membership). Associated members can become scientists of other research institutes, which deal with the topic phosphorus and are in close contact with regular members of the ScienceCampus. The admission of associated members conduces to an increasing external networking of ScienceCampus scientists and the internationalization of contacts. Contacts with external research institutes, ministries, and authorities were regularly maintained (e.g. 19.12.2018 presentation of recent research results of the ScienceCampus to ministry members; 21.03.2019 participation in 23rd "Gewässersymposium" (waters symposium)).

Due to the extension of the research clusters and since especially a gender-neutral orientation of the ScienceCampus should be experienced, as it is established in the

guidelines of the Leibniz institutes and the University of Rostock, an extension of the steering committee with the focus on applications of women was organized and successfully realized. Since April 2019 three more women are members of the steering committee of the ScienceCampus (Prof. Dr. I. Sokolova, PD Dr. D.-C. Fischer, Prof. Dr. B. Eichler-Löbermann).

Contacts to other networks were intensified, for example to the network Interdisciplinary Faculty (INF) and the DFG Graduate College Baltic Transcoast of the University of Rostock and by membership in the participation in meetings of the DPP. For a stronger networking and visibility of the ScienceCampus the DPP event at the faculty of agricultural and environmental sciences on the 22 August 2019 was organized during the first half year.

Research topics and initiatives

The ScienceCampus thrives on the continuous initiatives of its scientists in developing research themes and ideas and in considering proposals for their realization.

Through the Coordination Office, relevant funding calls and proposals regarding the acquisition of external research funds for scientists of the ScienceCampus are evaluated. In this context, the clusters were partially restructured due to the follow-up application in summer 2018 and cluster IV "Molecular Biology of Phosphorus" as well as the cross-cutting activity V "Governance options for closed P cycles" were successfully developed with the scientists of the ScienceCampus. In 2018, the research was extended by the funding of venture projects, so-called seed projects (e.g. "Procedural concepts for the extraction of agriculturally usable P recyclates from residues of animal production", "31P-NMR-Spectroskopy: Advancement of methods and application on P connections and P rivers in the environment"). This successful concept is also borrowed and extended for the second funding phase from 2019 on. To facilitate the application for seed projects, the assumption of travel and publishing costs but also the report of published publications and granted projects for the ScienceCampus members, old templates were improved respectively new templates created.

Structured graduate support

As young scientists are a significant part of the ScienceCampus network, a structured framework for their support and encouragement is offered by the ScienceCampus. Furthermore, feedback from the PhD students of the first graduate school (2015-2018) as well as from other funded PhD students of the ScienceCampus was requested and evaluated and will be realized as changes in the second graduate school (e.g. extension in the supervision agreement, provision of a guideline for the new PhD students).

The Coordination office is responsible for the coordination and administration of the new graduate school and will organize several events and other networking opportunities for the PhD students again (e.g lecture series on the subject of phosphorus winter semester 2019/2020, start-workshop P analytics end of October 2019 for new PhD students, international ScienceCampus symposium 12.11.2019-13.11.2019).

Event organization

The events organized and guided by the Coordination Office are an important basis not only for networking but also for the internal and external representation of the ScienceCampus.

Among the regular activities that took place in 2018 (and also will take place in 2019) were the organization of meetings of the Steering Group of the ScienceCampus (including presentation of current developments, record keeping, etc.) and of breakfast gatherings of PhD students of the ScienceCampus, which promoted mutual exchanges. For that reason, a "P-breakfast" for (former) PhD students was organized in March 2019 to receive feedback and improvement suggestions for the new graduate school (see above). This very well adopted concept, which includes all PhD students (also the ones not being funded), shall be continued during the second funding phase. Furthermore, the ScienceCampus symposium (compiling the program, invitation, catering etc.) will take place twice in 2019; the first time in April 2019 including a presentation of the concept und topics of the new graduate school and the second time in November 2019 as international symposium with participation of the international scientific advisory council. During the first half year, the DPP event at the faculty of agricultural and environmental sciences on the 22 August 2019 was organized, as mentioned above.

Public relations

The Leibniz ScienceCampus is a prominent research network among six partner institutions in Mecklenburg-Vorpommern and is represented not only regionally but also nationally and internationally. The Coordination Office is responsible for the presentation of the Leibniz ScienceCampus Phosphorus Research Rostock at various events (Long Night of Sciences 25.04.2019) and in the media (articles, interviews). For this reason, e.g. a former PhD student of the ScienceCampus Graduate School was employed to, in close collaboration with the Coordination Office, write an article about the first Graduate School for the journal "Wasser und Abfall". After consultation with the responsible people of the journal the article is expected to be submitted and published in summer 2019.

Moreover, the development of information (handouts, posters, presentations) about the ScienceCampus is part of the tasks of the Coordination Office. That also means that members of the ScienceCampus are actively addressed to represent the P-Campus at interesting events (conferences, workshops etc.). Selected workshops and other small events are used to increase the level of awareness of the ScienceCampus and attract new members by offering ScienceCampus writing pads and flyers. The Coordination Office offers support related to introducing the ScienceCampus to external scientific groups, policy makers, authorities, and the general public through visual presentations, such as research posters. Together with its PhD students, the ScienceCampus actively participated in the Long Night of Sciences at the University of Rostock. In April 2019, sources and ways of P in the environment, the impact of P in nutrition on the (bone)health of farm animals, and the impact of soil crusts and earthworms on the soil and the P availability were brought nearer to public.

Another important task was the design of the website of the Leibniz ScienceCampus Phosphorus Research Rostock, including content development, in coordination with relevant scientists. In 2019, the website had to be comprehensively edited due to the start of the second phase of the ScienceCampus. The website is updated continuously with new information from the ScienceCampus (e.g. new publications, P rele-

vant events). The Coordinator also compiles texts and information that allow the presentation of the ScienceCampus on other websites (for example, those of the DPP and the ESPP).

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PHOSPHORUS RESEARCH
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Imprint

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