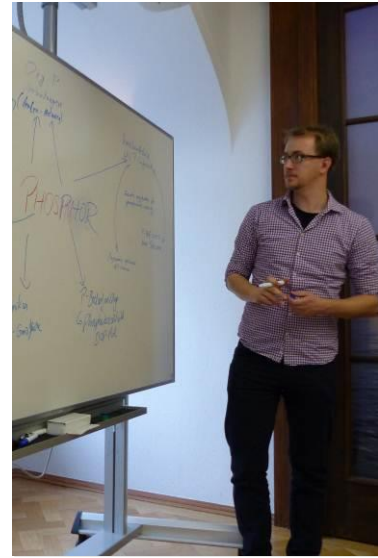




SCIENCE CAMPUS  
**PHOSPHORUS RESEARCH**  
ROSTOCK



# Activity Report 2015



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

After the completion in 2013-2014 of the structural phase of the Leibniz ScienceCampus Phosphorus Research Rostock (hereinafter ScienceCampus Rostock) and of the pilot projects carried out in preparation for the funding of the Graduate School, in 2015 the focus was on the development of the interdisciplinary Graduate School of Phosphorus Research, the intensification of internal and external networking, and the increased internationalization of the ScienceCampus Rostock. In addition, several important new, externally funded projects were acquired that were thematically assigned to the ScienceCampus Rostock. The Graduate School of Phosphorus Research is embedded in a structured graduate school concept developed by the ScienceCampus. Its intention is to support young scientists in phosphorus research as well as in their educational development, networking, and internationalization. In addition to events for graduate students, regular meetings of various groups of the ScienceCampus took place. In the winter term 2015/2016, the first Phosphorus Research lecture series was conducted at the University of Rostock. A prominent example of an event held for all members of the ScienceCampus was the first International Symposium, in March 2015. Over a period of 2 days, the Scientific Advisory Council of the ScienceCampus met for the first time and acknowledged the excellent prospects of the ScienceCampus. In 2015, extensive preparatory work was already underway for the 8th International Phosphorus Workshop (IPW8), organized by the ScienceCampus and to be held in September 2016.

## 2 Goals and concept

The ScienceCampus Rostock focuses on the exploration of the essential and irreplaceable element phosphorus and its diverse chemical compounds. The overall aim of the interdisciplinary collaboration in the ScienceCampus Rostock is to explore options for a more sustainable management of phosphorus by means of focused thematic networking. We investigate specific modes of action in agricultural and environmental systems as well as in technical and industrial processes. In addition to basic and applied research, development and transfer of technologies shall contribute to economic development. Furthermore, cooperation and research regarding this essential element will be intensified and strong national and international networks shall be established.

### **The following research institutions are partners in 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 ScienceCampus Phosphorus Research is divided into four areas of research (clusters):

- ▶ Cluster I: Phosphorus cycles and fluxes in the environment
- ▶ Cluster II: Sufficiency and efficiency of phosphorus utilisation, phosphorus recycling
- ▶ Cluster III: Phosphorus as an element in and as a result of catalytic processes
- ▶ Cross-cutting activity: The development of advanced phosphorus analysis methods

#### 3.1.1 Cluster 1: Phosphorus cycles and fluxes in the environment

Cluster I of the ScienceCampus Rostock has as its focus phosphorus fluxes and cycles 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 analyse 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 2: 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-fertilisation 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 utilisation efficiency)
- (2) Unlocking the accumulated but not available or not used P-stores in topsoil and the subsoil
- (3) Utilisation 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 3: Phosphorus as an element in and as result of catalytic processes

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

This cross-sectional task focuses on the improvement and development of methods to address the number of research questions within the ScienceCampus. Moreover, this cluster holds a number of projects to answer the question of relevant phosphorus compounds and their dynamics in the environment.

The methodological spectrum available in this cluster includes *state-of-the-art* analytical technology as liquid and gas chromatography coupled to mass spectrometric detection (GC-MS, LC-MS/MS).

In particular, the Institute for Baltic Sea Research Warnemünde maintains the Secondary Ion Mass Spectrometer CAMECA NanoSIMS 50 L for elementary and isotopic compositional analyses of smallest particles and single cells. Thus, detailed investigations on the P metabolism of Baltic Sea and soil microorganisms could depict the presence of P-storage vacuoles in cyanobacteria.

## 3.2 Research projects

Within the research clusters, 26 disciplinary and interdisciplinary, externally funded projects were thematically assigned to the ScienceCampus Rostock (Table 1). In addition, applications were submitted for the funding of several projects and some have already been approved. The Graduate School of the ScienceCampus Rostock, funded by the Leibniz Association and the partner institutions of the ScienceCampus, comprises 11 thematically affiliated individual projects (Table 2).

**Tab. 1. Currently running research projects which are thematically assigned to the ScienceCampus Rostock (status of December 2015; *italic: Phosphorus not subject of the total project*)**

Project	Project duration and funding	Participating partners of the Science-Campus	Research focus
<i>Aquaponik</i>	12/2011-10/2015 (Uni Rostock)	UoR	I, II
BACOSA: Baltic Coastal System Analysis and Status Evaluation	04/2013-03/2016 (BMBF)	UoR	I



Project	Project duration and funding	Participating partners of the Science-Campus	Research focus
<i>BaltCoast: A Systems Approach Framework for Coastal Research and Management in the Baltic</i>	04/2015-03/2018 (EU-Bonus)	IOW	I
<i>BALTIC IMTA - Integrated multitrophic Aquaculture in the Baltic Sea</i>	09/2013-10/2015 (Europ. Fischereifonds, MV)	UoR	I, II
Best Management-Praktiken und Nachhaltige Anwendung von Glyphosatprodukten (BMP-Glyphosat)	10/2013-2017 (BMEL, Projektträger BLE, Innovationsprogramm)	UoR	II
<i>BioAcid II: Biological Impacts Of Ocean Acidification</i>	09/2012-08/2015 (BMBF)	UoR, IOW	I
<i>BioAcid III: : Biological Impacts Of Ocean Acidification – Synthesis Phase</i>	10/2015-09/2017 (BMBF)	UoR, IOW	I
<i>CRUSTFUNCTION</i>	2014-2016 (DFG)	UoR	I
DachKüNO – Wissens- und Datentransfer in der Küstenmeeresforschung	04/14-09/16 (BMBF)	IOW	I
Durchführung einer Studie zu den Perspektiven für die deutsche Aquakultur im internationalen Wettbewerb	2016 – 2017 (BLE)	UoR	II
<i>ECO-FCE: A whole-systems approach to optimising feed efficiency and reducing the ecological footprint of monogastrics</i>	2013-2017 (EU-FP7)	FBN	II
EXCALIBOR: Empirical and experimental calibration of the clumped isotope (paleo)thermometer for biapatites	04/2014-06/2015 (DFG)	IOW	I, Q
<i>Fischglashaus: Modulares Gewächshausanbausystem zur aquaponischen Produktion von Warmwasserfischarten unter minimalem Ressourcenverbrauch in Mecklenburg-Vorpommern – Eine Innovationsinitiative zur energie- und nährstoffeffizienten Nahrungsmittelproduktion</i>	06/2013-01/2015 (Europ. Fischereifonds)	UoR	I, II
<i>GENUS Geochemistry and Ecology of the Namibian Upwelling System</i>	05/2012-04/2015 (BMBF)	IOW	I
Hohe Phosphor-Ausnutzung aus Gärresten unter Berücksichtigung der Fest-Flüssig-Trennung	08/2012-07/2015 (FNR)	UoR, LIKAT	II
Innovative solutions to sustainable Soil Phosphorus management (InnoSoilPhos)	2015-2023 (BMBF)	UoR, IOW	I, II, Q
<i>Kommunale Gewässer gemeinschaftlich entwickeln im urbanen Raum (Kogge)</i>	2015-2018 (BMBF)	UoR	I
Langzeitmonitoring Nährstoffe in der Darß-Zingster Boddenkette	Laufend seit 1980 (LUNG, Uni Rostock)	UoR	I
Mephor: Cellular mechanisms of phosphorus regulation in filamentous cyanobacteria	05/15 – 04/18 (Forschungstiftung Ostsee)	IOW	I
<i>Mischfruchtanbau mit Leguminosen: Effiziente Nutzung von Wachstumsfaktoren als Beitrag zum Ressourcen- und Gewässerschutz</i>	2012-2015 (FNR)	UoR	II
<i>MOSSCO: Modular System for Shelves and Coasts</i>	04/2013-03/2016 (BMBF)	IOW	I
<i>Nachhaltiges Landmanagement Norddeutsches Tiefland (NaLaMa-nT)</i>	09/2010-08/2015 (BMBF)	UoR	II



Project	Project duration and funding	Participating partners of the Science-Campus	Research focus
<i>Neue Organokatalysatoren und kooperative Katalysatorsysteme für die stoffliche Nutzung von CO<sub>2</sub></i>	2010-2015 (BMBF)	LIKAT	III
Optimierung der Düngewirkung von Reststoffen aus Biomassekonversionsanlagen – Ein Beitrag zum Ressourcen- und Umweltschutz	06/2014-05/2015 (BMBF)	UoR	II
Optimierung des Nährstoffaustrags und biologisches Nährstoffrecycling für Aquakulturen in Brackwasser	06/2013-10/2015 (EU FIAF, LFA-MV)	UoR	I, II
Phosphor-Deposition: Entwicklung ausgewählter Indikatoren und Bewertungssätze für die Meeresumwelt im Rahmen der Umsetzung der Meeresstrategie-Rahmenrichtlinie	09/15-10/17 (UBA)	IOW	I, Q
P-Recycling aus organischen Abfällen und Reststoffen – Stand, Potenziale und Perspektiven in M-V	2012-2015 (Stipendium)	UoR	II
P-Schadstoff-Wechselwirkungen infolge Applikation von Knochenkohle	09/2013-08/2016 (Landesgraduiertenstipendium MV)	UoR, LIKAT	
<i>POLARCRUST</i>	2014-2017 (DFG)	UoR	I
Role of phosphorus as a key component for managing grasslands N-yield and phytodiversity in organic farming	09/2013-12/2016 (BÖLN)	UoR	II
<i>SECOS: The Service of Sediments in German Coastal Seas</i>	04/2013-03/2016 (BMBF)	UoR, IOW	I
Selektive Oligomerisierung von Ethylen mit P-N-Liganden-Systemen	2006-2015 (SABIC/Linde AG)	LIKAT	III

**Tab. 2. Subprojects of the Graduate School Phosphorus Research Rostock 2015-2018 (financed by the Leibniz Anssociation and the partners of the ScienceCampus Rostock)**

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

Abbreviations: BMBF: Bundesministerium für Bildung und Forschung (Federal Ministry of Education and Research); BMEL: Bundesministerium für Ernährung und Landwirtschaft (Federal Ministry of

Food and Agriculture); BÖLN: Bundesprogramm Ökologischer Landbau und andere Formen nachhaltiger Landwirtschaft (Federal Organic Farming Programme); DAAD: Deutscher Akademischer Austauschdienst (German Academic Exchange Service); DFG: Deutsche Forschungsgemeinschaft (German Research Foundation); EU-FP7: Seventh Framework Programme for Research and Technological Development; FIAF: Finanzinstrument für die Ausrichtung der Fischerei (Financial Instrument for Fisheries Guidance); FNR: Fachagentur Nachwachsende Rohstoffe (Agency of Renewable Resources); LUNG: Landesamt für Umwelt, Naturschutz und Geologie Mecklenburg-Vorpommern (State Agency for the Environment, Nature Conservation and Geology Mecklenburg-Vorpommern); MV: Land Mecklenburg-Vorpommern

With seed funding from the Leibniz Association, five projects of the ScienceCampus could be funded. Brief summaries of their final reports are provided in the following:

### **Evaluation of different P-digestion methods for diverse environmental materials (EvaPhoN)**

#### **Partner: UoR, IOW (Cluster I, Q)**

Various digestion procedures for total phosphorus were compared. Extracted materials were dry mass and ash from plants, animal tissues soil and sediments as well as seston. It was not primarily the aim to find a best way, but to identify the most important steps and to make the respective comparisons as a reference available to the ScienceCampus. In addition, the original sources of the methods, reviews and methods comparisons were compiled. We also provide some ashes as a reference material. The already thoroughly prepared work instructions will be regularly supplemented with the aim to create a methodological manual in the long run.

Contact person: PD Dr. Rhena Schumann (UoR)

### **Genetic and nutritional effects on the efficiency of P use of monogastric animals**

#### **Partner: FBN, UoR (Cluster II)**

In order to identify measures to increase the efficiency of phosphorus (P) of monogastric animals, we investigated the physiological and transcriptional responses to modulated dietary P supply in growing pigs. The dietary P intake below and above current requirements was reflected in physiological serum parameters like inorganic phosphate, calcium, parathyroid hormone, vitamin D3 and cathepsin K, while the growth performance and feed intake were unaffected. The P supplementation above recommendations persistently affected animals as shown by microstructural bone parameters (increased Bone Mineral Density and Structure Model Index) and altered abundances of transcripts associated with bone morphology. Because of the multidisciplinary collaboration in this project, we were able to reveal the functional biodiversity of the animals regarding coping with a modulated dietary P supply. Genes found to be differentially expressed due to variable P supply are potential candidate genes for improved P efficiency.

Contact person: Prof. Dr. Klaus Wimmers (FBN)

### **Method Development for the Determination of particulate Glyphosate in Marine Environments; Bioavailability of Glyphosate**

#### **Partner: IOW, UoR (Cluster I, Q)**

This study focused on glyphosate which is the active ingredient in commercial herbicide products such as Roundup®. This project was aiming for i. the method development for

the extraction of glyphosate from particulate matter, ii. analysis of adsorption properties to soils from agricultural areas in Mecklenburg-West Pomerania and iii. analysis of the microbial degradation capacity and thus, the potential bioavailability of glyphosate for the Baltic Sea. Therefore, glyphosate was adsorbed to particulate matter such as sand, marine sediments with low and high organic carbon content and minerals. Glyphosate was extractable at different pH values depending on the type of particulate matter present. High extraction yields were obtained for glyphosate from minerals. However, extraction efficiency from sediments is insufficient, yet, and needs further improvements for glyphosate analysis from marine sediments. Adsorption isotherms for the soils from areas representative for the lowland landscape of Mecklenburg-West Pomerania indicate strong affinity of glyphosate to the selected soils. Cell culture experiments were conducted with *Nodularia spumigena* which is the predominant cyanobacterium for the Baltic Sea. The results of this project are currently under survey and will serve as the basis to develop further experimental strategies in order to identify factors which define glyphosate adsorption characteristics.

Contact person: Dr. Marion Abraham (IOW)

### **Phenotypic and molecular characterization of P utilization and uptake efficiency of *Solanum tuberosum***

#### **Partner: UoR, IPK (Cluster II)**

The aim of this project was to obtain knowledge about the genetic resources of potato with particular attention to the phosphorus efficiency (P-efficiency) and to submit a proposal for a follow up project. The data from the preliminary experiment show that different potato genotypes vary in their P-efficiency, which is in agreement with data from the literature. Based on these findings a project proposal with the topic "P-efficiency of potato" will be submitted to the German "Fachagentur für Nachwachsende Rohstoffe e.V. (FNR)".

Contact person: Prof. Dr. Ralf Uptmoor (UoR)

### **Recycling of phosphorus based organocatalysts through nanofiltration (RON)**

#### **Partner: LIKAT, UoR (Cluster III)**

In this project we demonstrated the application of organic solvent nanofiltration (OSN) as a sustainable alternative to distillation for the recycling of bifunctional phosphonium salts. We optimized the reaction and filtration process in respect to various process parameters (catalyst, solvent, membrane etc.) Under the optimized conditions the organocatalyst was retained up to 99% and could be recycled four times. The resulting paper was submitted to an internationally peer-reviewed journal.

Contact person: Dr. Thomas Werner (LIKAT)

## **3.3 Publications**

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- Großeheilmann, J., Büttner, H., Kohrt, C., Kragl, U., Werner, T. (2015): Recycling of phosphorus-based organocatalysts by organic solvent nanofiltration. ACS Sustainable Chemistry and Engineering 3: 2817–2822, DOI: [10.1021/acssuschemeng.5b00734](https://doi.org/10.1021/acssuschemeng.5b00734)
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### 3.4 Theses

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- Buchholz, F. (2015): Der Einfluss von Phosphordüngungsvarianten, deren Ausbringungszeitpunkt und Mischfruchtanbau auf die Aktivität von Bodenenzymen. Master Thesis, Supervisor: Prof. B. Eichler-Löbermann (UoR)
- Conrad, A.C. (2015): Die Synthese von Hydroxy-Carbonat-Apatit, und dessen Charakterisierung/Experimentelle Bildung von Calciumphosphaten als Funktion der Temperatur und deren Charakterisierung. Bachelor Thesis, Supervisor: Prof. M.E. Böttcher (IOW, University of Greifswald)
- Freitag, M. (2015): Untersuchungen der Nmin-Gehalte im Boden bei Mischfruchtanbau mit Leguminosen als Beitrag zu Gewässer- und Ressourcenschutz. Master Thesis, Supervisor: Prof. B. Eichler-Löbermann (UoR)
- Gropp, T. (2015): Wirkung von Gärresten auf die P-Mobilisierung im Boden und P-Versorgung von Weizen. Master Thesis, Supervisor: Prof. B. Eichler-Löbermann (UoR)
- Guckenberger, L.-M. (2015): Effekte der Phosphorversorgung auf das intestinale Mikrobiom beim Schwein. Master Thesis, Supervisor: Prof. P. Wolf (UoR)
- Hapke, M. (2015): Cobalt-katalysierte [2+2+2]-Cycloadditionen: Entwicklung, Struktur und Reaktivität neuer Präkatalysatoren und Anwendungen in der Synthese. Habilitation, Supervisor: Prof. U. Rosenthal (LIKAT, UoR)
- Prange, T. (2015): Effect of mix cropping combined with organic and inorganic fertilization on microbial bound phosphorus. Master Thesis, Supervisor: Prof. B. Eichler-Löbermann (UoR)
- Sanches, J. (2015): Effects of mixed cropping systems on plant available phosphorus pools in soil under drought stress conditions. Master Thesis, Supervisor: Prof. B. Eichler-Löbermann (UoR)
- Schneider, J. (2015): P-Sorption im Boden nach Langzeitapplikation von organischen und mineralischen Düngern. Master Thesis, Supervisor: Prof. B. Eichler-Löbermann (UoR)
- Sievert, K. (2015): Synthese und Charakterisierung von Cyanidoboraten und -phosphaten. PhD, Supervisor: Prof. A. Schulz (UoR)
- Skeff, W. (2015): Polar Herbicides in the German Baltic Estuaries Analysis, Occurrence and Effects. PhD, Supervisor: Prof. D. Schulz-Bull (IOW, UoR)
- Zacher, A. (2015): Einfluss von Vegetationszusammensetzung und P-Düngung auf die mikrobielle Biomasse, Mykorrhizierung und P-Mobilisierung im Oberboden unter Grünland. Master Thesis, Supervisor: Dr. C. Baum (UoR)

### 3.5 Graduate School of Phosphorus Research

For the Graduate School of Phosphorus Research a structured training concept (see the Annex and Fig. 1) was developed. Its target groups are excellent young scientists interested in phosphorus research (BSc and MSc students, PhD students, and postdocs), as evidenced by a thesis or a project in phosphorus research. They receive all relevant information and are authorized to receive grants, participate in events of the ScienceCampus Rostock, apply for financial support for internationalization (travel, publications, and



visiting scientists, including longer stays), and to actively take part in scientific and thematic networks, for example, the German Phosphorus Platform (DPP) and the European Sustainable Phosphorus Platform (ESPP).



**Fig. 1: Graduate concept of the Leibniz ScienceCampus Phosphorus Research Rostock**

The Graduate School 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. Eleven major knowledge and research gaps have accordingly been defined and 11 doctoral projects applied for and funded (Table 2). The development of BSc and MSc projects in connection with these PhD projects is planned.

By April/May 2015, all doctoral students had started their thesis research; in June 2015, they presented their topics at a Start Workshop. Doctoral students are supervised by a committee consisting of scientists from at least two partner organizations of the ScienceCampus. All mechanisms for quality assurance cited in the application to the Graduate School are actively implemented. In addition, there is a lively exchange of information between doctoral students through various events, such as workshops and the regularly held "Phosphorus Breakfast" (see Section 5). In addition to graduate students from the Graduate School, those from outside the school but with phosphorus-related research topics are members of the ScienceCampus Rostock and are thus able to participate in its events.

## 4 Networking

Besides the interactions among its individual scientists and research groups, the ScienceCampus Rostock is a member of the ESPP and, since March 2015, also of the DPP. Prof. P. Leinweber (ScienceCampus Rostock) was elected to the Executive Committee of the DPP. Also in 2015, the first networking meeting of the coordinators of the Leibniz ScienceCampi took place.

European Sustainable Phosphorus Platform (ESPP) – Participating in a working meeting 19.10.2015 (Dr. I. Krämer)

Deutsche Phosphor Plattform (DPP) – Participating in the general meeting of members (5.3.2015, 29.10.2015 in Berlin) and Forum 30.10.2015 in Berlin (Prof. F. Ekardt, Prof. P. Leinweber, Dr. I. Krämer, u.a.).

Network meeting of the coordinators of the Leibniz ScienceCampi, Berlin, 26.11.2015  
(Dr. I. Krämer)

## 5 Events

The ScienceCampus Rostock organized a number of external and internal events. They are listed below.

### 5.1 Public events

Colloquium Simone Röhling (Bundesanstalt für Geowissenschaften und Rohstoffe /Bundesministerium für Wirtschaft und Energie): „Phosphat: ein unverzichtbarer mineralischer Rohstoff“, UoR, 10.2.2015

1. International Symposium of the Leibniz ScienceCampus Phosphorus Research Rostock (on invitation only), visit and meeting of the Scientific Advisory Council of the ScienceCampus Rostock, IOW, 2.-3.3.2015

Workshop „Sustainable Crop Production – Recycling of Residues from Agriculture, Bioenergy Production and Food Industry“, Budapest, 25.-26.3.2015 (organised by the chair of Agronomy, UoR, BMBF funded, founding of a network for a EU-project proposal)

Colloquium (GdCh) Prof. Martin Bertau (Institut für Technische Chemie an der TU Bergakademie Freiberg) „Phosphatrecycling“, UoR, 25.6.2015

Colloquium Per Sjöberg (Uppsala University): "Analysis of Organic Phosphorus in Environmental Samples", IOW, 09.12.2015

Lecture Series Phosphorus Research „Interdisziplinäre Herangehensweise an ein lebenswichtiges Element“ (WS15/16) with 13 presentations of members of the ScienceCampus Rostock and 1 guest lecturer (Dr. Steve Robinson, University of Reading) (Program in the Annex)

### 5.2 Internal meetings and workshops

To promote networking and interdisciplinary cooperation within the ScienceCampus Rostock, various working meetings were held.

Internal meetings and workshops facilitate intensive networking by the scientists of the ScienceCampus. In addition to events for graduate students, an annual campus-symposium takes place in which all scientists introduce new projects, present their work, and discuss the results. The Steering Group of the Science Campus meets approximately every 3 months to discuss overarching issues as well as the strategic direction and development of the ScienceCampus.

The Steering Committee of the ScienceCampus Rostock met four times (16.2., 6.5., 1.9., and 23.11.2015) during the reporting period, each time at a different partner institute. At these meetings, the thematic development of the ScienceCampus and overarching decisions were deliberated.

In 2015, several organizational meetings (10.4., 16.7., 18.9., 3.11.2015) were held in preparation for the 8<sup>th</sup> International Phosphorus Workshop IPW8. The IPW8, which will be organized by the ScienceCampus Rostock, will meet in Rostock on the 12<sup>th</sup>-16<sup>th</sup> September, 2016.

To promote exchanges among PhD students working on phosphorus-related issues within the ScienceCampus Rostock, three "Phosphorus Breakfast" gatherings took place at different partner institutes (16.1., 8.5. and 13.11.2015), where updates on phosphorus research were presented.

Two other Graduate School workshops were the Start Workshop "Phosphorus Graduate School", held at the Leibniz Institute for Baltic Sea Research (IOW) on 12.06.2015, and a workshop of the Graduate School Phosphorus Research on "P-Analytics," held at the Biologische Station from 7. to 10.10. 2015.

## 6 Public relations

The ScienceCampus Rostock has 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)

Bachmann, S.; Eichler-Löbermann, B. (2015): Phosphorus fertilizer value of digestate from biogas installations. 2. European Sustainable Phosphorus Conference, Berlin, March 2015

Bathmann, U., "Die Küstenforschung in Deutschland", Forum Marine Forschung, national meeting in Kiel, 15.02.2015

Bathmann, U., "Küstenforschung in Deutschland", IOW Warnemünder Abende, Warnemünde, 30.07.2015.

Bathmann, U., "European Coastal Sea Research: Future Perspective", international meeting, Future Coast Europe, Berlin, 05.10.2015

Bathmann, U., "Die Küstenforschung in Deutschland", Landesvertretung MV, Berlin, 06.10.2015

Bathmann, U., "Die Entwicklung von KDM und die Küstenmeerforschung in Deutschland", NWMK, national meeting, Kiel, 27.12.2015

Collier, L.; Eichler-Löbermann, B.; Jablonowski, N. (2015): Digested sugar cane wastes can improve the early growth of Brazilian leguminous trees and soil chemical parameters. Tropentag 2015 in Berlin

Collier, L.; Silva, A.; Barbosa, J.; Arantes, N.; Silva, M.; Zang, J.; Zang, W.; Jablonowsky, N.; Leandro, W.; Schüch, A.; Eichler-Löbermann, B. (2015): Espécie arbórea do Cerrado brasileiro responde à aplicação de digestato dos resíduos da agroindústria de cana-de-açúcar. Encontro Anual das Ciências do Solo / EACS 2015, Castelo Branco

Eichler-Löbermann, B.; Brandt, C.; Stahn, P.; Busch, S.; Prange, T.; Uptmoor, R. (2015): Mischanbau mit Leguminosen zur effizienten Nutzung von Phosphor und Stickstoff. Mitt. Gesell. Pflanzenbauwiss 27, 101–102

Eichler-Löbermann, B.; Brandt, C.; Stahn, P.; Busch, S.; Prange, T.; Uptmoor, R. (2015): Phosphorus utilization in mixed-cropping-systems. 23rd international CIEC symposium, Son, Norway

- Ekardt, F. „Phosphor—ein Element aus sozialwissenschaftlicher Sicht...“, Forum „Einsatz von Sekundärphosphaten – Stand der Technik?“, Berlin, 30.10.2015
- Fundora, O.; Pineda, E.; Lugo, I.; Espinosa, R.; Eichler-Löbermann, B. (2015): Changes in soil fertility in 25 years of sugar cane monoculture in comparison to natural ecosystems. Tropentag 2015 in Berlin
- Granda, K.; Eichler-Löbermann, B.; Alvarado, Y.; Torres, R. (2015): Assessment of Ecuadorian rhizobium isolates under field conditions. Tropentag 2015 in Berlin, Germany
- Grünes, J.: Recycling of phosphorus from organic waste and residues – status, potentials and perspectives in Mecklenburg-Western Pomerania, Sardinia\_2015, 15th International Waste Management and Landfill Symposium, 5.-9.10.2015, Forte Village\_S. Margherita di Pula (CA), Italien
- Grünes, J: Phosphor-Recycling aus organischen Abfällen und Reststoffen – Stand Potentiale und Perspektiven in Mecklenburg-Vorpommern, 5. Wissenschaftskongress Abfall- und Ressourcenwirtschaft, 19.-20.03.2015, Innsbruck, Austria
- Leinweber, P. „Three examples for successful P recycling and product applications in agriculture“, 2nd European Sustainable P-Conference ESPC2, Berlin, 5./6.3.2015
- Leinweber, P. „Nachhaltige Versorgung der Pflanzenbestände mit Phosphat – begrenzender Faktor für die Bioökonomie?“, Tagung des Dachverbands Agrarforschung (DAF) zu nachhaltiger Bioökonomie, Phosphor und Pflanzenverfügbarkeit, 20.-21.10.2015
- Nausch, G. „Nährstoffbelastung der Ostsee“, 5. Dialog Wasserrahmenrichtlinie in MV, Güstrow, 15.10.2015
- Nausch, G. „Die „Überernährung“ der Ostsee – Wann hat sie begonnen und (wie) kann man sie stoppen?“, 20. Gewässersymposium LUNG, Güstrow, 20.10.2015
- Nelles, M.: Recycling of Phosphorus from Organic Waste and Residues – Status, Potentials and Perspectives in Germany, International Conference on Solid Waste 2015 – Knowledge Transfer for Sustainable Resource Management, 19-23 May 2015 Hong Kong.
- Nelles, M.: Aspects and Potentials of the Phosphorus Recycling from Organic Waste and Residues in Germany, 2nd Symposium of Asian Regional Branch of International Waste Working Group, 12.-15. April 2015 Tongji.
- Porto Muniz, M.; Zang, J.W.; da Fonseca-Zang, W.; Schüch, A.; Eichler-Löbermann, B.; Mozena, W.L. (2015): Soybean growth affected by the application of biodigestates from sugar cane vinasse. Tropentag 2015 in Berlin, Germany (presentations online)
- Schulz-Voigt, H. (2015): "The Role of Polyphosphate Accumulating Bacteria for the Phosphorus Cycle of the Ocean". Tagung der American Society for Microbiology (ASM), Mai 2015, New Orleans, USA
- Steinbauer, J., Schirmer, M.-L., Adomeit, S., Hoffmann, M., Werner, T. „First Catalytic Stobbe-type Condensation“ 24<sup>th</sup> North American Catal. Soc. Meeting (24<sup>th</sup> NAM), 14. – 19.06.2015, Pittsburgh, USA
- Vogel, T.; Nelles, M.; Eichler-Löbermann, B. (2015): A comprehensive evaluation of waste water based products from the composition to the P efficiency in the field. 2. European Sustainable Phosphorus Conference, Berlin, March 2015

- Wacker, U., Löffler, N., Rutz, T., Tütken, T., Conrad, A., Böttcher, M.E., Fiebig, J. "Clumped isotope thermometry of carbonate-bearing apatites: Digestion techniques and calibrations." Goldschmidt conference, Prag, Tschechische Republik, 08/2015
- Werner, T. „Organocatalyzed synthesis of fine chemicals utilizing CO<sub>2</sub> as a sustainable C1 building block“, 2<sup>nd</sup> International Symposium on "The Sustainable Use of Resources & Environment Protection by Catalysis", 17.–18.03.2015, Ho Chi Minh City University of Technology, Vietnam.
- Werner, T. „One component organocatalysts for the utilization of CO<sub>2</sub> as a C1 building block“ 5. BMBF Status Conference „Technologies for Sustainability and Climate Protection – Chemical Processes and Use of CO<sub>2</sub>“, 21.–22.04.2015, Berlin, Deutschland.
- Werner, T. „The development of catalytic Wittig reactions“, 9<sup>th</sup> Paul Walden Symposium on Organic Chemistry, 21.–22.05.2015, Riga, Lettland
- Werner, T., Büttner, H. „Two become One: One-component organocatalysts for the conversion of CO<sub>2</sub> with epoxides – Synthesis, Application, Recycling“, GDCh-Wissenschaftsforum Chemie, 30.08.–03.09.2015, Dresden
- Werner, T., Schirmer, M. L., Hoffmann, M. „Novel catalytic Wittig Reactions“, GDCh-Wissenschaftsforum Chemie, 30.08.–03.09.2015, Dresden
- Werner, T. „Phosphorus-based Organocatalysis and CO<sub>2</sub> Valorization“, GDCh-Kolloquium, 9.11.2015, Ernst-Moritz-Arndt-Universität Greifswald
- Zimmer, D., Kahle, P., Baum, C. „Auswirkungen sommerlicher Starkniederschlägen auf den P-Austrag von Dränflächen“ Jahrestagung DBG, 05.09.-11.09.2015
- Zimmer, D., Leinweber, P. „Phosphatüberschüsse im Boden – Probleme und Lösungsmöglichkeiten“ auf der Tagung des Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz in Kooperation mit Biogasforum Niedersachsen und dem 3N Kompetenzzentrum e.V.: „Biogas und überregionaler Nährstoffausgleich Was können Biogasanlagen dazu beitragen“ am 04.12.2015 in Soltau
- Hochschulinformationstag (HIT): „Reise eines Phosphormoleküls“, Prof. Dr. J. Tränckner (Wasserwirtschaft), Prof. Dr. B. Lennartz (Bodenphysik und Ressourcenschutz), Prof. Dr. I. Broer (Agrobiotechnologie) and Prof. Dr. E. Mohr (Tiergesundheit und Tier-schutz). 9.5.2015
- Leinweber, P.: DBU-Fachgespräch „Kreislaufführung & effiziente Nutzung Phosphor“ (12.11.2015): Integration von P (z.B. Recycling, Ökolandbau, politisch-rechtliche Begleitung) in die fördernden Querschnittsthemen.

## 6.2 Posters (selection)

- Bitschofsky, F. „P dynamic in sediments of the Darß-Zingst-Bodden chain“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015
- Büttner, H., Großbeilmann, J., Kohrt, C., Kragl, U., Werner, T. „Recycling of phosphorous-based Organocatalysts by Nanofiltration“, 48. Jahrestreffen Deutscher Katalytiker, 11.–13.03.2015, Weimar
- Büttner, H., Tenhumberg, N., Schäffner, B., Werner, T. "Synthesis of cyclic carbonates from renewable feedstocks", 5. Statuskonferenz der BMBF Fördermaßnahme "Techno-

- logien für Nachhaltigkeit und Klimaschutz - Chemische Prozesse und stoffliche Nutzung von CO<sub>2</sub>", 21.-22.04.2015, Berlin.
- Conrad, A.C., Böttcher, M.E., Fiebig, J., Dellwig, O., Grathoff, G., Leipe, T., Schmidt, B.C., Schmiedinger, I., Wacker, U. (2015): Calibration of C and O isotope fractionation during experimental formation of calcium-phosphate (EXCALIBOR project). EGU conference, Wien, Österreich, 04/2015
- Garske, B., Stubenrauch, J.: „Governance Instruments for Sustainable Phosphorus Management“. Forum „Einsatz von Sekundärphosphaten – Stand der Technik?“, Berlin, 30.10.2015
- Grimmer, C., Tenhumberg, N., Schäffner, B., Werner, T. „Bio-based cyclic carbonates“, 48. Jahrestreffen Deutscher Katalytiker, 11.-13.03.2015, Weimar
- Grimmer, C., Büttner, H., Tenhumberg, N., Werner, T. „Catalysts for the synthesis of bio-based cyclic carbonates from epoxidized fatty acid esters“, Wissenschaftsforum Chemie 2015, 30.08. – 2.09.2015, Dresden
- Jopp, S., Hoffmann, M., Deshmukh, S. „First Enantioselective Catalytic Wittig Reaction“, 48. Jahrestreffen Deutscher Katalytiker, 11.-13.03.2015, Weimar
- Jopp, S., Werner, T. „Catalytic Appel Reaction for Chlorination of Alcohols“, GDCh-Wissenschaftsforum Chemie, 30.08.-02.09.2015, Dresden
- Krämer, I., Bathmann, U. "Leibniz-WissenschaftsCampus Phosphorforschung Rostock", Forum „Einsatz von Sekundärphosphaten – Stand der Technik?“, Berlin, 30.10.2015
- Krämer I., Bathmann U. „Leibniz ScienceCampus Phosphorus Research Rostock“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015
- Krämer I., Bathmann U.: Leibniz-WissenschaftsCampus Phosphorforschung Rostock, KDM-Symposium „Küste 2025“. 17.04.2015
- Krämer, I., Bathmann, U. „Leibniz ScienceCampus Phosphorus Research Rostock: Towards sustainable phosphorus management“, Euromarine Foresight Symposium "Future Coast – Europe“, Berlin, 5.-7.10.2015
- Krämer, I., präsentiert durch I. Schaub, „Leibniz-WissenschaftsCampus Phosphorforschung Rostock“, F<sup>3</sup> Forschung trifft Forschung, Universität Rostock, 26.11.2015
- Lipka, M., Liu, B., Wegwerth, A., Dellwig, O., Winde, V., Al-Raei, A., Schoster, F., and Böttcher, M.E. „Element transformation rates and fluxes across the sediment-water interface of the Baltic Sea“, 2015 Aquatic Sciences Meeting (ASLO), 02/2015, Granada, Spanien
- Lipka, M., Liu, B., Wegwerth, A., Dellwig, O., Winde, V. and Böttcher, M.E. „Fluxes across the sediment water interface and transformation rates in surface sediments of the Baltic Sea“. IOW Scientific Advisory Board Evaluation, 03/2015, Warnemünde
- Lipka, M., Liu, B., Wegwerth, A., Dellwig, O., Winde, V. and Böttcher, M.E. „Element transformation rates and fluxes across the sediment-water interface in the Baltic Sea.“, 55th Conference of Estuarine Coastal Sciences Association (ECSA55), 09/2015, London, United Kingdom
- Lipka, M., Liu, B., Wegwerth, A., Dellwig, O., Winde, V. and Böttcher, M.E. „Element transformation rates and fluxes across the sediment-water interface in the Baltic Sea:



A stable isotope and modelling approach". Jahrestagung der Arbeitsgemeinschaft Stabile Isotope e.V., 09/2015, Heidelberg

Panten, K. und Leinweber, P. "Phosphat aus Knochenkohle: Freisetzung aus Einzelpartikeln und Ertragswirksamkeit" Forumsveranstaltung Deutschen Phosphor-Plattform e.V. ([www.deutsche-phosphor-plattform.de/dokumentation-2-forum-dpp/](http://www.deutsche-phosphor-plattform.de/dokumentation-2-forum-dpp/)), 30.10.2015

Pfahler, V. „Phosphorus use and acquisition efficiency of *Solanum tuberosum* L.“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015

Polley, C. „Responses to various dietary P-levels in growing pigs“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015

Schirmer, M.-L., Werner, T. "Base free catalytic Wittig reaction", GDCh-Wissenschaftsforum Chemie, 30.08.-02.09.2015, Dresden

Steinbauer, J., Büttner, H., Desens, W., Werner, T. „One-component catalytic system for the conversion of CO<sub>2</sub> with oxiranes“, 5. Statuskonferenz der BMBF Fördermaßnahme "Technologien für Nachhaltigkeit und Klimaschutz - Chemische Prozesse und stoffliche Nutzung von CO<sub>2</sub>", 21.-22.04.2015, Berlin

Vogel, T. „Biogas digestates - effects on phosphorus supply to plants“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015

Vogel, T. „Waste water products as P fertilizer - An evaluation in the field“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015

Wacker, U., Löffler, N., Rutz, T., Tütken, T., Conrad, A., Schmiedinger, I., Böttcher, M.E., Fiebig, J. "Clumped isotope thermometry of carbonate-bearing apatites: Digestion techniques and calibrations". GASIR conference, Heidelberg, 10/2015

Wulf, C., Büttner, H., Desens, W., Werner, T. "One-component catalytic system for the conversion of CO<sub>2</sub> with oxiranes", 48. Jahrestreffen Deutscher Katalytiker, 11.-13.03.2015, Weimar

### 6.3 Press

Rat für nachhaltige Entwicklung: Die Menschheit hat ein P-Problem. Interview with Dr. Inga Krämer and others, 12.3.2015. [www.nachhaltigkeitsrat.de/index.php?id=8899](http://www.nachhaltigkeitsrat.de/index.php?id=8899)

Phosphorforschung Rostock, request by Tim Schröder (science journalist) Interview, 21.10.2015 (I. Krämer) – Result: Tim Schröder „Der Stoff, von dem wir alle abhängig sind“, mare No. 115

Phosphorforschung Rostock, request by Claudia Georgi (freelance science journalist) for Der Tagesspiegel, Interview 29.09.2015 (I. Krämer)

„Hell statt heiß“, *Chemische Reaktionen mit Licht*, report on the research of the working group of M. Hapke, Leibniz-Journal (2/2015), S. 26/27

### 6.4 Websites

Leibniz ScienceCampus Phosphorus Research Rostock: [www.wissenschaftscampus-rostock.de](http://www.wissenschaftscampus-rostock.de) ([www.sciencecampus-rostock.de](http://www.sciencecampus-rostock.de); [www.p-campus-rostock.de](http://www.p-campus-rostock.de)) → e.g., 14 News articles (2015)



Leibniz Association/ScienceCampi: [www.leibniz-gemeinschaft.de/forschung/hochschulkooperationen/leibniz-wissenschaftscampi/rostock/](http://www.leibniz-gemeinschaft.de/forschung/hochschulkooperationen/leibniz-wissenschaftscampi/rostock/)

University of Rostock/Interdisciplinary Faculty/Maritime Systems: [www.inf.uni-rostock.de/mts/projekte/projekte-des-departments/wissenschaftscampus-rostock-phosphorforschung/](http://www.inf.uni-rostock.de/mts/projekte/projekte-des-departments/wissenschaftscampus-rostock-phosphorforschung/)

## 6.5 Inputs into Programming Processes

Interview (I. Krämer): design of the Everglades \$10m Grand Challenge Prize to develop cost-effective technologies for the removal and recovery of phosphorus from water (winning criteria). 11.12.2015

Short contribution to the public participation regarding the EC Marine Framework Directive program of measures (I. Krämer).

## 6.6 Others

Büttner, C. Kohrt und T. Werner, J. Großeheilmann, U. Kragl „Recycling of phosphorous based organocatalysts by organic solvent nanofiltration“: 11.-13. März 2015 in Weimar, Poster award of the 48. Jahrestreffens Deutscher Katalytiker 2015

Krämer, I.: Rapporteur „P in the environment – Reducing phosphorus losses: big returns on big investments“, ESPC2 - 2nd European Sustainable Phosphorus Conference, Berlin, 05./06.03.2015

Lange Nacht der Wissenschaften, UoR. Information stand of the Leibniz ScienceCampus Phosphorus Research Rostock, presented by D. Derlet-Eichler, I. Krämer, 7.5.2015.

## 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 12 PhD students from 45 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.



**Abb. 1: 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. Hisao Ohtake, Osaka University Japan  
 Prof. Dr. Paul Withers Prifysgol, Bangor University/UK

### 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. Manfred Schwerin, FBN, since August 2015 Prof. Dr. Klaus Wimmers  
 Prof. Dr. Klaus-Dieter Weltmann, INP

### 7.2.3 Spokesperson

Prof. Dr. Ulrich Bathmann, IOW

### 7.2.4 Steering committee

Prof. Dr. Ulrich Bathmann, IOW  
 Dr. Volker Brüser, INP  
 Dr. Klaus Dehmer, IPK  
 Prof. Dr. Marko Hapke, LIKAT  
 Prof. Dr. Ulf Karsten, UoR  
 Dr. Inga Krämer  
 Prof. Dr. Udo Kragl, UoR  
 Prof. Dr. Peter Leinweber, UoR (spokesperson UoR)  
 Prof. Dr. Detlef Schulz-Bull, IOW  
 Prof. Dr. Klaus Wimmers, FBN

### Representatives:

PD Dr. Tom Goldammer, FBN  
 Dr. Stephan Reuter, INP

Prof. Dr. Axel Schulz, UoR/LIKAT  
Prof. Dr. Marko Hapke, LIKAT  
Evelin Willner, IPK

### 7.2.5 Coordination office

(Work and tasks 2015: see Annex)  
Dr. Inga Krämer  
Daniela Derlet-Eichler (Secretariat)

### 7.2.6 Members

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

Prof. Dr. Matthias Beller	Applied Homogeneous Catalysis	Cluster III
Hendrik Büttner	Organocatalysis	Cluster III
Prof. Dr. Armin Börner	Asymmetric Catalysis	Cluster III
Dr. Marko Hapke	Cycloadditions and Transition Metal Catalysis	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

PD Dr. Tom Goldammer	Genome Biology	Cluster II
Dr. Michael Oster	Genome Biology	Cluster II
Franziska Just	Genome Biology	Cluster II
Prof. Dr. Manfred Schwerin	Director	Cluster II
Prof. Dr. Klaus Wimmers	Genome Biology	Cluster II

#### Leibniz Institute for Baltic Sea Research Warnemünde (IOW)

##### Directorate

Prof. Dr. Ulrich Bathmann	Director	Cluster I
Dr. Inga Krämer	Coordination Office	

##### Department Biological Oceanography

PD Dr. Matthias Labrenz	Environmental Microbiology	Cluster I
Dr. Monika Nausch	Microbial Processes and Phosphorus Cycle	Cluster I
PD Dr. Gerald Schernewski	Coastal & Marine Management	Cluster I
Prof. Dr. Heide Schulz-Vogt	Microbial Ecophysiology	Cluster I
Juliane Unger	Microbial Processes and Phosphorus Cycle	Cluster I
Dr. Angela Vogts	NanoSIMS Lab	Q
PD Dr. Maren Voß	Marine Nitrogen Cycle	Cluster I

##### Department Marine Geology

Prof. Dr. Helge Arz	Paleoceanography - Sedimentology	Cluster I, Q
Prof. Dr. Michael Böttcher	Geochemistry and Stable Isotope Biogeochemistry	Cluster I, Q
Dr. Olaf Dellwig	Geochemistry and Stable Isotope	Cluster I, Q

	Biogeochemistry	
Dr. Thomas Leipe	Microanalysis	Cluster I, Q
Marko Lipka	Geochemistry and Stable Isotope Biogeochemistry	Cluster I, Q

#### Department Marine Chemistry

Dr. Marion Abraham	Organic Contaminants	Cluster I, Q
Dr. Günther Nausch	General Marine Chemistry	Cluster I, Q
Constantin Recknagel	Organic Contaminants	Cluster I, Q
Prof. Dr. Gregor Rehder	Trace Gases	Cluster I, Q
Dr. Oliver Schmale	Trace Gases	Cluster I, Q
Prof. Dr. Detlef Schulz-Bull	Marine Chemistry	Cluster I, Q

#### Department Physical Oceanography and Instrumentation

Prof. Dr. Hans Burchard	Coastal ocean process modelling	Cluster I
Dr. Anja Eggert	Regional Oceanography	Cluster I
Dr. René Friedland	Baltic Sea system dynamics	Cluster I
Dr. Thomas Neumann	Baltic Sea system dynamics	Cluster I
Dr. Hagen Radtke	Baltic Sea system dynamics	Cluster I
Dr. Martin Schmidt	Regional Oceanography	Cluster I

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

Dr. Klaus Dehmer	Genebank, Satellite Collections North	Cluster II
Prof. Dr. Andreas Graner	Director	
Evelin Willner	Genebank, Satellite Collections North	Cluster II

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

Dr. Volker Brüser	Catalytic Materials	Cluster II
Dr. Stephan Reuter	Plasma Medicine/Decontamination	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. 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
Dr. Kirsten Büsing	Nutrient Physiology and Animal Nutrition	Cluster II
Dr. Friederike de Mol	Crop Health	Cluster II
PD Dr. Bettina Eichler-Löbermann	Agronomy	Cluster II

Prof. Dr. Bärbel Gerowitt	Crop Health	Cluster II
Jennifer Grünes	Waste Management and Material Flow	Cluster II
Dr. Petra Kahle	Soil Physics and Environmental Resources Conservation	Cluster I, II
Prof. Dr. Norbert Kanswohl	Agricultural Technology and Process Engineering	Cluster II
Svenja Karstens	Landscape Ecology and Site Evaluation	Cluster I
Dipl. Agr.-Ing. Ulrich Knaus	Aquaculture and Sea-Ranching	Cluster I, II
Prof. Dr. Peter Leinweber	Soil Science	Cluster II,Q
Prof. Dr. Bernd Lennartz	Soil Physics and Environmental Resources Conservation	Cluster I, II
Barbara Mahnke	Grassland and Fodder Sciences	Cluster I
Dr. Gert Morscheck	Waste Management and Material Flow	Cluster II
Dr. Jürgen Müller	Landscape Ecology and Site Evaluation	Cluster I
Franziska Mütter	Water Resources Management	Cluster II
Prof. Dr. Michael Nelles	Waste Management and Material Flow	Cluster II
Prof. Dr. Harry Palm	Aquaculture and Sea-Ranching	Cluster I, II
Prof. Dr. Jens Tränckner	Water Resources Management	Cluster II
Prof. Dr. Ralf Uptmoor	Agronomy	Cluster II
Telse Vogel	Agronomy	Cluster II
Dr. Denny Wiedow	Agricultural Technology and Process Engineering	Cluster II
Prof. Dr. Nicole Wrage-Mönnig	Grassland and Fodder Sciences	Cluster II
Dr. Dana Zimmer	Soil Science	Cluster II
<u>Faculty of Law</u>		
Prof. Felix Ekardt	Research Unit Sustainability and Climate Policy	Cluster II
<u>Faculty of Mathematics and Natural Sciences</u>		
Maximilian Berthold	Institute for Biological Sciences, Applied Ecology & Phycology	Cluster I, Q
Franziska Bitschofsky	Institute for Biological Sciences, Marine Biology	Cluster I
PD Dr. Stefan Forster	Institute for Biological Sciences, Marine Biology	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
Dr. Arne Schoor	Institute for Biological Sciences, Ecology	Cluster I

Prof. Dr. Axel Schulz	Institute for Chemistry, Anorganic Chemistry	Cluster III
PD Dr. Rhenia Schumann	Institute for Biological Sciences, Applied Ecology & Phycology, Biological Station Zingst	Cluster I, Q
Dr. Martin Sklorz	Institute for Chemistry, Analytical & Technical Chemistry; Analytical Chemistry	Cluster III
Prof. Ralf Zimmermann	Institute for Chemistry, Analytical & Technical Chemistry; Analytical Chemistry	Q
<u>Rostock University Medical Center</u>		
Prof. Brigitte Vollmar	Institute for Experimental Surgery, University Medicine Rostock	Cluster II

## 8 Funding

In 2015, the ScienceCampus Rostock was funded by the Ministry of Agriculture, Environment, and Consumer Protection Mecklenburg-Vorpommern and by the Leibniz Association. Substantial contributions also came 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 Agriculture, Environment, and Consumer Protection Mecklenburg-Vorpommern (€85,000 in 2015) were mainly used 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.

The initial funding from the Leibniz Association (€150,000) ended in July 2015 and was mainly used to establish the structures of the ScienceCampus und to finance five interdisciplinary projects, which were supervised by scientists from at least two partner institutions of the ScienceCampus. The project proposal from 2014, for the funding of a graduate school, was approved by the Leibniz Association. Thus, the ScienceCampus Rostock was awarded a total of €1.2 million over a period of 4 years (start 2015). Among the initiatives to be funded are 11 interdisciplinary PhD projects.

## APPENDIX





# Leibniz ScienceCampus Phosphorus Research Rostock

## Graduate Concept including the Graduate School of Phosphorus Research

### 1 Graduate concept

The graduate concept of the ScienceCampus Rostock is directed to an excellent, structured graduate education of young researchers in the field of phosphorus research along with an extending internationalization. It integrates Bachelor-, Master- and Doctoral studies and the scientific work of postdocs. In addition to the individual (BSc, MSc) and bilateral (PhD) tutoring by the workgroup leaders and scientists responsible for the projects, a thematic programme is offered (see 3 'Thematic programme'). The Phosphorus Graduate School (PGS) with doctoral students forms the core of the concept (see 2.1). In addition, other thematically related doctoral students can be associated to the PGS and thereby use the offered programme, which is also in large parts open to thematically related MSc- and BSc-students and postdocs.

<b>Graduate Concept</b>		
Postdocs	PhD / <u>Phosphorus Graduate School</u>	MSc/BSc
Thematic training/study programme		
Soft skills incl. knowledge transfer		
Internationalisation & Networking		

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

### 2 Members

Members are participants within the graduate concept programme of the ScienceCampus Rostock and include doctoral students of the Phosphorus Graduate School (PGS) and other thematically related BSc, MSc and doctoral students and postdocs.

#### 2.1 Phosphorus Graduate School (PGS)/doctoral students

The core of the graduate concept of the ScienceCampus Rostock forms a thematic graduate school. This Phosphorus Graduate School (PGS) has the overall aim of an excellent graduate education with new and innovative phosphorus themes. Each doctoral student will contribute and participate in the structured graduate education. The PGS will provide opportunities of interdisciplinary exchange and training as well as courses promoting soft skills. With an excellent research-intensive environment, this target group-oriented programme offers its doctoral students optimal conditions for a doctorate and a tailor-made preparation on time after graduation, both academic and non-academic careers.

Key aspects are

- Acquisition and improvement of skills for research and interdisciplinary work
- Deepening of methodological skills
- Acquisition of key skills/competences for further career development

The programme emphasizes particularly approaches to promote interdisciplinarity. These approaches are based on the teaching of social and communication skills. The curriculum of an increasing level of self-serving organization, joint participation in a summer school, interdisciplinary seminars and workshops and the prevention of scientific misconduct support that goal.

### 2.1.1 The thesis

All doctoral students will be supported by pairs of supervisors from at least two partner institutions of the ScienceCampus Rostock (e.g. IOW and University of Rostock). The doctoral students are enrolled at the Faculty of Mathematics and Natural Sciences, the Faculty of Agricultural and Environmental Sciences or the Faculty of Law of the University of Rostock. The PhD-theses must meet the formal requirements by the PhD regulations of the respective faculties involved. The enrolment gives the students the opportunity to participate in courses offered by the Graduate Academy of the University of Rostock (see 4.1).

For all doctoral students of the PGS the general scheme of work units is listed in figure 2. All these steps will be done jointly by the doctoral students and their supervisors. In addition, the doctoral students are supposed to discuss their PhD thesis with the supervisors (committee) at least three times per year and additionally have a career talk at least in the 2<sup>nd</sup> year. A supervisor and doctoral student agreement following the recommendations of the DFG shall be signed in the first months of work ([www.graduiertenakademie.uni-rostock.de/fileadmin/UniHome/Forschung/Reinheckel/Dokumente/Empfehlungen\\_der\\_DFG.pdf](http://www.graduiertenakademie.uni-rostock.de/fileadmin/UniHome/Forschung/Reinheckel/Dokumente/Empfehlungen_der_DFG.pdf) and [www.graduiertenakademie.uni-rostock.de/fileadmin/Graduiertenakademie/MBV.pdf](http://www.graduiertenakademie.uni-rostock.de/fileadmin/Graduiertenakademie/MBV.pdf)). This agreement contains rights and obligations on both sides. In addition, subject and work programme are recorded. Later modifications are not excluded, but should be mentioned in the agreement (update).

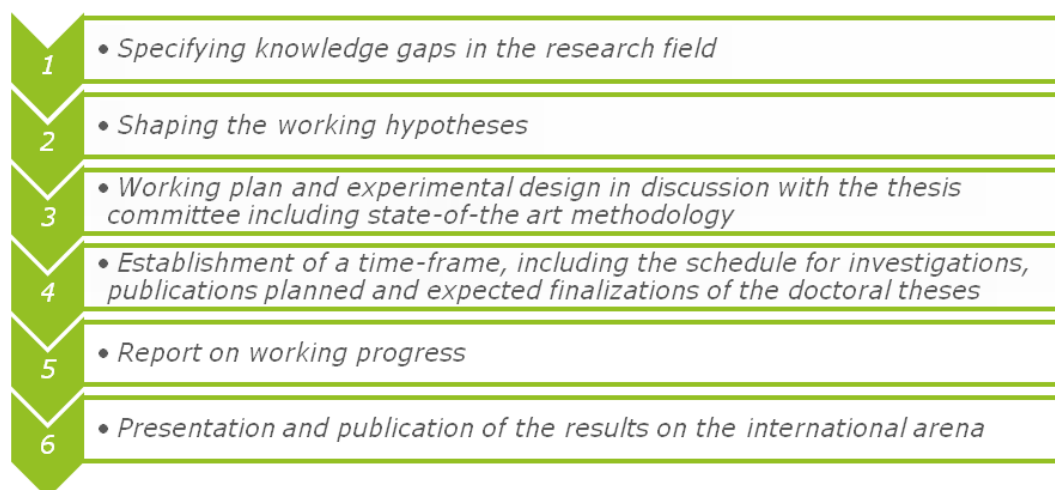


Figure 2: General scheme of work units for the PhD theses

### 2.1.2 Additional skills

Besides the individual scientific work on the thesis, the doctoral students of the PGS are expected to (list of issues including ECTS can be found in the intranet of the website of the ScienceCampus Rostock)

- complete at least 2 thematic workshops<sup>1</sup>
- attend the annual group seminars<sup>1</sup>
- attend 80% of the symposia, colloquia and lecture series of the ScienceCampus Rostock<sup>1</sup>

- participate (and present) in the department and laboratory meetings and seminars as well as the institute's colloquia<sup>1</sup>
- complete at least 2 soft skill courses<sup>2</sup>
- participate in at least 1 public relation-issues<sup>3</sup>
- tutor at least 1 BSc or MSc thesis

(<sup>1</sup> see 3; <sup>2</sup> see 4.1; <sup>3</sup> see 4.2)

The main part of requirements shall be completed in the first and second year. In the third year, a minimized course load gives students the opportunity to concentrate upon their research topic and to write their thesis. This enables the students to conduct research at the most advanced level. In addition to the curriculum training, students will contribute to scientific excellence by presenting results at national and international workshops and conferences and by publishing their data in international journals. Each doctoral student should have at the end of the PhD period published or submitted manuscripts of their results in international peer-reviewed journals. The guidelines of the Leibniz Association concerning open access publication have to be followed and the ScienceCampus Rostock mentioned in the acknowledgments.



Figure 3: Curriculum of the Phosphorus Graduate School

Figure 4: Time schedule for doctoral students of the Phosphorus Graduate School

## 2.2 Thematically related BSc, MSc and doctoral students and postdocs

The graduate programme offers young scientists with thematically relevant ongoing projects the opportunity to participate in the programme. As members can apply:

- Doctoral students from the partner institutions of the ScienceCampus Rostock working on a thesis that deals substantially with phosphorus research
- BSc and MSc students from the partner institutions of the ScienceCampus working on a thesis that deals substantially with phosphorus research
- Postdocs from the partner institutions of the ScienceCampus, whose research exhibits a substantial part on phosphorus research
- Visiting undergraduate and graduate students, postdocs that are working on phosphorus topics

Doctoral students of the partner institutions of the ScienceCampus can apply to become associate members of the PGS. They should be enrolled at faculties of the University of Rostock, to be able to participate in courses offered by the Graduate Academy of the University of Rostock. After successful application these doctoral students have the same rights and obligations as the doctoral students of the PGS.

The ScienceCampus Rostock awards scholarships for the length of two to three months to (external) scientists with thematically relevant phosphorus research topics to allow a research stay at the ScienceCampus Rostock. The visiting fellows should link their research interests and work with the thematic priorities of the ScienceCampus and contribute to discussions and workshops etc. within the graduate programme.

## 2.3 Regulations/Membership conditions

The members agree to participate in the programme (colloquia, workshops etc. see 3) and to comply with the rules of good scientific practice of the Leibniz Association ([www.leibniz-gemeinschaft.de/forschung/gute-wissenschaftliche-praxis](http://www.leibniz-gemeinschaft.de/forschung/gute-wissenschaftliche-praxis)). The members shall present their projects in a seminar/workshop at least once a year.

Application procedure for membership: The following documents shall be submitted to the coordination office of the ScienceCampus: a letter of motivation (1-2 pages) in which the interest in the membership is explained, curriculum vitae, list of publications, if appropriate, short synopsis of the research project. The selection of the applicants is made by a majority vote of the steering committee of the ScienceCampus. Doctoral students of the PGS do not have to apply, they are automatically members.

Duration: The membership ends after three years or by the end of the proposed research projects; for doctoral candidates with the publication of the thesis, for postdocs with the publication of relevant publications or end of their project. It is recommended that doctoral research projects will be completed within a period of three years.

Certificates: The ScienceCampus Rostock is not a PhD degree-awarding body itself. However, the doctoral degree can be supplemented with a graduate school certificate (obligations see 2.1.2). For the submission of the PhD thesis and the final exams the rules for a PhD degree of the relevant faculty apply. Also, the BSc, MSc, other doctoral students (who are not associate members of the PGS with extended obligations) and postdocs can get a certificate with the documentation of their activities within the graduate programme of the ScienceCampus Rostock.

Travel expenses: Each member can apply for travel expense reimbursement. The conditions and application procedure can be found on the website ([www.wissenschaftscampus-rostock.de/intern.html](http://www.wissenschaftscampus-rostock.de/intern.html)).

Publications: Support for publication costs can be requested to the scientific coordination/steering committee of the ScienceCampus. The conditions and application procedure can be found on the website ([www.wissenschaftscampus-rostock.de/intern.html](http://www.wissenschaftscampus-rostock.de/intern.html)).

Visiting Fellowship: Visiting Fellows receive a stipend of 1000 € per month and a mobility and material fee of 200 €, but no further allowances. There are up to three months per year per person possible. A grant from the ScienceCampus does not constitute an employment or service relationship. The Visiting Fellows are advised to take necessary health insurance at own expense according to the DAAD recommendations. For the duration of the stay, visiting fellows get a computer work place. The visiting term will be carried out in two or three consecutive months and not divided. No later than two months after the end of the scholarship, a written final report on the gained results must be submitted to the coordination office of the ScienceCampus Rostock. Application Procedure: Awarding of scholarships to Visiting Fellows will be selected according to the ability to connect to the ScienceCampus on the criteria of excellent scientific work. Applications can be submitted to the coordination office of the ScienceCampus any time and must include the following documents: a short letter of motivation with the justified interest in a research stay at the ScienceCampus, curriculum vitae including list of publications, short synopsis (3-5 pages) for the proposed research project including host working group and a work plan for the stay.

### 3 Thematic programme

The programme includes the following phosphorus research related activities:

**Colloquia (public):** will be organised by the ScienceCampus Rostock at least twice a year; invitation of external scientists with phosphorus research topics.

**Group Seminars (doctoral students of the PGS present and discuss their work):** The doctoral students present their theses and results internally to their fellow students and to the supervisors, thereby getting hints for their practical work and for presenting scientific results once a year. The 'start workshop' will be the first in this series.

**International P-Campus Symposia (public):** internationally oriented symposia will support the international network of research students and the PGS; they will be a forum for discussions with invited experts such as the members of the International Scientific Advisory Council of the ScienceCampus Rostock. Students are required to attend all symposia: passive participation in the 1<sup>st</sup> and active participation in the 2<sup>nd</sup> and 3<sup>rd</sup> year in form of an oral presentation and/or poster. In addition, the students are asked to suggest external speakers for the symposia. One key activity in the internationalization will be the 'International Phosphorus Workshop 2016 (IPW8)', which will be held in Rostock and hosted by the ScienceCampus Rostock.

**Lecture Series (public):** weekly (anticipated for winter term 2015/2016).

**Seminars** at the Institutes/University: the students shall present their results in the institutes' seminars and will get advice for their practical work and for presenting scientific results.

**Summer School for doctoral students of the PGS:** summer school organized together with the doctoral students of the ScienceCampus Rostock with own and external teachers. The doctoral students will present their research results and methodological

approaches and techniques of quantitative and qualitative research will be addressed. The summer school aims at more detailed discussions of cross-cutting issues on the current state of research and to raise the profile of the doctoral students.

**Thematic Workshops (open to all members):** Specific workshops are the preferred forum to stimulate exchange between internal and external scientists once or twice per year on current research themes as well as theories or methods of phosphorus research. The students will be integral partners in these workshops with presentations and practical exercises. These workshops are also meant as team-building measures and can be carried out e.g. at the Biological Research Station Zingst (University of Rostock). Examples of envisaged workshops:

- 'Phosphorus Boot Camp' course: provides the general background in phosphorus research/chemistry necessary for all PhD projects in general. It is aimed to give a brief overview of the main concepts and methods used in phosphorus research.
- Workshop 'Innovative analytical methods in P research'
- Workshop 'Technology transfer opportunities'

## 4 Soft skills

### 4.1 Graduate Academy of University of Rostock

The Phosphorus Graduate School (PGS) is embedded in the Graduate Academy of the University Rostock ([www.uni-rostock.de/forschung/graduieretenakademie](http://www.uni-rostock.de/forschung/graduieretenakademie)). The Graduate Academy offers complementary education of soft skills and career development in a broad range (courses only partly in English). Furthermore, the Graduate Academy organizes a meeting once a year, called 'Tag der Promovierenden' that stimulates mutual information and transdisciplinary linking and networking among the doctoral students. The network of the Graduate Academy allows an exchange of knowledge and experiences with other doctoral students at the University of Rostock. Also the Graduate Academy follows the recommendations of the DFG to complete care agreements between doctoral students and supervisors. The doctoral students of the PGS are automatically members of the Graduate Academy (fulfilling all requirements).

The graduate academy's objectives:

- Central organization to accompany qualification measures aiming to support doctoral candidates
- Improvement of the individual supervision of doctoral candidates
- Enabling an intensive scientific exchange in a network of doctoral candidates

Courses offered include:

- Support for the dissertation: coaching and self-management for doctoral students (start, hang on, graduation phase).
- Scientific core competences/methods: slide writing, writing scientific English, improved reading, academic writing and presentation skills, good practice in science
- Research and careers: application cycle, project management, career planning, exploitation of research results
- Communication and presentation: doctoral thesis defence, rhetoric, design of scientific posters, conflict management

It is also possible to organise courses on demand.

### 4.2 Public relations and knowledge transfer

Excellence in science communication is an essential aspect for a career in academia but also useful for many other professionals. Thus, all students of the PGS shall participate in



public relation activities at least twice during their doctoral studies. This can either be achieved by giving lay presentations to the public e.g. high school students, teachers, journalists, or by publishing articles e.g. in newspapers, non-scientific journals or at web-sites.

Another important topic for graduates and scientists is the technology transfer as a means of dissemination and promotion of results and innovations emerging from the activities in the ScienceCampus Rostock. Screening workshops will be offered for all members of the ScienceCampus in cooperation with the technology transfer departments of the partner institutes. During these workshops new results or developments should be presented by the different working groups and will be evaluated by a board of technology transfer experts from the different partner institutes regarding the potential of economic exploitation. This board will give advice to the scientists on subsequent steps. According to the stage of market maturity the proposed ideas can be validated further or the related institute can do market research for the transfer potential. This would, for example, include tasks concerning IP-rights, search for business partner(s) or generation of roadmaps for further development of ideas and products. Moreover, the partners aim at encouraging especially young scientists to use their ideas or results as a base for building up start-ups or spin-offs. To raise the awareness for this special career, information events for all scientists involved in the ScienceCampus Rostock will be organized and provided, for example, by the University Centre for Entrepreneurship.

## **5 Internationalization and networking**

The Campus strives to promote the networking among graduate students and scientists. Besides the workshops and other events, young researchers meet at a 'phosphorus breakfast' for exchange of ideas several times per year (every third month).

The graduate concept/thematic graduate school and the ScienceCampus Rostock as a whole contribute to the internationalization efforts and strategies of the Leibniz Institutes and the University. Research topics are offered at the international level to attract also international students and scientists. Upon start of their work at Rostock the doctoral students/scientists can use all relevant infrastructure of the University for foreign students and guest scientist like the 'Welcome Center' ([www.welcome-center.uni-rostock.de](http://www.welcome-center.uni-rostock.de)).

During research work all students are embedded in the manifold international networks of the supervisors and hosting institutes. The following few examples for institutional partnerships illustrate what a broad and diverse range of international collaborations is offered to the doctoral students at the ScienceCampus Rostock: IOW has established a scientific network with focus on the Baltic Sea with numerous research institutions in the Baltic Sea area, i.e. the Baltic NEST Institute of the Stockholm University or the Institute of Oceanology of the Polish Academy of Science in Sopot, but also globally, i.e. with the Universidad de Concepcion, Chile, the Guangzhou Marine Geological Survey, China, and the Instituto Nacional de Investigacao Pesqueira de Republica de Angola. As member of the Euromarine+ Consortium. LIKAT collaborates with the Istituto di Chimica Composti Organo Metallici (ICCOM, Firenze, Italy) and with the Saudi Basic Industries Corporation (SABIC). FBN is involved in large European research initiatives, e.g. ECO-FCE (A whole-systems approach to optimize and reduce the ecological footprint of monogastrics with 17 partners from 9 countries) and the EU COST Action METHAGENE (31 partners from 17 countries). IPK is actively involved in the European Cooperative Programme for Plant Genetic Resources (ECPGR) and INP has established collaborations via visiting professor-

ships to various universities overseas. The University of Rostock has established international collaborations with 55 universities all over the world and collaborates with 175 universities in the frame of the EU Erasmus program. Besides these rather general activities, members of the ScienceCampus Rostock actively participate in thematic P oriented networks or expand existing ones. One key example is the European Sustainable Phosphorus Platform (ESPP, [www.phosphorusplatform.org](http://www.phosphorusplatform.org)) in which the ScienceCampus Rostock is an active member.

The doctoral students will participate with their research in these scientific networks, e.g. by visiting collaborating foreign laboratories. Furthermore, they will be encouraged to present intermediate results at international conferences. Finally, the doctoral theses represent cumulative works consisting of a number of peer-reviewed publications in highly-ranked international journals.

## **6 Equal opportunities**

Equal opportunity concepts such as the cascade model of the Leibniz Association, the concepts of the partnering Leibniz Institutes and the University of Rostock, which promote e.g., women in scientific leading positions, will also be fully applied in the graduate programme of the ScienceCampus Rostock. The ScienceCampus Rostock greatly values strong involvement of women in the projects, both in practical work and in management. Moreover, the Leibniz Institutes and the University have established concepts of reconciling work and family life that will fully apply in the ScienceCampus.

Equally important is particularly the support of female applicants and later the female candidates in planning for a high level academic career in order to increase the share of women in leading academic positions. Mentoring programs are offered at e.g. the IOW and the Leibniz organization. Good practice examples are available at all partner institutes.

## **7 Quality management/Evaluation**

Quality management in the Phosphorus Graduate School takes place through the thesis committees with at least two supervisors from different partner institutions. They will have regular meetings with the doctoral students to guarantee successful final examination of the doctoral thesis within three years. Annual thematic workshops, symposia and other events with members of all partner institutes as well as with researchers from other national and international research institutes plus representatives from the ministries will assure intensive exchange on the state of the art research in the ScienceCampus Rostock. The doctoral students present their research results in form of talks and posters at international workshops and conferences, thereby ensuring a better classification and integration of own data, exchange and information on state of the art of the research results. Once a year, each doctoral candidate reports in the form of a lecture on the progress of the work available to all members of the Phosphorus Graduate School.

External evaluation of the ScienceCampus including the PGS will take place by the International Scientific Advisory Council for the ScienceCampus Rostock.

## **Leibniz ScienceCampus Phosphorus Research Rostock**

### **Tasks of the Coordination Office 2015 (report to the Ministry of Agriculture, Environment and Consumer Protection MV)**

***The Leibniz Science Campus Phosphorus Research Rostock links the research of 70 scientists from six research institutions who are active in many different disciplines and involved in externally funded projects with a total volume of more than €15 million. This linkage is accomplished by the Coordination Office, financed by the Ministry of Agriculture, Environment, and Consumer Protection Mecklenburg-Vorpommern. Without its efforts, neither the close networking of scientists nor a successful external presentation of the ScienceCampus or its structural developments would be feasible. Moreover, the Coordination Office has also enabled the acquisition of funds in the amount of €1.2 million by the Leibniz Association in support of graduate education, networking, and the internationalization of the ScienceCampus.***

In the following, the activities and thematic foci of the Coordination Office of the Leibniz ScienceCampus Phosphorus Research Rostock in 2015 are described. The Scientific Coordinator, Dr. Inga Krämer (represented during her parental leave until 20.01.2016 by Dr. Franziska Schmacka), was supported by the administrative assistant Daniela Derlet-Eichler (represented during her parental leave from 2.10.2015 to 29.5.2016 by Julia Schneider: 23.11.2015–31.5.2016).

The focus of the Coordination Office's work is the coordination of the research foci and projects of both the partner institutions and individual members. Among its other tasks were the external representation of the ScienceCampus, the preparation of reports and e-mails providing information to the different relevant parties, the organization of events of different formats, and, together with the Financial Department of the IOW, financial management. 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, its provision of support in the development of research project proposals, its coordination of the graduate school, its role as an event organizer, and 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 the national and international levels.

In 2015, the Coordination Office continued to serve as a contact for all members of the ScienceCampus, handled external inquiries, and forwarded targeted information to the relevant members/member groups. By mediating both internal and external contacts, networking among scientists was supported. Contacts with external research institutes, departments, and agencies were regularly maintained, and those with other networks were intensified, such as through membership, participation in meetings of the European Sustainable Phosphorus Platform (ESPP) and participation in both a forum and the general meeting of the German Phosphorus Platform (DPP). At the first networking meeting of the Leibniz ScienceCampi, held in Berlin, networking with other coordinators was deepened and included a lively exchange of experiences and ideas.

## **Research topics and initiatives**

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

Through the Coordination Office, relevant funding calls and suggestions regarding the acquisition of external research funds for scientists of the ScienceCampus are evaluated. In addition, the office coordinates projects supported by seed financing from the Leibniz Association, from project approval to the final reports.

## **Structured graduate support**

As young scientists make up a significant part of the ScienceCampus network, a structured framework for their support and encouragement is offered by the campus.

The Coordination Office developed a concept for structured graduate training at the ScienceCampus (see the Annual Report), whose core is the Graduate School of the ScienceCampus. The Coordinator was responsible for the coordination and administration of the Graduate School and organized both a kick-off workshop and a methods workshop, in addition to other networking opportunities for the graduate students.

## **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 2015 were the organization of meetings of the Steering Group of the ScienceCampus, which addressed current developments, record keeping, etc., and of breakfast gatherings of PhD students of the ScienceCampus, which promoted mutual exchanges. The Coordination Office also organized the 1st International Symposium of the ScienceCampus (program creation, invitation of the Scientific Committee, etc.) and several colloquia (see the Science Campus' Annual Report of 2015). In addition, the Coordinator assumed responsibility for the organization and coordination of the Organizing Committee (consisting of 11 scientists of the ScienceCampus) of the 8<sup>th</sup> International Phosphorus Workshop (IPW8), which for the first time will be held in Germany, at the ScienceCampus Rostock, in September 2016. The Committee's tasks include website creation and support, the organization of meetings, and the planning and commissioning of the general program of the event (catering, excursions, etc.).

## **Public relations**

The Leibniz ScienceCampus Phosphorus Research Rostock is a prominent research network comprising six partner institutions in Mecklenburg-Vorpommern. It has not only a regional, but also a national and international reputation.

The Coordinator presents the Leibniz ScienceCampus Phosphorus Research Rostock at a number of events, in the media (articles, interviews), and by developing information (handouts, posters, presentations) about the ScienceCampus (for a list, see the Annual Report of the ScienceCampus). This also entails providing the scientists of the Leibniz ScienceCampus Phosphorus Research Rostock with material to represent the ScienceCampus at events (conferences, workshops etc.) of thematic interest. The Coordination Office provides support related to introducing the ScienceCampus to external science groups, politicians, government, and the general public through presentations (slides) and posters.

The Coordination Office also organized the 1<sup>st</sup> Phosphorus Research Lecture Series, at the University of Rostock, and presented the ScienceCampus to the general public during Science Night at the University of Rostock.

Another important task was the design and maintenance of the website of the Leibniz ScienceCampus Phosphorus Research Rostock, including content development, in coordination with relevant scientists. The website is updated continuously with new information from the ScienceCampus. The Coordinator also compiles texts and information that allow the presentation of the ScienceCampus on other websites (for example, those of the German Phosphorus Platform and the European Sustainable Phosphorus Platform).



## Program of the lecture series Phosphorus Research, winter term 2015/2016

### Ringvorlesung

## Phosphorforschung

### Interdisziplinäre Herangehensweise an ein lebenswichtiges Element

Zeit: Wintersemester 2015/2016, mittwochs 17:00-18:30 Uhr  
Ort: Hörsaal 001 „Hans Spemann“, A.-Einstein-Str. 3

Datum	Vortragsthema	Referent
14.10.2015	Phosphorus mirabilis	Prof. Dr. Axel Schulz, Anorganische und Elementorganische Chemie, Universität Rostock
21.10.2015	Phosphor: Ein wichtiger Baustein in Katalyse und Chemie	Dr. habil. Marko Hapke, Cycloadditionen und Übergangsmetallkatalyse, Leibniz-Institut für Katalyse (LIKAT)
28.10.2015	Der marine Phosphor-Kreislauf	Prof. Dr. Detlef Schulz-Bull, Meereschemie/ Organische Fremdstoffe, Leibniz-Institut für Ostseeforschung Warnemünde (IOW)
04.11.2015	Phosphorus – a critical element in wetland conservation and restoration	Dr. Steve Robinson, Geography and Environmental Science, University of Reading (UK)
11.11.2015	Nährstoffe in den deutschen Küstengewässern und in der Ostsee	Dr. Günther Nausch, Meereschemie, Leibniz-Institut für Ostseeforschung Warnemünde (IOW)
18.11.2015	Leibniz-WissenschaftsCampi und weitere universitäre Forschungsinitiativen	Prof. Dr. Ulrich Bathmann, Direktor Leibniz-Institut für Ostseeforschung Warnemünde (IOW), Sprecher WissenschaftsCampus
25.11.2015	Der Phosphorzyklus und seine Anwendung in landbasierten Aquaponiksystemen	Prof. Dr. Harry Palm, Aquakultur und Sea-Ranching, Universität Rostock
02.12.2015	Wofür und wie effektiv nutzen Tiere Phosphor – Neue Einblicke aus „omics-Studien“	Prof. Dr. Klaus Wimmers, Genombiologie, Leibniz-Institut für Nutztierbiologie (FBN)
09.12.2015	Eutrophierung flacher Küstengewässer durch Phosphor: Was nun?	PD Dr. Rhena Schumann, Angewandte Ökologie, Universität Rostock
16.12.2015	Phosphor im Abwasser: Emission, Reduzierung, Recycling	Prof. Dr. Jens Tränckner, Wasserwirtschaft, Universität Rostock
06.01.2016	Beitrag der Kreislaufwirtschaft zur Phosphor-Versorgung - Grundlagen, Technologien & Grenzen	Prof. Dr. Michael Nelles, Abfall- und Stoffstromwirtschaft, Universität Rostock
13.01.2016	Knochenkohle - ein interessantes Recyclingmaterial mit Düngewirkung	Prof. Dr. Peter Leinweber, Bodenkunde, Universität Rostock
20.01.2016	Phosphor-Versorgung im Pflanzenbau mit Beispielen aus der internationalen Agrarforschung	Prof. Dr. Bettina Eichler-Löbermann, Pflanzenbau, Universität Rostock
27.01.2016	Nachhaltiges Phosphor-Management: Gesellschaftliche, politische und rechtliche Aspekte	Prof. Dr. Felix Ekardt, Forschungsstelle Nachhaltigkeit und Klimapolitik & Universität Rostock





## **Imprint**

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