Working Group "Young DPG"
Arbeitsgruppe junge DPG (AGjDPG)

Anna Bakenecker
Vorsitzende AG jDPG
Einsteinstraße 16
48149 Münster
bakenecker@jdpg.de

Stephan Köhler
stellv. Vorsitzender AG jDPG
Institut für Physik
Johannes Gutenberg Universität Mainz
Staudingerweg 7, 55128 Mainz
koehler@jdpg.de

Die jDPG lädt alle Interessierten herzlich zu ihrem Programm auf der Frühjahrstagung 2012 ein. Mit einem bunten Themenmix soll den Teilnehmern ein Einblick in aktuelle Forschungsthemen gegeben und weiterführende Qualifikationen vermittelt werden. So können sich die Teilnehmer bereits am Sonntag Nachmittag im Tutorial über wissenschaftliches Schreiben informieren und sich am Donnerstag über Auslandserfahrungen austauschen. Den Abschluss des jDPG Programms bildet in diesem Jahr der Einsteinslam der am Donnerstagabend in der Urania stattfinden wird. Bei diesem Wettbewerb wird entschieden welche(r) SlammerInn die Physik am besten in 10 Minuten vermitteln kann.

Overview of Invited Talks and Sessions

(lecture room E 020; Poster C)

Invited Talks

AGjDPG 4.1	Tue	9:30–10:00	E 020	**Stochastic gene regulation strategies in bacteria** — •Ulrich Gerland
AGjDPG 4.2	Tue	10:00–10:30	E 020	**The evolutionary advantage of being round** — •Oskar Hallatschek
AGjDPG 4.3	Tue	10:30–11:00	E 020	**Optimal control strategies in living cells** — •Markus Kollmann
AGjDPG 4.4	Tue	11:00–11:30	E 020	**Bacterial communication systems** — •Ilka Bischofs

Sessions

AGjDPG 1.1–1.4	Sun	16:00–18:30	H 0105	**Tutorial Scientific Writing**
AGjDPG 2.1–2.4	Mon	15:00–17:00	HE 101	**Focus Session: Big Data**
AGjDPG 3.1–3.6	Mon	17:15–18:45	HE 101	**Focus Session: Big Data (Contributed Talks)**
AGjDPG 4.1–4.8	Tue	9:30–12:30	E 020	**Systems Biology of Bacteria**
AGjDPG 5.1–5.2	Wed	10:00–11:15	EMH 225	**Plagiate vermeiden und erkennen**
AGjDPG 6.1–6.5	Thu	9:50–12:00	BH 243	**PhD Student Symposium: Spintronics on the Way to modern Storage Technology I**
AGjDPG 7.1–7.5	Thu	10:00–12:30	HFT-FT 131	**Climate - Modelling, joint session with jDPG**
AGjDPG 8.1–8.5	Thu	13:00–15:00	BH 243	**PhD Student Symposium: Spintronics on the Way to modern Storage Technology II**
AGjDPG 9.1–9.4	Thu	14:00–16:00	EMH 225	**'Beruf(s)-Leben' (Vereinbarkeit von Familie und wissenschaftlicher Laufbahn)**
AGjDPG 10.1–10.15	Thu	16:00–19:00	Poster C	**Erfahrungsaustausch Internationales**

AGjDPG 1: Tutorial Scientific Writing

Although the publication of research results is one of the most essential things for being successful in science, for many scientists writing papers can be an exhausting thing. Especially for those who are at the beginning of their scientific career there are many unclear questions concerning the topic "scientific writing". How should the manuscript be written? Which results should be presented in the paper and how? With the help of experienced editors from some of the most important international journals our tutorial will try to demystify the topic and will answer the above and other related questions. A special intention is to provide young physicists with useful information since their chances to learn more about writing scientific publications are usually very rare. Our tutorial is, therefore, divided into two equal parts. In the first our panel guests will give a short introduction to the topic, whereas in the second part we will pick up some particular aspects for a group discussion. This part will also be open for questions from the audience.

Time: Sunday 16:00–18:30 Location: H 0105

Tutorial AGjDPG 1.1 Sun 16:00 H 0105
Tutorial for authors and referees — •Hernan Rozenfeld — APS Editorial Office. Ridge, NY USA.

In this talk we will start by explaining how editors process a manuscript that is submitted for publication to an APS journal, including a brief overview on how we choose referees. We will show how to write a well-structured manuscript and what is expected in each section and will provide some hints on how to prepare referee reports. After the presentation the audience will be given a chance to ask questions to a panel of editors from different journals.

Tutorial AGjDPG 1.2 Sun 16:20 H 0105
From submission to publication with IOP journals - a guide for authors — •Tim Smith — IOP Publishing, Bristol, UK

This talk will provide an overview of the editorial process involved in publishing a research paper in IOP journals. Particular focus will be placed on the process of editorially assessing articles for suitability (including referee selection), the expectations of referees in assessing key criteria for publication and tips for authors in preparing a manuscript for submission. Finally I will take a look at Video Abstracts (recently launched by New Journal of Physics) and how these can represent a new option for authors looking to broaden the reach of their work.

Tutorial AGjDPG 1.3 Sun 16:40 H 0105
Preparing and submitting a scientific paper — •Rachel Won — Nature Photonics, Tokyo, Japan

Rachel will talk you through the concept of scientific detailed information and the guidelines on scientific manuscript preparation and submission, as well as an overview on the editorial and peer-review processes. You will learn what editors seek, how to write a good cover letter and a good scientific paper, and how to make an appeal.

Tutorial AGjDPG 1.4 Sun 17:00 H 0105
Writing to meet expectations — •Mark Buchanan — 35a West St, Abbotsbury, UK

The human mind isn't a blank slate. Readers come to any scientific paper – indeed, to any piece of writing – with preconceptions, expectations, habits and instincts, some genetically hard wired. Effective communication aligns itself with such instincts, avoiding needless confusion by laying out arguments in a style that meets readers' expectations and works with the human brain, not against it. I'll illustrate these points with examples from scientific papers.

There will be a panel discussion with all invited speakers after their contributions, chaired by Stefan Hildebrandt (Editor in chief pss-journals).

AGjDPG 2: Focus Session: Big Data

Time: Monday 15:00–17:00 Location: HE 101

Invited Talk AGjDPG 2.1 Mon 15:00 HE 101
Cities and Complexity — •Michael Batty — CASA, UCL, Gower Street, London WC1E 6BT

Cities, like many human systems, evolve as the product of a multitude of individual decisions concerning location and movement, generating order that emerges from the bottom up. In the last decade, they have been used as exemplars par excellence of many features that now define the complexity sciences: interacting dynamic systems, far-from-equilibrium, with strong path dependence, and surprising and novel behaviours. Cities are thus the crucibles of innovation in the economy and society and have become ever more central to the way we articulate our understanding of human systems. In parallel to these concerns, cities appear to becoming even more complex. New forms of behaviour are being generated largely through the development of new information technologies which enable individuals to communicate in countless novel ways a for example in the development of social media, while new forms of city-wide data are emerging as ICT is being fashioned into new systems underpinning the wired city. Transport of all kinds if being revolutionized by the import of ICT and in the near future, it is likely that the development of new forms of urban econophysics dealing with urban markets for land, housing as well as specific markets involving the production and consumption of goods at the spatial level will become the subject of the city focus. In this talk, I will summarise three of these developments: cities and the complexity sciences the rise of big data and the city, and smart cities.

Invited Talk AGjDPG 2.2 Mon 15:30 HE 101
Experimental Computational Finance & Big Data Environment — •Philip Treleaven — University College London, UK

High-frequency algorithmic trading is growing rapidly accounting for 70% of US equity volumes in 2010 (according to Reuters and Bloomberg), but is also of major concern due to potential catastrophic "Flash Crashes". Likewise, the behavior and risk of individual trading algorithms is poorly understood.

For the past seven years UCL has worked with the major investment banks and funds developing algorithmic trading systems, and more recently with the regulators investigating high-frequency trading risk and systemic risk. To support this work we have developed our Algorithmic Trading & Risk Analytics Development Environment (ATRADE) platform which can be used both for virtual and real trading and has access to terabytes of "big" data. It has been designed to: a) speed the development of trading algorithms, b) evaluate algorithm risk, and c) assess algo programmers. As an evaluation of the performance of ATRADE, in 2011 it was used to support a global algorithmic trading competition which attracted over 300 traders in 100 teams scattered across Europe, North America and Australia. Moving forward, UCL is now extending ATRADE with a comprehensive social media engine that supports scraping and analyzing of a wide range of social media data (called Social media Streaming, Repository and Analytics Manager (SocialSTREAM) platform). This presentation will present ATRADE and SocialSTREAM.

Invited Talk AGjDPG 2.3 Mon 16:00 HE 101
Embedding high dimensional data on networks — •Tiziana

DiMatteo — King's College London

In this talk I will introduce a graph-theoretic approach to extract clusters and hierarchies in complex data- sets in an unsupervised and deterministic manner, without the use of any prior information [1,2]. This is achieved by building topologically embedded networks containing the subset of most significant links and analyzing the network structure. For a planar embedding [3] this method provides both the intra-cluster hierarchy, which describes the way clusters are composed, and the inter-cluster hierarchy which describes how clusters gather together. I will discuss performance, robustness and reliability of this method by investigating several synthetic data-sets finding that it can outperform significantly other established approaches. Applications to financial data-sets show that industrial sectors and specific activities can be extracted and meaningfully identified from the analysis of the collective fluctuations of prices in an equity market.

[1] Won-Min Song, T. Di Matteo, T. Aste, Discrete Applied Mathematics 159 (2011) 2135. [2] Won-Min Song, T. Di Matteo, T. Aste, "Hierarchical information clustering by means of topologically embedded graphs", PLoS ONE (2011). [3] M. Tumminello, T. Aste, T. Di Matteo, R. N. Mantegna, PNAS 102, n. 30 (2005) 10421.

Invited Talk AGjDPG 2.4 Mon 16:30 HE 101

Econophysics and social research with large sets of data — •Rosario N. Mantegna — Dipartimento di Fisica, Università di Palermo, Viale delle Scienze Ed. 18, 90128, Palermo, Italy

The interaction between physics, economics and social sciences, that econophysicists have pursued over the past twenty years, is based on the idea of using statistical physics methods and paradigms to describe economic and social systems. This interaction is not new, for example, Daniel Bernoulli introduced one of the key concepts of Economics, i.e. the utility function while he was also contributing to hydrodynamics. The interaction was not only in the old past but it has been present in other periods of the history of science. For example, it was proposed again, in the last century, by Ettore Majorana in its tenth article published posthumously in 1942. However, the recent contribution of econophysicists in the analysis and modeling of economic and social systems presents specific aspects because nowadays economic and social sciences have switched from disciplines characterized by a low rate of data production to disciplines with a high rate of data production. Today the society produces an enormous amount of data from scientific, social and business activities. The latter type of data is a gold mine for the study of economic and social phenomena when searching for stylized facts (a technical term used to indicate statistical regularities). The data mining of these data allows the building of an empirical base that is used in the modeling of economic and social phenomena taking into account statistical regularities observed empirically.

AGjDPG 3: Focus Session: Big Data (Contributed Talks)

Time: Monday 17:15–18:45 Location: HE 101

AGjDPG 3.1 Mon 17:15 HE 101

Quantifying the behavior of stock correlations under Market stress — Tobias Preis[1,2,3], •Dror Kenett[4], H. Eugene Stanley[1], Dirk Helbing[2,5], and Eshel Ben-Jacob[4] — [1]Center for Polymer Studies, Department of Physics, 590 Commonwealth Avenue, Boston, MA 02215, USA, — [2]Chair of Sociology, in particular of Modeling and Simulation, ETH Zurich, Clausiusstr. 50, 8092 Zurich, Switzerland — [3]Artemis Capital Asset Management GmbH, Gartenstr. 14, 65558 Holzheim, Germany — [4]School of Physics and Astronomy, Tel-Aviv University, Tel-Aviv, Israel — [5]Santa Fe Institute, 1399 Hyde Park Road, Santa Fe, NM 87501, USA

Understanding of correlations in complex systems is crucial in the face of crises, such as the ongoing financial crisis. However, in complex systems, such as financial systems, correlations are not constant but instead vary in time. Here we address the question of quantifying state-dependent correlations in stock markets, since reliable estimates of correlations are most needed to protect a port- folio. We find the striking result that the average correlation among stocks belonging to a given index scales linearly with market stress reflected by the normalized value of the index return. Consequently, the diversification effect of the portfolio value melts away in times of market losses, just when it would most urgently be needed. Our empirical findings could be used to anticipate diversification break- downs leading to protected individual portfolios and could contribute to increased stability of financial markets in general.

AGjDPG 3.2 Mon 17:30 HE 101

Quantifying Trading Behavior in Financial Markets Using Google Trends — Tobias Preis[1,2,3], •Helen Susannah Moat[1,4], H. Eugene Stanley[2], and Dirk Helbing[1,5] — [1]Chair of Sociology, in particular of Modeling and Simulation, ETH Zurich, Clausiusstr. 50, 8092 Zurich, Switzerland — [2]Center for Polymer Studies, Department of Physics, 590 Commonwealth Avenue, Boston, Massachusetts 02215, USA — [3]Artemis Capital Asset Management GmbH, Gartenstr. 14, 65558 Holzheim, Germany — [4]Department of Mathematics, UCL, Gower Street, London, WC1E 6BT, UK — [5]Santa Fe Institute, 1399 Hyde Park Road, Santa Fe, New Mexico 87501, USA

Crises in financial markets affect humans worldwide. Detailed market data on trading decisions reflect some of the complex human behavior that has led to these crises. We show that massive new data sources resulting from human interaction with the Internet offer a different perspective on the behavior of market participants in periods before large market movements. Analyzing Google query volumes for search terms related to finance, we find that we can identify early warning signs of stock market moves. We further demonstrate that a trading strategy based on our analysis can outperform the market. Our results illustrate the unprecedented potential that combining extensive behavioral data sets offers for a better understanding of collective human behavior.

See also: http://www.tobiaspreis.de; http://www.suzymoat.co.uk; http://polymer.bu.edu/hes; http://www.soms.ethz.ch/people/dhelbing

AGjDPG 3.3 Mon 17:45 HE 101

Complex Economic Behavior Captured by Big Data — •Tobias Preis — Chair of Sociology, in particular of Modeling and Simulation, ETH Zurich, Clausiusstr. 50, 8092 Zurich, Switzerland — Center for Polymer Studies, Department of Physics, 590 Commonwealth Avenue, Boston, Massachusetts 02215, USA — Artemis Capital Asset Management GmbH, Gartenstr. 14, 65558 Holzheim, Germany

Financial market fluctuations are characterized by abrupt switches between upward trends and downward trends, which can last for hundreds of days or just a few minutes. Here, we address two questions. Firstly, can these ubiquitous switching processes be quantified? Secondly, what insight do new big social data sources offer into this collective behavior?

www.tobiaspreis.de

AGjDPG 3.4 Mon 18:00 HE 101

Who writes Wikipedia, a data-driven modeling of Wikipedia editorial activity — •Taha Yasseri, Róbert Sumi, and János Kertész — Institute of Physics, Budapest University of Technology and Economics, Budapest, Hungary

Recently developed Internet-based technologies facilitate collective cooperation of individuals more than ever. Among all possible examples, Wikipedia, the free encyclopaedia written by unknown volunteers from all around the world, is the one, in which self-organised value formation occurs with no external supervision or guidance. Moreover, similar to other online societies, the complete set of information about the activity of individuals is digitalised and collected in an easily accessible way, so that statistically analysing this big data corpus is achievable now.

In this contribution, we report on our recent investigations [1] on the accumulated data of the activity of Wikipedia editors in 34 languages (more than 1 billion records from more than 25 million editors), (i) to observe and evaluate the universalities and differences among various societies of editors and, (ii) to have an estimation of the geographical distribution of editors in the globe, based on the data-driven model for editor activities. We believe such studies could shed light to unknown aspects of the Wikipedia development process, its biases and limitations.

[1] T. Yasseri, R. Sumi and J. Kertész, Circadian patterns of

Wikipedia editorial activity: A demographic analysis, to appear in *PLoS ONE, pre-print: arXiv/1109.1746.*

AGjDPG 3.5 Mon 18:15 HE 101

Analysis and modeling of human behavior observed in cyber space communication data — •KENTA YAMADA[1], YUKIE SANO[2], HIDEKI TAKAYASU[3], and MISAKO TAKAYASU[4] — [1]Waseda University, Japan — [2]Nihon University, Japan — [3]Sony CSL, Japan — [4]Tokyo Institute of Technology, Japan

Analysis and modeling of human behavior become major targets of twenty-one century science. Especially, huge data of articles in cyber space such as blogs and twitters are attracting attention because the data directly reflect trends and topics in the society.

In this presentation, we report our analysis and modeling of the huge blog database which contains 300,000 bloggers including 70 million articles from 11/01/2006 to 8/31/2011. We observed some characteristic patterns in appearance frequency of some key words per day. We categorize them into three patterns: ordinary words, news words and trendy words. Ordinary words like adverbs are characterized by stationary processes, while the frequency of the news words and trendy words are characterized by non-stationary processes. A news word such as "tsunami" shows a sharp increase by sudden appearance of news and the number decays slowly following a power law. In the case of a trendy word, the number of entries per day increases exponentially.

In order to understand the origin of these characteristic motions, we introduce a state transition type agent-based model similar to the SIR (Susceptible-Infected-Recovered) model which is a basic epidemic model. We show that our simple agent-based model reasonably reproduces these three typical patterns.

AGjDPG 3.6 Mon 18:30 HE 101

Mapping dietary Patterns and their Transitions: Implications for the Environment — PRAJAL PRADHAN, •DOMINIK E. REUSSER, and JÜRGEN P. KROPP — Potsdam Institute for Climate Impact Research

This study analyzes global, long term data on food consumption per country to identify typical patterns of diets. From these patterns, we derive typical food transition pathways on a global scale. Subsequently we assess the environmental consequences from green-house-gas (GHG) emission and anthropogenic inputs.

We used Self Organizing Map to identify the patterns and the transition pathways based on supply of 12 food groups from FAOSTAT dataset for a period 1961-2007. Data on energy output/input ratio for crop production and agricultural emission were used to estimate fossil energy used and GHG emission associated with the patterns.

We identified nine typical dietary patterns consisting high, moderate and low food intake with varied compositions along with a typical food transition pathway with one bifurcation. As expected, the high dietary patterns require higher fossil energy and lead to higher GHG emission. However related non-CO2 GHG emission intensities are relatively low.

Changes in dietary patterns are a part of the global change processes. Identification of past transitions is way to anticipate possible future transitions, which may supports policy processes.

AGjDPG 4: Systems Biology of Bacteria

Time: Tuesday 9:30–12:30 Location: E 020

Invited Talk AGjDPG 4.1 Tue 9:30 E 020

Stochastic gene regulation strategies in bacteria — •ULRICH GERLAND — LMU, Munich, Germany

The regulatory circuits that control the processing of signals and the transcription of genes in bacterial cells are fascinating nonlinear stochastic systems. They often appear to be optimized by evolution, but they are only beginning to be explored on a quantitative level. I will briefly review some of the developments in this field, and then focus on a small regulatory circuit that controls the production of the machinery required to import and digest a specific sugar in E. coli bacteria. In a population of cells, this remarkably simple circuit leads to heterogeneous dynamic behavior that appears to implement an optimal strategy to deal with unpredictable environments.

Invited Talk AGjDPG 4.2 Tue 10:00 E 020

The evolutionary advantage of being round — •OSKAR HALLATSCHEK — Max Planck Research Group for Biophysics and Evolutionary Dynamics, MPI-DS, Goettingen, Germany

Bacterial species display an astonishing variety of shapes, such as round, rod-like, comma- or spiral-shaped. Shape is thought to influence several biological functions, such as nutrient take-up, swimming and the attachment to surfaces. Here, we study a possible impact of cell shape on adaptation. We show that, due to a biophysical buckling instability, rod-like bacteria exhibit much higher levels of random number fluctuation (genetic drift) in growing colonies than round microbes. Consequently, the establishment of beneficial mutations is strongly suppressed in colonies of rod-like bacteria. Our experiments and model thus support the hypothesis that shape strongly influences adaptability of growing biofilms.

Invited Talk AGjDPG 4.3 Tue 10:30 E 020

Optimal control strategies in living cells — •MARKUS KOLLMANN — Department Biologie, Universität Düsseldorf, Germany

Unicellular organisms have evolved an astonishing repertoire to survive in fluctuating environments. To ensure high reproductive success, microorganisms adapt sufficiently fast to new living conditions, such as nutrient availability, osmolarity, and ambient temperature. Such phenotypic adaptation is coordinated by the activity of cellular circuits, whose components are regulated on the level of DNA, RNA, and protein. The question arises whether the observed regulatory strategies of microorganisms can be explained by an optimal tradeoff between precision, timing and resource efficiency of cellular response. Strong evidence for such optimized cellular control can be found within bacteria and the evolved control strategies show striking similarities to predictions from optimal control theory. We give several examples for highly optimized bacterial circuits, their proposed objective functions, and their molecular realizations.

Invited Talk AGjDPG 4.4 Tue 11:00 E 020

Bacterial communication systems — •ILKA BISCHOFS — ZMBH, Heidelberg, Germany

Bacteria interact with each other in multiple ways, e.g. via diffusible signaling molecules. In a process called quorum sensing bacteria produce, secrete, sense and respond to signals, which accumulate with cell density. This allows them to control gene expression in a cell density-dependent manner. For example, frequently they launch specific responses, which are executed more efficiently collectively, upon reaching a "quorum". Interestingly, in nature there exists a variety of different quorum sensing network architectures. In particular, cell density information enters into cellular decision making processes in various ways. By means of simple theoretical models we compare different quorum sensing network architectures. Based on this analysis we begin to derive network design principles that may explain the significance of certain architectural features found in natural networks and we make predictions on how to build synthetic networks with optimized functions.

AGjDPG 4.5 Tue 11:30 E 020

A Plausible Mechanism for the Generation of Ultrasensitivity and Bistability in Bacterial Two-Component Systems — •RONNY STRAUBE — Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg

Two-component systems are the simplest signal processing units mostly found in bacteria. They consist of a histidine kinase (HK) and a cognate response regulator (RR) which often acts as a transcription factor. Upon stimulation the HK undergoes autophosphorylation and, subsequently, transfers the phosphate group to the RR. In addition, many HKs also exhibit phosphatase activity towards the phosphorylated form of the RR. The relative activity between autophosphorylation, kinase and phosphatase mode is often regulated by small allosteric effectors. Using a simple mathematical model I show that if the kinase and phosphatase activities are regulated in a reciprocal fashion two-component systems can generate highly sigmoidal responses (ultrasensitivity) quite similar to covalent modification systems in eukaryotes [1]. Under proper kinetic conditions the response can even become

hysteretic with an intermediate bistable regime. Hence, despite the bifunctional nature of the HK switch-like all-or-none responses could already be generated at the protein-protein level without genetic regulation. [1] Goldbeter A, Koshland, DE Jr. An amplified sensitivity arising from covalent modification in biological systems. Proc. Natl. Acad. Sci USA 78, 6840-6844 (1981).

AGjDPG 4.6 Tue 11:45 E 020

A model for sigma factor competition in bacterial cells — •Marco Mauri and Stefan Klumpp — Max Planck Institute of Colloids and Interfaces, Potsdam, Germany

Bacteria respond to changing environment conditions by switching the global pattern of transcribed genes, making only those products essential for their survival. In response to specif environmental stresses the cell activates several stress-specific molecules called sigma factors. They bind the core RNA polymerase (RNAP) - the machinery of transcription - and direct it towards the appropriate stress response genes. Since more than one sigma species could be present in the cell at the same time, it is believed that the modulation of their availability and competition among them for core RNAP provide important mechanisms for the global switch of the transcriptional program.

To analyze this competition, we have developed a theoretical model based on earlier work from the Gross lab [1]. The model shows that competition occurs only when the number of free sigmas exceeds the number of free cores. Within this framework, we analyzed the effects of some factors that modulate the competition such as anti-sigma factors, small RNA and active transcription. We applied the model to in vitro sigma competition experiments [2] and obtained good agreement. We also used the model to examine under which conditions a stop of transcription of ribosomal RNA as in the stringent response can passively up-regulate transcription driven by alternative sigmas.

[1] Grigorova et al., PNAS. 103, 5332 (2006)
[2] Jishage et al., Genes & Dev. 16, 1260 (2002)

AGjDPG 4.7 Tue 12:00 E 020

Unified description of Min protein patterns in vivo and in vitro — •Mike Bonny[1], Elisabeth Fischer-Friedrich[2], Martin Loose[4], Petra Schwille[3], and Karsten Kruse[1] — [1]Theoretische Physik, Universität des Saarlandes, Postfach 151150, 66041 Saarbrücken, Germany — [2]Max Planck Institute for the Physics of Complex Systems, Nöthnitzer Straße 38, 01187 Dresden, Germany — [3]Biophysics, BIOTEC, TU Dresden, Tatzberg 47/49, 01307 Dresden, Germany — [4]Harvard Medical School, Department of Systems Biology, 200 Longwood Avenue, Warren Alpert Building, Boston, MA 0211

The bacterial proteins MinD and MinE self-organize into a variety of fascinating patterns in the presence of a membrane. In vivo, standing and traveling waves as well as bistable stationary states are observed. In vitro they form plane and spiral waves. Several models explain Min protein pattern formation by cooperative attachment of MinD to the membrane and MinE-induced detachment from the membrane. However, a description reproducing all observed patterns is missing. We have found that MinE can bind by itself transiently to the membrane [1,2]. Analyzing mean field and stochastic models of Min protein dynamics, we find that our description shows all observed in vivo and in vitro patterns if we include the transient membrane interaction of MinE.

[1] M. Loose et al., Struct. Mol. Biol., 18, 577 (2011).
[2] K. Park et al., Cell, 146, 396 (2011).

AGjDPG 4.8 Tue 12:15 E 020

Quorum sensing of motile bacteria in spatial confinement — •Jan Ribbe and Berenike Maier — Institut für theoretische Physik, Universität zu Köln, Köln, Germany

Microscopic structures influence the direction of swimming bacteria through hydrodynamic interaction. Thus we hypothesize that the concentration of bacteria in spatially structured environments is heterogeneous and can potentially lead to local accumulation of bacteria. Bacteria in groups often have different lifestyles than individuals. Controlled by quorum sensing and nutrient limitation, a well-defined fraction of cells differentiates into the competent state at high cell density.

Here, we intend to test the hypothesis whether the state of motility impacts on bacterial lifestyle. First we addressed the question whether competence and motility are mutually exclusive. We found that cells of *Bacillus subtilis* that have decided to become competent do not necessarily abolish motility. The rate of motility of competent cells decreases, but remains at 20±10 %. Next, we generated asymmetric microfluidic channels with volumes of 30 pl. We found that motile cells accumulate in the dead ends of the asymmetric channels and exhibit a pronounced concentration gradient. Active swimming promoted accumulation significantly. Using fluorescence reporters for the master regulator of competence, we found that the number of competent cells is strongly increased in dead ends where cell concentration is high. In future experiments we will characterize the spatio-temporal development of competence in microhabitats of different dimensions.

AGjDPG 5: Plagiate vermeiden und erkennen

Time: Wednesday 10:00–11:15 Location: EMH 225

AGjDPG 5.1 Wed 10:00 EMH 225

Fälschungen in der Physik - Was kann man dagegen tun? — •Detlef Görlitz — Fachbereich Physik, Universität Hamburg

Das richtige Zitieren Anderer ist nicht das einzige Problem bei der Bekämpfung von Plagiaten und Fälschungen. Besonders in der Physik ist die Übernahme oder Fälschung von Messwerten (z. B. in Diagrammen) ein großes Problem, das bisher nicht automatisch per Plagiatssoftware und den dahinterstehenden Algorithmen und Heuristiken endeckt werden kann. Daher ist die Verantwortung von Gutachtern, Aufgabenstellern und Betreuern gem. den DFG-Richtlinien zur guten wissenschaftlichen Praxis gefragt. In diesem Beitrag werden die entsprechenden Ansätze erläutert und die damit erforderlichen organisatorischen und technischen Umstände diskutiert.

Invited Talk AGjDPG 5.2 Wed 10:30 EMH 225

Der Plagiatsuchdienst Docoloc — •Jens Brandt — Docoloc Plagiatsuche, Braunschweig, Deutschland, http://www.docoloc.de

Wissenschaftliche Texte und Informationen können heutzutage schnell und bequem über das Internet bereitgestellt werden. Eine stetig steigende Verfügbarkeit digitaler Inhalte erleichtert das Auffinden von Informationen zunehmend. Derart verfügbare Informationen können jedoch auch sehr einfach missbraucht werden indem einzelne Abschnitte oder ganze Aufsätze in eigene Arbeiten übernommen werden. Ein nicht unwesentlicher Anteil solcher Textplagiate bleibt allerdings unerkannt. Erst durch den konsequenten Einsatz automatisierter Plagiatprüfungen können Textplagiate effektiv aufgedeckt und unterbunden werden.

Der Plagiatsuchdienst Docoloc setzt genau dort an und bietet Lehrenden und Gutachtern ein Hilfsmittel zum Auffinden übernommener Textstellen. Docoloc vergleicht die Texte sowohl mit dem World-Wide-Web, als auch mit individuell vereinbarten Dokumentenbeständen. Damit überschneidet sich die von Autoren herangezogene Literatur mit der Suchbasis der Plagiatsuche optimal. Der Einsatz von Docoloc bei der Begutachtung von Dokumenten bietet eine wesentliche Zeitersparnis, so dass mehr Zeit für die inhaltliche Bewertung der Arbeiten zur Verfügung steht.

Im Rahmen dieses Vortrages wird zunächst die Plagiatsproblematik in Wissenschaft und Lehre beleuchtet und anschließend der Plagiatsuchdienst Docoloc näher vorgestellt. Als strategischer Projektpartner unterstützt Docoloc das Projekt Open-Access Plagiatsuche (http://oaps.eu), auf das im Vortrag ebenfalls kurz eingegangen wird.

AGjDPG 6: PhD Student Symposium: Spintronics on the Way to modern Storage Technology I

Time: Thursday 9:50–12:00 Location: BH 243

Thu 9:50 BH 243

Welcome by the AGjDPG and the organizers

Topical Talk AGjDPG 6.1 Thu 10:00 BH 243

Magnon Spintronics — •Burkard Hillebrands, Andrii Chumak, Alexandr Serga, and Benjamin Jungfleisch — Fachbereich Physik and Forschungszentrum OPTIMAS, TU Kaiserslautern

Spintronics is concerned with the development of devices which exceed the performance and energy efficiency of charge-based electronics by exploiting the electron's spin degree of freedom. Spin angular momentum, which is the information carrier in spintronics, can be transferred not only by the flow of electrons, but also by magnons: the quanta of spin waves (collective excitations of the spin lattice of a magnetic material). This opens a new research direction: magnon spintronics, a sub-field of spintronics in which information is transferred and processed using magnons. It can be implemented in an electric-isolator environment (yttrium iron garnet, YIG) fully avoiding Ohmic losses. I will give a tutorial style introduction into the main construction blocks of a magnon spintronics device: converters between information carried by the spin and the charge of electrons and magnons, magnon conduits, and physical phenomena allowing information processing by magnons. The most promising convertors for magnon spintronics are based on the spin pumping effect (which transforms spin waves into pure spin currents) and the inverse spin Hall effect (which converts spin currents into charge currents). I will present some selected results addressing magnetic insulator YIG - nonmagnetic Pt structures.

Topical Talk AGjDPG 6.2 Thu 10:30 BH 243

Functional materials for spintronics, magnetic devices and magnetization dynamics — •Günter Reiss[1], Andreas Hütten[1], Jan Schmalhorst[1], Markus Meinert[1], Daniel Ebke[1], Andy Thomas[1], Hans-Werner Schumacher[2], Markus Münzenberg[3], and Sergej Demokritov[4] — [1]Physics Department, Bielefeld University, Bielefeld, Germany — [2]PTB Braunschweig, Braunschweig, Germany — [3]Physics Department, Göttingen University, Göttingen, Germany — [4]Physics Department, Münster University, Münster, Germany

Spintronics uses the magnetic moment of electrons to process and store information or to sense magnetic fields. The corresponding devices are usually built from stacks of different thin films such as ferro-, ferri- and antiferromagnets, insulators, seed layers and conductors. The properties of the materials and the various interfaces are the key enablers for the device functionality. Using magnetic tunnel junctions (MTJs) capable of spin torque transfer switching as example we present the challenges of applications and discuss recent advances in using either traditional material combinations such as CoFeB/MgO or new materials such as Heusler alloys and magnetically perpendicular materials. In all stacks, magnetization and damping are key parameters and thus important dynamic properties will be discussed as well. In the last part, new memristive properties will be presented which could enable mimicking brain operations with MTJs.

AGjDPG 6.3 Thu 11:00 BH 243

Revealing the significance of heating in the all-optical switching process — •Sabine Alebrand, Daniel Steil, Alexander Hassdenteufel, Mirko Cinchetti, and Martin Aeschlimann — Department of Physics and Research Center OPTIMAS, University of Kaiserslautern, 67653 Kaiserslautern, Germany

It is well known that it is possible to switch the magnetic state of a ferrimagnetic GdFeCo sample all-optically, i.e. just by using one single circularly polarized laser pulse and without any additional external magnetic field [1]. In principle the laser pulse may fulfil two functions: delivering helicity and heating up the sample. Up to now it is still controversially discussed in literature if heating is necessary for the all-optical switching process [2,3].

To shed light on this issue: (i) we consider the dependence of the minimum laser fluence needed to obtain switching on the repetition rate of the laser pulses; and (ii) discuss the results of σ-π experiments using one circularly pulse (acting as angular momentum source) and a linearly polarized pulse (acting as a heating pulse). We show that it is possible to switch all-optically by the combination of both pulses although the fluence of the circularly polarized laser pulse is below the minimum fluence threshold (determined for switching with only one circularly polarized pulse). Both of our experiments clearly favour the fact that heating contributes to the switching process.

[1] Stanciu et al. PRL 99, 047601, 2007 [2] Kirilyuk et al., Rev. of Mod. Phys. 82, 2010 [3] Vahaplar et al., PRL 103, 117201, 2009

AGjDPG 6.4 Thu 11:15 BH 243

Large relaxation times in permalloy reprogrammable magnonic crystals — •Rupert Huber, Thomas Schwarze, Georg Duerr, and Dirk Grundler — Lehrstuhl für Physik funktionaler Schichtsysteme, Technische Universität München, James-Franck-Str., D-85748 Garching b. München, Germany

Stimulated by photonic crystals artificial band structures for magnons have attracted growing interest recently. The so called magnonic crystals are expected to have promising impact for nanometer sized spin wave logic elements. We have produced a one-dimensional densely packed ferromagnetic wire array by electron beam lithography and lift-off processing of 30 nm thick permalloy. This is based on a double exposure process, in order to avoid proximity effects at a period of 300 nm. We present data obtained by all electrical spin wave spectroscopy (AESWS). [1] Using a vector network analyzer and two collinear coplanar waveguides we measure spin wave propagation. The signals depend characteristically on an applied in-plane field reflecting the reprogrammable band structure [2]. We present quantitative data on velocities and relaxation times extracted from the phase information of the propagating spin wave.[1] We acknowledge financial support through the Nanoinitiative Munich (NIM) and the European Community*s Seventh Framework Programm (FP7/2007-2013) under Grant Agreement no. 228673 MAGNONICS. [1] Ballieul et al., APL, 83, 5 (2003) [2] J. Topp et al., PRL 104, 207205 (2010)

Topical Talk AGjDPG 6.5 Thu 11:30 BH 243

Spin wave propagation and excitation, microwave assisted switching and non-linear magnetic resonance — •Georg Woltersdorf, Hans G. Bauer, and Christian H. Back — Universität Regensburg, Regensburg, Germany

The control of the propagation properties of spin waves is essential for the successful implementation of magnon based logic devices. In addition since large excitation amplitudes are needed it is desirable to thoroughly understand the non-linear magnetization dynamics in such structures.

We use time resolved Kerr microscopy to study magnetic excitations on a sub-micron length scale. In doing so the spin wave propagation in magnetic wires and microwave assisted switching behavior in magnetic elements is studied. In addition we use X-ray magnetic circular dichroism experiments to determine precisely the number of magnons that are excited in Permalloy films. We show that commonly used models for non-linear resonance are actually not applicable at low bias fields. A simple non-linear model allows us to find the correct threshold field and the associated critical modes. This analysis explains our experimental findings and agrees with micro-magnetic simulations.

AGjDPG 7: Climate - Modelling, joint session with jDPG

Time: Thursday 10:00–12:30 Location: HFT-FT 131

Invited Talk AGjDPG 7.1 Thu 10:00 HFT-FT 131
The first Arctic ozone hole in spring 2011 - observations, current understanding and relation to climate change — •Markus Rex, Ingo Wohltmann, Peter von der Gathen, and Ralph Lehmann — Alfred-Wegener-Institut für Polar- und Meeresforschung

The Arctic winter 2010/2011 was characterized by an unusually stable and cold polar vortex in the lower stratosphere. Conditions for the formation of polar stratospheric clouds were widespread and the fraction of the polar vortex exposed to such conditions was the largest in the observational record, which started in the mid-1960s. The combination of extremely cold conditions throughout the winter with a long lived and stable vortex in spring led to record chemical destruction of ozone in the Arctic. Based on the measurements of the Match ozonesonde network and the Microwave Limb Sounder (MLS) instrument on Aura we will discuss the degree and the time evolution of this record loss and compare the Arctic ozone loss in 2011 with the range of ozone losses that occurred in early and recent Antarctic ozone holes. Model calculations of our fully lagrangian Chemical Transport Model ATLAS are used to assess our current theoretical understanding of the processes that lead to Arctic ozone loss and to highlight the role of denitrification for the record loss in 2010/2011. Analyses of the long term evolution of meteorological conditions in the lower polar stratosphere and approaches to diagnose climate change related changes in these from Climate Model output suggest a link between climate change and the occurrence of increasing degrees of Arctic ozone loss.

30 min coffee break

Invited Talk AGjDPG 7.2 Thu 11:00 HFT-FT 131
Potential tipping elements of the climate system — •Anders Levermann — Potsdam Institute for Climate Impact Research, Potsdam, Germany — Physics Institute of Potsdam University, Potsdam, Germany

Some regions and processes within the global climate system respond strongly non-linear to gradual changes in background climate with potentially dramatic impact on human society and nature. The talk discusses a number of these so-called tipping elements with respect to their underlying physical feedbacks: North Atlantic Current, Indian monsoon circulation and West Antarctic Ice Sheet. (Levermann et al. 2012, Climatic Change.)

AGjDPG 7.3 Thu 11:30 HFT-FT 131
Skaleninvariante Horizontaldiffusion in einem Globalen Zirkulationsmodell — •Urs Schaefer-Rolffs und Erich Becker — Leibniz-Institut für Atmosphärenphysik, D-18225 Kühlungsborn

Globale Zirkulationsmodelle (General Circulation Models, GCMs) sind für das Verständnis der Dynamik der globalen Zirkulation der Atmosphäre unentbehrlich. Grundlagen bilden die hydro- und thermodynamischen Gleichungen sowie die Wechselwirkungen der aufgelösten mit den nicht aufgelösten Skalen. So ist für die vollständige Beschreibung des Lorenzschen Energiezyklus die horizontale Energiekaskade in den subskaligen Bereich essentiell. Die dazu konventionell verwendete Hyperdiffusion ist jedoch nicht physikalisch konsistent.

Im *Kühlungborn Mechanistic general Circulation Model* verwenden wir seit 2007 das nichtlineare Smagorinsky-Schema basierend auf dem Mischungsweg-Konzept zur Parametrisierung der Horizontaldiffusion. Trotz einer erstmalig thermodynamisch korrekten Simulation des Energiezyklus zeigt das Smagorinsky-Schema Defizite. Um diese zu lösen, erweitern wir unser GCM mit dem Dynamischen Smagorinsky-Modell (DSM). Das DSM vermag die Mischungslänge lokal aus den kleinsten aufgelösten Skalen abzuschätzen.

In unserer Präsentation werden wir zunächst kurz auf die Theorie des DSM eingehen; nach unserem Kenntnisstand wurde das DSM bisher nicht in GCMs zur Parametrisierung der Horizontaldiffusion verwendet. Wir zeigen außerdem detailliert, welche Verbesserungen im Energiespektrum erreicht werden können.

AGjDPG 7.4 Thu 11:45 HFT-FT 131
Calculation of climate trend functions from local time series using a Monte-Carlo-enhanced process — •Dieter Ihrig — FH Südwestfalen, Iserlohn, Germany

Most of the scientific community accepts the fact that there is a temperature increase since pre-industrial time looking to the yearly mean temperature. But not overall the world the yearly mean temperature is clearly increasing. In Germany for example the yearly mean temperature is decreasing during the last 3 years. It is not really helpful to calculate a trend function as a straight line over few years. To understand the climate system and climate models it will be helpful to know the temperature trends in the sens of new time series depending on the locality or at least to latitude. A method to extract trends from time series using a Monte-Carlo-enhanced filtering process was presented 2008 in Darmstadt. The performance of the method will be demonstrated using simulated climate trend functions. The method will be applied at real climate series (1881 to 2011) of 40 stations. The calculations are made for yearly mean temperature and 12 monthly mean temperature. The results in temperature trends are compared with respect to the latitude. Using the temperature trend the change of net radiation energy input is calculated and discussed with respect to the latitude.

Invited Talk AGjDPG 7.5 Thu 12:00 HFT-FT 131
How variable is our climate? — •Thomas Laepple[1] and Peter Huybers[2] — [1]Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany — [2]Harvard University, USA

Determining the magnitude of natural climate variability is neccessary for predicting the plausible range of future climates. While the instrumental record is too short to determine slow climate variations, the analysis of climate archives of the mid-late Holocene (7000yr BP to modern) provides information about variations on decadal to millenial timescales. In a systematic comparison of paleo-temperature records and general circulation model (GCM) simulations, we show that current models systematically underestimate the variance in regional ocean temperature variability during the mid-late Holocene, with the discrepancy increasing from decadal to millennial timescales to more than an order of magnitude. The possibility that the greater variability results from noise in temperature proxies is rejected after analysis of the covariability between instrumental temperature records and coral, alkenone, and Mg/Ca proxies of temperature. The balance of evidence indicates that internal climate variability is much larger than simulated by GCMs on decadal and longer timescales, though the sensitivity of the climate system and magnitude of external forcing could also be greater at multi-decadal and longer timescales than presently accounted for in GCMs. In either case, these results suggests that model simulations are biased toward showing a too stable climate.

AGjDPG 8: PhD Student Symposium: Spintronics on the Way to modern Storage Technology II

Time: Thursday 13:00–15:00 Location: BH 243

Invited Talk AGjDPG 8.1 Thu 13:00 BH 243
Ultrafast manipulation of magnetic order — •Theo Rasing — Radboud University Nijmegen

The interaction of sub-picosecond laser pulses with magnetically ordered materials has developed into an extremely exciting research topic in modern magnetism and spintronics. From the discovery of sub-picosecond demagnetization to the recent demonstration of magnetization reversal by a single 40 femtosecond laser pulse, the manipulation of spins by ultra short laser pulses has become a fundamentally challenging topic with a potentially high impact for future spintronics, data storage and manipulation and quantum computation. In addition, when the time-scale of the perturbation approaches the characteristic

time of the exchange interaction (~10-100 fs), the soin dynamics enters a novel, highly non-equilibrium, regime where the exchange interaction might even become time dependent. Using ultrashort excitations, we may be able to manipulate the exchange interaction itself. Such studies require the excitation and probing of the spin and angular momentum contributions to the magnetic order at timescales of 10fs and below, a challenge to be met by future fs X-ray FEL*s.

References A.V.Kimel, et al, Nature 435 (2005), 655-657 C.D.Stanciu, et al, Phys.Rev.Lett.99, 047601 (2007) A.V.Kimel, et al, Nature Physics 10, 727-731 (2009) K.Vahaplar, et al, Phys.Rev.Lett.103, 117201 (2009) A.Kirilyuk, et al, Rev. Mod. Phys. 82, 2731-2784 (2010) I.Radu et al, Nature 472, 205 (2011)

Topical Talk AGjDPG 8.2 Thu 13:30 BH 243
Spin-transfer processes: Magnetic coupling, spin-transfer torque, and pure spin currents — •Daniel E. Bürgler — Peter Grünberg Institute, Electronic Properties (PGI-6) and Jülich-Aachen Research Alliance, Fundamentals of Future Information Technology (JARA-FIT), Forschungszentrum Jülich, D-52425 Jülich, Germany

Modern magnetic storage technology relies on manipulating and detecting magnetization states of nanometer-sized ferromagnetic (FM) entities. Spin-transfer processes in FM/non-FM/FM structures give rise to spintronic concepts featuring such functionalities. Equilibrium spin-transfer without net spin or charge transport is the origin of (anti)ferromagnetic interlayer coupling, which played a key role for the discovery of giant magnetoresistance. A spin-polarized current, i.e. flow spin momentum and charge, exerts a torque on the magnetization when entering a FM material by transferring spin angular momentum from the current to the magnetization. These spin-transfer torques give rise to current-driven magnetization dynamics with unprecedented properties like magnetization reversal without applying an external field or the excitation of persistent large-angle magnetization precessions with frequencies in the GHz range, which are the basis for spin-transfer nano-oscillators. Pure spin currents, finally, transport spin momentum without net motion of charge. This situation results for instance from spin accumulation in a non-magnetic metal. Non-local transport measurements in lateral spin valve exploit spin accumulation to generate and detect pure spin currents. Devices based on pure spin currents potentially operate with significantly reduced dissipation.

AGjDPG 8.3 Thu 14:00 BH 243
Improved reliability of magnetic field programmable gate arrays through the use of memristive tunnel junctions — •Jana Münchenberger, Patryk Krzysteczko, Günter Reiss, and Andy Thomas — Bielefeld University, Thin Films and Physics of Nanostructures, 33615 Bielefeld

Since the recent, successful implementation of the long-hypothesized memristor, its use in neuronal computing and in the reproduction of biological neural networks has gained increasing attention. In addition to the development of these new applications, the growing number of devices with memristive properties is promising to improve already established technologies. We use the recently reported memristance in magnesium-oxide-based magnetic tunnel junctions (MTJs) to improve the error tolerance in magnetic random access memory and magnetic field programmable logic. The MTJs have a thin barrier of 1.3 nm and were structured by e-beam lithography and ion beam etching. They show a tunnel-magnetoresistance (TMR) ratio of 100% and a memristive effect of about 6%. Using this effect, we can show that it is possible to tailor the resistance of the MTJs and thus compensate for resistance fluctuations that occur as a result of the fabrication process. Furthermore, the MTJs maintain stable resistances and do not need to be periodically refreshed.

AGjDPG 8.4 Thu 14:15 BH 243
Manipulation of Skyrmions created by opto-magnetic switching — •Stefan Gerlach, Denise Hinzke, and Ulrich Nowak — University of Konstanz, 78457 Konstanz, Germany

Magnetic bubbles are spots of opposite magnetization and can be observed in ferromagnetic thin films and nanoelements with high perpendicular anisotropy[1]. Their dynamics is determined by a topological number called the Skyrmion number which relates them to the well-known and similiar Skyrmions[2].

Opto-magnetic switching is known to reverse the magnetization of small spots in thin films within picoseconds[3]. We use Landau-Lifshitz-Bloch (LLB)-based simulations which allow for the linear reversal mechanism[4] combined with a two temperature model to describe the opto-magnetic switching. We will show how bubble domains can be created and discuss their dynamics when manipulated with external magnetic fields.

[1] C. Moutafis, et al., Phys. Rev. B 79, 224429 (2009)
[2] N. S. Kiselev et al., J. Phys. D: Appl. Phys. 44, 392001 (2011)
[3] K. Vahaplar et al., Phys. Rev. Lett. 103, 117201 (2009)
[4] N. Kazantseva et al., Phys. Rev. B 77, 184428 (2008)

Topical Talk AGjDPG 8.5 Thu 14:30 BH 243
Magnetoelastic Magnetization Control and Magnetization Dynamics at Low Temperatures — •Hans Huebl[1], Andreas Brandlmaier[1], Christoph Zollitsch[1], Johannes Lotze[1], Mathias Weiler[1], Fredrik Hocke[1], Georg Woltersdorf[2], Ruldof Gross[1], and Sebastian T.B. Goennenwein[1] — [1]Walther-Meißner-Institut, Bayerische Akademie der Wissenschaften, Garching, Germany — [2]Physik-Department, Universität Regensburg, Regensburg, Germany

In magnetic storage applications magnetization direction manipulation and magnetization switching speed are two key parameters. While magnetization orientation is usually controlled by means of Oersted fields, magnetization control via elastic strain fields represents an alternative approach. Here, we implement such a "spin-mechanics" concept in a hybrid structure consisting of a ferromagnetic thin-film deposited onto a piezoelectric actuator. The combination of piezoelectric and magnetoelastic effects allows to change the magnetization orientation by up to 90° solely via the voltage applied to the actuator. In a second set of experiments, we investigate magnetization damping, which directly relates to the magnetization switching speed. We discuss broadband ferromagnetic resonance as a tool to investigate magnetization damping as a function of temperature between 300 K and 50 mK, and address the impact of photon-magnon coupling.

This work is supported by the Excellence Cluster "Nanosystems Initiative Munich (NIM)" and DFG SFB 631.

AGjDPG 9: 'Beruf(s)-Leben' (Vereinbarkeit von Familie und wissenschaftlicher Laufbahn)

Die Vortragenden dieser gemeinsamen Session des Arbeitskreises Chancengleichheit der DPG und der Jungen DPG werden teilweise über persönliche Erfahrungen der Vereinbarkeit von Familie und wissenschaftlicher Laufbahn berichten, teilweise über die gesellschaftlichen und finanziellen Randbedingungen. Das Thema ist von allgemeinem Interesse, insbesondere für junge Physiker und Physikerinnen, und nicht nur auf die Situation von Frauen beschränkt - also ein echtes Gleichstellungsthema.

Time: Thursday 14:00–16:00 Location: EMH 225

Invited Talk AGjDPG 9.1 Thu 14:00 EMH 225
Doktorand und praktizierender Vater? Elternzeit bei befristeten Verträgen — •Ursula Schauer — Alfred-Wegener-Institut für Polar- und Meeresforschung Bussestraße 24, 27570 Bremerhaven

NachwuchswissenschaftlerInnen müssen ihre Karriere aufbauen. Sie haben dabei in aller Regel befristete Verträge, sind aber auch gleichzeitig im Alter der Familiengründung. Auf den ersten Blick scheint das kaum zu vereinbaren. Allerdings bekennen sich die meisten Universitäten und öffentlichen Forschungseinrichtungen und -finanzierer mittlerweile zu dem Ziel Vereinbarkeit von Familie und Beruf des/der WissenschaftlerIn. Die Gesetzeslage trägt dem mit dem Wissenschaftszeitvertragsgesetz ebenfalls durchaus Rechnung. Dennoch hapert es an vielen Stellen massiv mit der Umsetzung in die Praxis. In dem Vortrag werden die gesetzliche Grundlage der Elternzeitregelung bei befristeten Verträgen erläutert sowie individuelle und institutionelle Strategien, Probleme

und Fallstricke diskutiert.

Invited Talk AGjDPG 9.2 Thu 14:30 EMH 225
Who is this about anyway? Research with a wife and kids: A Postdocs perspective. — •Graham Kells — Freie Universität Berlin

In this presentation I will discuss some of the challenges of juggling family life and research in a foreign country. Most of my presentation will focus on the anecdotal experience of our move to Berlin i.e. learning to deal without your usual support structure, finding the right environment for children, challenges of finding and enrolling in multilingual kindergartens & schools. I will highlight why my pursuit of an academic role has necessarily led to the suspension of my wife's career and the effects (both good and bad) it has had our children's development.

Invited Talk AGjDPG 9.3 Thu 15:00 EMH 225
Nur Mama darf nicht krank werden — •Elke Scheer — Universtät Konstanz

In diesem Vortrag werde ich kurz über meine eigenen Erfahrungen in Bezug auf Vereinbarkeit von Berufstätigkeit in der Wissenschaft und Familie berichten. Dieser Erfahrungsbericht beinhaltet auch anekdotisch die Entwicklung der Akzeptanz von familienbegründeten Randbedingungen von Wissenschaftlern und Wissenschaftlerinnen in Universitätsgremien und geht auf besondere Herausforderungen ein. Dieser Erfahrungsbericht wird ergänzt durch einige statistische Tatsachen über Wissenschaftlerinnen und Wissenschaftler mit Familie.

Invited Talk AGjDPG 9.4 Thu 15:30 EMH 225
Neue Konzepte der „echten" Gleichstellung — •Simone Herth — Sonderforschungsbereich 613, Universität Bielefeld, Deutschland

In der Vergangenheit wurde die Gleichstellung häufig als Frauenförderung verstanden. Aus dieser Zeit stammt z.B. die Möglichkeit eines Promotionsstipendiums für Frauen, so dass die Frauen ein Stipendium ohne Arbeitslosen- und Rentenversicherung bekamen, die Männer dagegen die sozialversicherungspflichtigen regulären Stellen. Mit der Umbenennung zur Gleichstellungsbeauftragten setzte daraufhin ein Umdenken ein, das aber immer noch nicht in die Realität eingezogen ist. Dieser Vortrag fasst weit verbreitete Initiativen der Gleichstellungsförderung zusammen, diskutiert die tatsächlichen Probleme und Schwierigkeiten von Frauen speziell in den MINT (Mathematik, Informatik, Naturwissenschaft, Technik)-Fächern und zeigt neue Konzepte der echten Gleichstellung.

AGjDPG 10: Erfahrungsaustausch Internationales

Scientists are global networkers. They cooperate and exchange ideas across borders and around the globe, interacting between countries and cultures. That is a great environment full of opportunities, but it requires skills and experience beyond scientific knowledge to successfully benefit from it. It is an essential part of scientific education to gain this experience and to spend time abroad in different scientific cultures, even if this is not explicitly required by the curricula. All the more, one's own initiative is required and curiosity has to be stimulated to see and experience other countries and scientific contexts.

In this session, students and young researchers share where in the world they have been, what they did, how they got there, and what they experienced.

The world is full of possibilities, benefit from them!

Time: Thursday 16:00–19:00 Location: Poster C

AGjDPG 10.1 Thu 16:00 Poster C
Counting Electrons in Umeå — •Stephan Köhler — Johannes Gutenberg-Universität Mainz

Umeå University (UMU) is the fifth oldest university in Sweden situated in one of the fastest growing cities of the country. With its strong and broadly oriented mathematics and physics departments, covering subject from materials science to astrophysics, it is also a stimulating place for physics students from abroad. Here I present an introduction to the physics program and student life in Umeå. I will also present a project I performed in the theoretical physics department at UMU. In this project I compared two approaches to Full Counting Statistics of Electrons (FCS). The goal of FCS is to predict the response of electrons in a mesoscopic circuit to an applied voltage, a behavior that becomes more and more important as nanotechnology advances. The influential approach by Levitov, Lee and Lesovik [1] is introduced and compared to the approach by Rammer, Shelankov and Wabnig [2]. It is shown that both approaches are only equal if the electron system is in a pure state in the charge representation.

[1] L. Levitov, H. Lee, and G. Lesovik, J. Math. Phys. 37, 4845 (1996) [2] J. Rammer, A. Shelankov, and J. Wabnig, Phys. Rev. B 70, 115327 (2004)

AGjDPG 10.2 Thu 16:00 Poster C
Study Abroad in Hong Kong — •Roman Bansen — Leibniz Institute for Crystal Growth, 12489 Berlin, Germany

Studying abroad becomes increasingly important in a more and more globalized world. Besides the professional interest in certain research activities in different places, it also offers good networking opportunities and can greatly enhance both language proficiency and soft skills.

The poster presents details about and impressions of studying abroad in Hong Kong in general and at the Chinese University of Hong Kong (CUHK) in particular. Costs and financing are discussed, a brief introduction to the cultural background is given, and selected courses in physics and languages are shown, followed by a short presentation of possible activities (far) beyond the university compound.

AGjDPG 10.3 Thu 16:00 Poster C
Gel dosimetry - a laser based 3D scanner for radiology gel samples — •Johannes Widmer[1,2], Senthil Kumar Dhivyaraj Kalaiselven[2,3], and James Jebaseelan Samuel Emmanuel Rajan[2] — [1]Institut für Angewandte Photophysik, TU Dresden, Germany — [2]Photonics Division, VIT University, Vellore, Tamil Nadu, India — [3]Department of Therapeutic Radiology, University of Minnesota, Minneapolis, USA

A laser based 3D scanner is developed to take tomography images of partly transparent samples. The scanner is optimized to characterize gel samples from spatially resolved dosimetry measurements. The resulting device should be suitably designed to be constructed in India. This gave me valuable insight into the scientific and technological environment of the country and made me find my way through a quite different culture of research and commerce, within and beyond the scientific context of the university. The project was implemented during a nine months stay at the Vellore Institute of Technology University in Vellore, Tamil Nadu, India, in co-operation with the Christian Medical College, Vellore, in 2006/07. It was conducted within the framework of existing research activities of the host university.

AGjDPG 10.4 Thu 16:00 Poster C
Ein Semester an der San Jose State University, San Jose, CA, USA — •Thomas Bienert — Carl von Ossietzky Universität, Oldenburg, Germany

Dieses Poster stellt eine komptakte Zusammenfassung meines Auslandssemesters an der San Jose State University in San Jose, Kalifornien, USA dar. Ich gebe Einblick in meine Planung und Finanzierung des Semesters, sowie eine Beschreibung der organisatorischen Schritte, die ich auf dem Weg ins bzw. im Ausland gehen musste. Hierzu gehören unter Anderem die Anmeldung an der Uni, das Visum und die Wohnungssuche vor Ort.

AGjDPG 10.5 Thu 16:00 Poster C
Studieren wo ich will: Als "Free-Mover" von Kassel nach Bor-

deaux — •Kerstin Kämpf — Technische Universität Darmstadt

Wer im europäischen Ausland studieren möchte, orientiert sich meist an den Partneruniversitäten der eigenen Universität und sucht nach ERASMUS-Platz für sein Auslandssemester. Doch nicht für alle Studiengänge gibt es an der Partneruniversität die gewünschte oder notwendige Spezialisierung oder der bevorzugte Ort ist nicht in der Liste der ERASMUS-Partner. In meinem Fall bestand die Schwierigkeit darin ein zum Studiengang Nanostrukturwissenschaft an der Uni Kassel passendes Programm in Frankreich zu finden. Ich habe mich schließlich für den Master "Strukturelle Biochemie" an der Universität Bordeaux entschieden und somit eine Vertiefung in einer anderen Richtung eingeschlagen. Über das "Free-Mover" (neu: "PROMOS") Programm des DAAD konnte ich eine Unterstützung für mein Auslandsemester in Bordeaux erhalten. Wie mein Weg nach Frankreich aussah und wie sich der Weg ins Ausland an eine Nicht-Partneruniversität von dem üblichen ERASMUS-Programm unterscheidet, wird in diesem Poster vorgestellt.

AGjDPG 10.6 Thu 16:00 Poster C

Sommerschulen und Auslandssemester in Russland — •Michael Hofmann — TU Berlin

Um den akademischen Austausch mit Osteuropa und der ehemaligen Sowjetunion zu stärken, fördert der Deutsche Akademische Austauschdienst (DAAD) mit seinem GoEAST-Programm Studium, Forschung und Praktika in Ländern dieser Region.

In den Jahren 2007-2009 habe ich Sommerschulen in Zentralrussland und Sibirien besucht und ein Auslandssemester an der Lomonossow-Universität in Moskau absolviert. Mit meinem Poster möchte ich euch für einen Aufenthalt in Russland begeistern, der nicht nur wissenschaftlich, sondern auch kulturell eine Bereicherung ist.

Bei mir findet ihr zudem Tipps für die Bewerbung sowie Finanzierung einer Sommerschule bzw. eines Auslandssemesters. Wer den akademischen Aufenthalt mit touristischem Entdeckungsgeist kombinieren will, bekommt gerne wertvolle Infos.

AGjDPG 10.7 Thu 16:00 Poster C

Beschreibung der Doppelionisation von Neon mit Hilfe verallgemeinerter Dyson-Wellenfunktionen — •Matthias Zimmermann[1] und Tom Kirchner[2] — [1]Universität Ulm, Ulm, Deutschland — [2]York University, Toronto, Kanada

Um die Doppelionisation von Neon-Atomen durch Elektronen- oder Ionenbeschuss theoretisch beschreiben zu können, werden geeignete Anfangszustände benötigt. Im Rahmen des RISE-Programms des DAAD wurde in einem Praktikum an der York University in Toronto versucht hierfür Dyson-Wellenfunktionen zu verwenden. Diese stellen eine Verallgemeinerung der Dyson-Orbitale auf Zwei-Elektronen-Wellenfunktionen dar.

Dyson-Orbitale sind als ein Überlappintegral der Wellenfunktion des neutralen Atoms und des einfach ionisierten Atoms definiert und werden beispielsweise in der Quantenchemie zur Beschreibung der Photoionisation verwendet. Eine Dyson-Wellenfunktion kann daher als Wellenfunktion der später ionisierten Elektronen interpretiert werden, solange sich diese noch im Atom befinden.

Der Schwerpunkt des Praktikums lag auf der Untersuchung der Eigenschaften der verallgemeinerten Dyson-Wellenfunktionen, ihrer Berechnung und Visualisierung für die Doppelionisation von Neon. Es ergaben sich hierbei 15 verschiedene Dyson-Wellenfunktionen, welche anschließend als Anfangszustände für die Berechnung des Wirkungsquerschnitts des Ionisationsprozesses verwendet wurden.

AGjDPG 10.8 Thu 16:00 Poster C

Studieren im modernen Asien: Hong Kong — •Shun Yu — TU Darmstadt, Deutschland

Im WS 2010/2011 durfte ich dank dem IRO (International Relations Office) ein Semester (gerne auch zwei) an der Hong Kong University of Science and Technology (HKUST) verbringen. Ermöglicht wurde dies auch vom sehr unterstützenden Fachbereich Physik, der an unserer Universität alles tut, um den Studenten einen möglichst unkomplizierten und schönen Auslandsaufenthalt während des Studiums zu ermöglichen. In den viel zu kurzen 4 Monaten (September bis Anfang Januar) war es dennoch möglich, einiges von Hong Kong, China und den umliegenden asiatischen Ländern zu sehen. Neben dem Studium bot sich dort die einmalige Gelegenheit, Mensch, Kultur und Mentalität der verschiedenen asiatischen Ländern kennen zu lernen. Interessant ist natürlich auch das damit verbundene Schul-/Erziehungssystem, das sich wesentlich von den europäischen Ideen unterscheidet. Wie sich mein Leben und Studium am und außerhalb vom Campus gestaltete, würde ich gerne mit einem Poster vorstellen.

AGjDPG 10.9 Thu 16:00 Poster C

Theoretische Neurowissenschaften in China — •Maximilian Thess — Institut für Theoretische Physik, TU Berlin

Präsentation eines Posters zum Auslandsstudium an der Tongji Universität in Shanghai, China im Sommer 2010. Inhalte: Organisation, Leben vor Ort, Studium, Bachelorarbeit, Reisen

AGjDPG 10.10 Thu 16:00 Poster C

Canada, SNOLAB and Switzerland, CERN — •Anna Bakenecker — Westfälische Wilhelms-Universität, Münster, Germany

Canada, Ontario, Sudbury, Lively, Creighton Mine - In the middle of nowhere, 2km under earth in a nickel mine is SNOLAB (Sudbury Neutrino Observatory) located. Detectors for neutrinos and dark matter particles are doing their work in the world's deepest underground laboratory. The laboratory, which is a clean room, can be only entered via a small cage (elevator) and a dirty mine drift. In order to work here as a physicist one has to undergo training for miners, however it is adventurous! I was working on a project on low background measurements as a summer student in 2010.

My second summer student job took me to Geneva, CERN in 2011. How to become a summer student? How does life look like at CERN? What kind of job can an undergraduate student do at CERN? Every year around 150 summer students from all over the world come together at CERN. The multicultural and the work experience made up an unforgettable summer in Switzerland.

AGjDPG 10.11 Thu 16:00 Poster C

Probing intrinsic properties of high-temperature superconductors — •Holger Motzkau and Thorsten Jacobs — Experimental Condensed Matter Physics, Department of Physics, Stockholm University, AlbaNova University Center, 106 91 Stockholm, Sweden

Some high-temperature superconductors naturally consist of superconducting and insulating crystal layers that form intrinsic Josephson junctions. They allow tunneling experiments that give a deep insight into material properties and mechanisms of superconductivity. We use crogen-free cryostats to investigate the interplay between superconductivity, magnetic fields, THz radiation, phonons, and other quasi particles in cuprates such as $Bi_2Sr_2CaCu_2O_{8+x}$. Samples are fabricated in a clean room environment using nanofabrication methods such as thin film deposition, dry etching, focused ion beam, and electron beam lithography. Another focus of the group is the improvement of nanocalorimetry for the investigation of thermodynamic properties of superconductors.

AGjDPG 10.12 Thu 16:00 Poster C

Studienmöglichkeiten an der National Taiwan University, Taipei, ROC Taiwan — •Kristina Hönes — Karlsruher Institut für technologie

Die National Taiwan University (NTU) ist die renommierteste, größte und älteste Universität Taiwans. Sie genießt einen sehr guten Ruf unter den asiatischen Universitäten und es bestehen viele Auslandkontakte, vor allem in die USA, China und Japan. Schwerpunkte der Physikfakultät sind theoretische und experimentelle Festkörperphysik, vor allem Halbleiterphysik und Magnetismus. Der zweite Schwerpunkt ist Astrophysik. Dank der sehr guten finanziellen Ausstattung wird auch den Austauschstudenten sehr viel geboten, unter anderem werden Chinesischkurse und Exkursionen ins Land organisiert. Insgesamt ist die NTU eine ungewöhnliche, aber lohnende Möglichkeit ins Physikstudium ein Auslandsaufenthalt zu integrieren, der sowohl fachlich auch als auch außerfachlich viel zu bieten hat.

AGjDPG 10.13 Thu 16:00 Poster C

Astrophysical research in the Canaries — •Sabine Thater — Leibniz-Institut für Astrophysik Potsdam

The Instituto de Astrofísica de Canarias (IAC) is an astrophysical research centre located in the Canaries. It is divided into two headquarters and two observatories, the Instituto de Astrofísica/Observatorio del Teide in Tenerife, and the Centre for Astrophysics/Observatorio del Roque de los Muchachos in La Palma. The IAC Research Programme includes a number of astrophysical research and technological development projects including structure of the universe and cosmology, local universe, star formation and ISM, solar physics and even an instrumentation part.

Every year, the IAC gives a number of grants for astrophysical research and for technological development. As 'Becaria der Verano' I would like to give you an overview of the astrophysical life in the IAC.

AGjDPG 10.14 Thu 16:00 Poster C

USA, East Coast: Harvard University & Mass. General Hospital — •Malte C. Gather — Institut für Angewandte Photophysik, TU Dresden, Dresden, Germany

I will share my experience on studying and researching abroad, in particular at Harvard University and at the Mass. General Hospital, both in Boston/Cambridge, USA.

Since last year I am a Juniorprofessor at the TU Dresden. Because I maintain close contact with former colleagues at Harvard, I might also be able to help organizing research stays in Boston for current or prospective PhD students.

My research topics at Harvard were physics/biology, biophotonics, biomedical imaging, optical devices based on biological materials and structures.

I have also studied and performed research in the UK (Imperial College London) and in Iceland.

AGjDPG 10.15 Thu 16:00 Poster C

Erfahrungen während Sprachreise nach Quito, Ecuador und Volontariat auf den Galapagos-Inseln im Sommer 2011 — •Michael Klemke — Hochkirchstraße 8, 10829 Berlin

Auf die zahlreichen Erlebnisse und Erfahrungen kann ich auf einem einseitigen Poster nur eingeschränkt eingehen und möchte an dieser Stelle eine Vorauswahl hervorzuhebender Inhalte und Ereignisse treffen.

- Empfehlungen für die Planung einer Sprachreise und/oder eines Volontariats nach bzw. in Ecuador/Südamerika
- Kurzinformation bzgl. Ecuador (Info-Box)
- Besonderheiten des Unterrichts an einer privaten Sprachschule und der Unterkunft in Quito
- Erfahrungen während des Volontariats auf San Cristóbal (östlichste der Galapagos-Inseln)
- Vorstellung der Fundación Jatun Sacha
- Kurzinformation über aktuelle Projekte der Fundación
- Kritische Betrachtung der Galapagos-Nationalparkverwaltung und seiner Umweltschutzpolitik und -aktivität im Archipel
- Auswahl und Darstellung von besonderen Momenten und Fotografien