

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

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Die junge DPG lädt alle Interessierten herzlich zum ihrem Programm auf der Jahrestagung 2016 ein. Neben den etablierten Kooperationen mit dem Fachverband SOE und der AGI findet am Montag wieder der allseits beliebte EinsteinSlam statt. Darüberhinaus finden am Donnerstag zwei Softskill-Workshops statt.

Aktuelle Informationen zum Programm der jDPG gibt es online unter www.jdpd.de

Overview of Workshops and Sessions

(Lecture rooms H1, H5, H9, and H16)

Workshops

AGjDPG 4.1	Thu	9:30–12:00	H9	After academia: kickstart your career — ●ROBIN KLAASSEN
AGjDPG 6.1	Thu	14:00–16:30	H9	Giving an effective presentation — ●ROBIN KLAASSEN

Sessions

AGjDPG 1.1–1.3	Sun	16:00–18:30	H16	Tutorial: Evolutionary Dynamics and Applications to Biology, Social and Economic Systems
AGjDPG 2.1–2.3	Mon	10:00–11:45	H5	Forschungsdatenmanagement: Von der Idee zur Umsetzung (mit jDPG)
AGjDPG 3	Mon	20:00–22:00	H1	EinsteinSlam
AGjDPG 4.1–4.1	Thu	9:30–12:00	H9	After academia - kickstart your career
AGjDPG 5.1–5.5	Thu	9:30–12:15	H1	Symposium SYSM
AGjDPG 6.1–6.1	Thu	14:00–16:30	H9	Giving an effective presentation

AGjDPG 1: Tutorial: Evolutionary Dynamics and Applications to Biology, Social and Economic Systems

Current model approaches for collective phenomena in biological, social and economic systems widely employ methods from statistical physics. This sequence of tutorial talks demonstrates how physical concepts allow the formulation of appropriate microscopic models, the numerical and analytical treatment to obtain phase diagrams and macroscopic equations of motion. Host-virus coevolution, social opinion formation and systemic risk of the interbank network are research frontiers illustrating fruitful applications (Session compiled by J.C.Claussen)

Time: Sunday 16:00–18:30

Location: H16

Tutorial AGjDPG 1.1 Sun 16:00 H16
Predicting evolution: statistical mechanics and biophysics far from equilibrium — ●MICHAEL LÄSSIG — Institut für theoretische Physik, Zülpicher Strasse 77, D-50937 Köln

The human flu virus undergoes rapid evolution, which is driven by interactions with its host immune system. We describe the evolutionary dynamics by a fitness model based on two biophysical phenotypes of the virus: protein folding stability and susceptibility to human immune response. This model successfully predicts the evolution of influenza one year into the future, which has important consequences for public health: evolutionary predictions can inform the selection of influenza vaccine strains. Based on this example, we discuss the role of statistical mechanics and biophysics in making evolutionary biology a predictive science.

Tutorial AGjDPG 1.2 Sun 16:50 H16
Voter models of social opinion formation. — ●KATARZYNA SZNAJD-WERON — Department of Theoretical Physics, Wrocław University of Technology, Wybrzeże Wyspińskiego 27, 50-370 Wrocław

Among many different subjects, opinion dynamics is one of the most studied in the field of sociophysics. In my opinion there are at least two important reasons why physicists study this topic. The first motivation comes from social sciences and can be described as a temptation to build a bridge between the micro and macro levels in describing social systems. Traditionally, there are two main disciplines that study social behavior - sociology and social psychology. Although the subject of the study is the same for both disciplines, the usually taken approach is very different. Sociologists study social systems from the level of the social group, whereas social psychologists concentrate on the level of the individual. From the physicist's point of view this is similar to the relationship between thermodynamics and statistical physics. This analogy raises the challenge to describe and understand the collective behavior of social systems (sociology) from the level of

interpersonal interactions (social psychology). The second motivation to deal with opinion dynamics is related to the development of non-equilibrium statistical physics, because models of opinion dynamics are often very interesting from the theoretical point of view. A good example of such an interesting model is a broad class of voter models, including linear voter model and nonlinear q-voter model introduced in along with its modifications.

Tutorial AGjDPG 1.3 Sun 17:40 H16
Maximum-entropy methods for network reconstruction, systemic risk estimation, and early-warning signals — ●DIEGO GARLASCHELLI — Lorentz Institute for Theoretical Physics, University of Leiden, The Netherlands

The global financial crisis shifted the interest from traditional measures of “risk” of individual banks to new measures of “systemic risk”, defined as the risk of collapse of an entire interbank system. In principle, estimating systemic risk requires the knowledge of the whole network of exposures among banks. However, due to confidentiality issues, banks only disclose their total exposure towards the aggregate of all other banks, rather than their individual exposures towards each bank. Is it possible to statistically reconstruct the hidden structure of a network in such a way that privacy is protected, but at the same time higher-order properties are correctly predicted? In this talk, I will present a general maximum-entropy approach to the problem of network reconstruction and systemic risk estimation. I will illustrate the power of the method when applied to various economic, social, and biological systems. Then, as a counter-example, I will show how the Dutch interbank network started to depart from its reconstructed counterpart in the three years preceding the 2008 crisis. Over this period, many topological properties of the network showed a gradual transition to the crisis, suggesting their usefulness as early-warning signals of the upcoming crisis. By definition, these early warnings are undetectable if the network is reconstructed from partial bank-specific information.

AGjDPG 2: Forschungsdatenmanagement: Von der Idee zur Umsetzung (mit jDPG)

Time: Monday 10:00–11:45

Location: H5

Topical Talk AGjDPG 2.1 Mon 10:00 H5
„Open Data“ und Forschungsdatenmanagement in Physik und Astronomie: Warum, wozu und wie? — ●JOACHIM WAMBSGANSS — Zentrum für Astronomie der Universität Heidelberg

Beim wissenschaftlichen Arbeiten werden Forschungsdaten gesammelt, erzeugt, bearbeitet, analysiert und interpretiert. Klassischerweise werden in Publikationen wissenschaftliche Methoden beschrieben, Ergebnisse diskutiert und Schlussfolgerungen gezogen, die unterliegenden Daten werden meist nur summarisch und in bearbeiteter Form als Tabelle oder Diagramm veröffentlicht.

In den letzten Jahren richtete sich der Fokus mehr und mehr auf die Bedeutung der Forschungsdaten/Rohdaten selbst. Aktuell gibt es Bestrebungen, die Veröffentlichung von Forschungsdaten und deren Langzeitarchivierung zu ermöglichen oder sogar zu fordern, idealerweise in direkter Verbindung zu den Publikationen. Dies hat eine ganze Reihe von Vorteilen: Forschungsdaten können nachgenutzt werden, Forschungsergebnisse können überprüft werden, einmalige (nicht-reproduzierbare) Datensätze werden gesichert. Dem stehen jedoch eine ganze Reihe von Schwierigkeiten gegenüber: Technische (Welche Infrastrukturen können/sollen genutzt werden? In welchen Formaten werden die Daten abgelegt?), finanzielle (Wer übernimmt die Kosten?) und auch wissenschafts-soziologische Probleme (*Warum soll ich diesen*

extra Aufwand auf mich nehmen?).

Gegenwärtig gibt es eine Reihe von Initiativen: Teilweise institutionell angetrieben (Universität, Forschungsorganisation), teilweise geographisch organisiert (Bundesland, Staat, Europa, international), oft von den einzelnen Wissenschaftsdisziplinen initiiert. Eine globale Lösung ist sicherlich nicht möglich. Es gibt in einigen Bereichen bereits gute Entwicklungen, teilweise *bottom-up*, teilweise *top-down*, aber der Weg ist noch weit. Einerseits bedarf es eines Umdenkens bei den Forscherinnen und Forschern und auch bei den Institutionen und Forschungsförderorganisationen. Andererseits müssen die technischen Möglichkeiten geschaffen und vereinfacht werden. Bereits heute kann (und sollte!) man Daten in zitierbarer Form veröffentlichen. In nicht allzu ferner Zukunft wird es zur guten wissenschaftlichen Praxis gehören, bei jedem Forschungsantrag oder -projekt einen Plan zum Forschungsdatenmanagement mitzuliefern.

Im Vortrag werden einige Gedanken und Entwicklungen zum Thema *Open Data* und Forschungsdatenmanagement vorgestellt, die hoffentlich zu einer intensiven Diskussion führen werden.

AGjDPG 2.2 Mon 10:45 H5
Hochschulweites Forschungsdatenmanagement der Universität Bielefeld — ●JOHANNA VOMPRAS — Universität Bielefeld – Universitätsbibliothek

Am 12. November 2013 hat das Rektorat der Universität Bielefeld als erste Hochschule in Deutschland umfassende Maßnahmen zum Umgang mit Forschungsdaten verabschiedet. Als wesentlich für die erfolgreiche Implementierung des qualitätsbewussten Umgangs mit Forschungsdaten hat sich das Ineinandergreifen von Leitlinien, Beratungsangeboten und Publikationsdiensten erwiesen. Zum Beispiel steht den Forschenden für die Dokumentation des Umgangs mit Forschungsdaten ein Tool für die Erstellung und Verwaltung von Data-Management-Plänen zur Verfügung. Ebenso können Forschungsdaten im institutionellen Repositorium publiziert und kontextualisiert werden. Individuelle Beratungsangebote und Schulungen sowie die Beteiligung an disziplinären Infrastrukturvorhaben ermöglichen – durch den bestehenden Dialog mit Forschenden – einen kontinuierlichen Abgleich von Anforderungen und Badarfen. Der Vortrag präsentiert am Bielefelder Beispiel sowohl strategische als auch organisatorische Maßnahmen für den Aufbau einer Forschungsdateninfrastruktur, als auch Erfahrungen der Nutzer aus den Profildbereichen der Universität bei der Nutzung der bereits etablierten Dienste. In dem Vortrag werden ebenfalls Weiterentwicklungspotentiale der hochschulweiten Dienste diskutiert. So wird in den kommenden Jahren der Entwicklungsschwerpunkt an der Universität Bielefeld sein, die Reproduzierbarkeit empirischer Forschungsdaten disziplinübergreifend sicherzustellen.

AGjDPG 2.3 Mon 11:15 H5

Archivierung und Publikation von Forschungsdaten mit RADAR — •MATTHIAS RAZUM — FIZ Karlsruhe - Leibniz-Institut für

Informationsinfrastruktur GmbH

Die Nachvollziehbarkeit und Reproduzierbarkeit wissenschaftlicher Erkenntnisse basiert zunehmend auf digitalen Daten. Deren Publikation, Verfügbarkeit und Nachnutzung muss im Rahmen guter wissenschaftlicher Praxis gewährleistet werden. Das Projekt RADAR geht diese Herausforderung durch die Etablierung einer generischen Infrastruktur für die Archivierung und Publikation von Forschungsdaten an. Dafür vereinen fünf Projektpartner aus den Informations- und Naturwissenschaften (FIZ Karlsruhe, TIB, KIT/SCC, LMU München und IPB Halle) ihre Kompetenzen. Durch enge Kooperation mit Wissenschaftler/innen, Datenzentren, Fachgesellschaften und Verlagen wird eine bedarfsgerechte Entwicklung der Infrastruktur sichergestellt. RADAR richtet sich an zwei Zielgruppen: Projekte (d. h. Forscher/innen) und Institutionen. Es verfolgt dabei einen zweistufigen Ansatz: ein disziplinübergreifendes Einstiegsangebot zur formatunabhängigen Datenarchivierung mit minimalem Metadatensatz und ein erweitertes Angebot mit integrierter Datenpublikation. Der thematische Schwerpunkt liegt bei den wissenschaftlichen Disziplinen im *long tail of science*, in denen Forschungsdateninfrastrukturen meist noch fehlen. RADAR erlaubt eine temporäre oder – im Falle einer Datenpublikation – eine zeitlich unbegrenzte Datenarchivierung. Das angestrebte Geschäftsmodell zielt auf einen sich selbst tragenden Betrieb mit einer Kombination aus Einmalzahlungen und institutionellen Angeboten ab. RADAR ist als Baustein der internationalen Informationsinfrastruktur geplant, der sich über Schnittstellen auch in weitere Datenmanagement-Dienste Dritter integrieren lässt.

AGjDPG 3: EinsteinSlam

Der beliebte Einstein-Slam findet auch in diesem Jahr wieder auf der Jahrestagung statt. Alle Teilnehmer der Tagung sind herzlich eingeladen, sich am Montagabend im Audimax einzufinden. Der Slam beginnt um 20:00 Uhr.

Darum geht's:

Die Slamer haben exakt 10 Minuten Zeit, auf möglichst ansprechende und unterhaltsame Weise ihre Forschung einem breiten Publikum vorzustellen. Am Ende entscheidet das Publikum, wer den *Goldenen Albert* für den besten Slam mit nach Hause nehmen darf.

Weitere Informationen gibt es auf www.einstein-slam.de.

Time: Monday 20:00–22:00

Location: H1

EinsteinSlam

AGjDPG 4: After academia - kickstart your career

Time: Thursday 9:30–12:00

Location: H9

Tutorial AGjDPG 4.1 Thu 9:30 H9
After academia: kickstart your career — •ROBIN KLAASSEN — The Netherlands

So you're in physics, and you like it (if not... well, why are you here?). You're working on obtaining your Master's or even PhD degree. But what comes next? Of course you can continue climbing the academic ladder, and many are happy doing so. But there's an entire other world of opportunities just waiting to be visited... if you can manage

the trip.

This workshop will help you gear up for this adventure, by making you think about what is important for you in a first job, helping you find that wonderful workplace, and, perhaps most important, giving you the means to have them make you an offer you can't refuse! The session will focus on lots of practical tips and tricks for every step of the way, with enough room for discussion and sharing experiences. Take charge of that first step of your career and visit this workshop!

AGjDPG 5: Symposium SYSM

Time: Thursday 9:30–12:15

Location: H1

Invited Talk AGjDPG 5.1 Thu 9:30 H1
Science Forecasts: Measuring, Predicting, and Communicating Scientific Developments — •KATY BÖRNER — Indiana University

In a knowledge-based economy, science and technology are omnipresent and their importance is undisputed. Equally evident is the need to allocate resources, both monetary and human, in an effective way to foster innovation. In the preceding decades, data mining, metrics, and indicators have been embraced to gain insights into the structure and evolution of science; but there have been no significant efforts

into mathematical, statistical, and computational models that can predict future developments in science, technology, and innovation (STI). While it may not be possible to predict the nature, essence, or the precise extent of impact of the next scientific or technological innovation, it is often possible to predict the circumstances leading to it, i.e., where it is most likely to happen and under which conditions. See Scharnhorst, Börner, and Besselaar, eds. 2012. *Models of Science Dynamics: Encounters Between Complexity Theory and Information Science*. Springer Verlag for an overview of major model types.

This talk reviews and demonstrates the power of computational

models for simulating and predicting possible STI developments and futures. In addition, it showcases novel means to broadcast moderated STI forecasts to make them accessible and understandable for a general audience.

Invited Talk AGjDPG 5.2 Thu 10:00 H1
Mapping science with variable-order Markov dynamics reveal overlapping fields and multidisciplinary journals — ●MARTIN ROSVALL — Umeå University, Sweden

To better understand the parallel human endeavor of science, we need good maps that both simplify and highlight the flows of ideas and underlying research organization. However, current maps of science cannot effectively identify the multilevel and overlapping fields of science with multidisciplinary journals. For example, whereas maps based on citations between journals in first-order Markov models can only assign each journal to a single field, maps based on multi-step citation chains in higher-order Markov models become computationally infeasible already for moderate-sized systems. To overcome these problems, we introduce a method that uses model selection to find the appropriate variable-order Markov model. We also present interactive maps of science that highlights the assignments of multidisciplinary journals and how ideas flow through those journals.

Invited Talk AGjDPG 5.3 Thu 10:30 H1
Network algorithms for reputation and quality in scholarly data — ●MATÚS MEDO, MANUEL MARIANI, and Yi-CHENG ZHANG — University of Fribourg, Fribourg, Switzerland

The ever-increasing quantity and complexity of scientific production have made it difficult for researchers to keep track of advances in their own fields. This, together with growing popularity of online scientific communities, calls for the development of effective information filtering tools. Network theory is an important driving aspect for such algorithms. We will first discuss the case of an online scientific community where users and papers form a bipartite network which can be effectively used to evaluate the reputation of users and fitness of papers. We show that when the input data is extended to a multilayer network including users, papers and authors, the resulting performance improves on multiple levels. In particular, top papers have higher citation count and top authors have higher h-index than top papers and top authors chosen by other algorithms. We will then move to stress the role of time in scholarly data. Most research metrics either ignore time (such as the h index) or consider it in an ad-hoc fashion (such as the m quotient). On the example of PageRank which has been used in the past to assess the quality of papers, we show that a demonstrably better ranking of papers can be obtained by considering time in a principled way.

15 min. break

Invited Talk AGjDPG 5.4 Thu 11:15 H1
Modeling scientific networks in social media — ●CASSIDY SUGIMOTO — School of Informatics and Computing, Indiana University Bloomington, USA

This talk will examine the role of social media in constructing new or reinforcing old epistemic communities. In particular, we will analyze the interconnectivity of scientists on social media platforms according to their disciplinary affiliation and the degree to which these networks reinforce or contrast with models constructed through collaboration and citation relations. We will analyze the role of gender and other socio-demographic characteristics where possible.

Invited Talk AGjDPG 5.5 Thu 11:45 H1
Modeling scientific collaboration across multiple scales: from individuals to Europe — ●ALEXANDER PETERSEN — IMT Lucca Institute for Advanced Studies, Lucca, Italy

Quantitative measures are becoming increasingly prevalent at all scales of scientific evaluation, largely due to the advent of large comprehensive publication databases that allow for detailed studies of ideas, people, and institutions, and the vast networks connecting them. As such, there is plenty of room to apply methods from complex systems to address policy-oriented issues relevant to the entire science system. In the first half, I will discuss micro-scale patterns of collaboration from a researcher's local 'ego' perspective, showing that scientific collaboration is characterized by a high turnover rate juxtaposed with frequent 'life partners'. I will show that these extremely strong collaborations have a significant positive impact on productivity and citations – the apostle effect – representing the measurable advantage of 'super' social ties. In the second half, I will discuss macro-scale collaboration patterns concerning the evolution the European Research Area (ERA), a cross-border labor, funding, and mobility scheme aimed at fostering innovation and growth within Europe. However, despite decades of integration policies, recent analyses have shown there to be little cross-border integration in the EU above global trends – i.e. Europe remains a collection of national innovation systems. I will show that high-skilled mobility – i.e. brain drain, largely from East to West following the 2004/2007 EU enlargement – can explain why the cross-border integration of R&D within the ERA is lagging.

Right after the symposium, participants are invited to enjoy a guided tour of the Places and Spaces: Mapping Science exhibition (<http://scimaps.org>) on display in the foyer of the university library.

AGjDPG 6: Giving an effective presentation

Time: Thursday 14:00–16:30

Location: H9

Tutorial AGjDPG 6.1 Thu 14:00 H9
Giving an effective presentation — ●ROBIN KLAASSEN — The Netherlands

Chances are that you are a very smart person (hey, you're in physics, obviously). But are all those brains also helping you when standing in front of a room full of people, and you have a way too short amount of time to explain to them what your scientific work is all about? Can your brains keep you from pacing around nervously while mumbling some difficult words with your face towards the slides? Can they make

sure your audience even remembers one sentence of it, a week after the presentation?

If the answer to any of these questions is 'no', and you are actually concerned about the number of people openly yawning and playing on their phones during your talk, or if you just want to learn how to structure your talk and your slides, then this workshop is for you. Expect an interactive session with videos, explanations, discussions and short exercises. So muster your courage, step forward and take part in this workshop!