Working Group "Young DPG"
Arbeitskreis junge DPG (AKjDPG)

Enrico Stein
Technische Universität Kaiserslautern
Erwin-Schrödinger Straße 46
67663 Kaiserslautern
stein@jdpg.de

With this year's program the Working Group young DPG wants to appeal to many minds. Those, who are new to the conference and feeling lost in view of the many sessions and the many topics, we want to offer the chance to catch an anchor and to learn about several topics of the conference on a MSc level. You are heartily invited to visit the tutorials on Sunday!

Those, who are longer in the business, we together with the Working Group Information want to give the possibility to discuss on a hot topic determining their future, namely about the upcoming developments of the publication system in the context of a panel discussion on Tuesday.

Last, we also offer the opportunity to ease the hard scientific program and to learn about interesting topics in the atmosphere of an EinsteinSlam. Slammers will have the possibility to present physical topics to an audience and to convince if that they are the right person to own the Golden Albert. Since we also want to support networking between the conference's participants, we offer a tower building contest on Tuesday right after the plenary talk and a pub crawl on Wednesday evening.

Everyone is welcome! We are looking forward to see you at our events!

Overview of Talks and Sessions
(Lecture rooms K 1.011, 1.016, 2.016, and RW HS)

Tutorials

AKjDPG 1.1	Sun	16:00–16:45	K 1.011	**Introduction into physics of Wendelstein 7-X** — •Sergey Bozhenkov
AKjDPG 1.2	Sun	16:55–17:40	K 1.011	**What's up in complex/dusty plasmas?** — •Dietmar Block
AKjDPG 2.1	Sun	16:00–16:45	K 1.016	**An Introduction to Quantum Computers** — •Norbert Schuch
AKjDPG 2.2	Sun	16:55–17:40	K 1.016	**The Quantum Way of Doing Computations** — •Rainer Blatt
AKjDPG 3.1	Sun	16:00–16:45	K 2.016	**Molekülphysik - ein Tutorial** — •Gereon Niedner-Schatteburg
AKjDPG 3.2	Sun	16:55–17:40	K 2.016	**Controlled molecules to investigate ultrafast chemical dynamics in the molecular frame** — •Sebastian Trippel

Invited talks of the PhD-Symposium: Floquet Physics - how time-periodic systems can make a difference (SYPS)

SYPS 1.1	Mon	14:00–14:30	RW HS	**Floquet engineering of interacting quantum gases in optical lattices** — •André Eckardt
SYPS 1.2	Mon	14:30–15:00	RW HS	**Experiments on driven quantum gas and surprises** — •Cheng Chin
SYPS 1.3	Mon	15:00–15:30	RW HS	**Exploring 4D Quantum Hall Physics with a 2D Topological Pumps** — •Oded Zilberberg, Michael Lohse, Christian Schweizer, Immanuel Bloch, Hannah Price, Yaacov Kraus, Sheng Huang, Mohan Wang, Kevin Chen, Jonathan Guglielmon, Mikael Rechtsman
SYPS 1.4	Mon	15:30–16:00	RW HS	**Floquet Discrete Time Crystals in a Trapped-Ion Quantum Simulator** — •Guido Pagano, Jiehang Zhang, Paul Hess, Antonis Kyprianidis, Patrick Becker, Jacob Smith, Aaron Lee, Norman Yao, Tobias Grass, Alessio Celi, Maciej Lewenstein, Christopher Monroe

Discussion

AKjDPG 4.1 Tue 12:45–13:45 RW HS **The Future of Our Publication System** — •Uwe Kahlert, Konstanze Söllner, Andrea Taroni, Gerard Meijer, Enrico Stein

Lunch Talks organized by AKjDPG

PV V Tue 13:00–13:45 K 2.020 **Vom Doktorhut zum Vorstandshemd: Physiker können auch Unternehmer** — •Wilhelm Kaenders

PV XIV Thu 13:00–13:45 K 2.020 **Erneuerbare Energien und elektrisches Energiesystem – ein Platz für Physiker?** — •Bernd Utz

Sessions

AKjDPG 1.1–1.2 Sun 16:00–17:40 K 1.011 **Tutorial Plasma Physics**
AKjDPG 2.1–2.2 Sun 16:00–17:40 K 1.016 **Tutorial Quantum Computing**
AKjDPG 3.1–3.2 Sun 16:00–17:40 K 2.016 **Tutorial Molecular Physics**
AKjDPG 4.1–4.1 Tue 12:45–13:45 RW HS **The Future of our Publication System (joint session AKjDPG/AGI)**

AKjDPG 1: Tutorial Plasma Physics

Time: Sunday 16:00–17:40   Location: K 1.011

Tutorial   AKjDPG 1.1   Sun 16:00   K 1.011
Introduction into physics of Wendelstein 7-X — •Sergey Bozhenkov and W7-X team — Max-Planck-Intitut für Plasmaphysik, Greifswald, Germany

This tutorial will give an overview of active stellarator research topics, including an explanation of stellarator optimization, an introduction into the physics of Wendelstein 7-X (W7-X) and a thorough presentation of its experimental results so far. A high quality of magnetic flux surfaces necessary for confinement and compensation of remaining errors are demonstrated. The plasma initiation and heating to multi-keV temperatures are provided by electron cyclotron resonance heating with presently available power up to 7 MW. The power exhaust and the plasma wall interaction are defined by an island divertor with inertially cooled graphite targets, which already makes possible plasma operation with the heating power of 2 MW for 30 s. A good diagnostic coverage allows first tests of the W7-X optimization as well as, for example, first measurements of the plasma turbulence. In future, with adding more heating power and ion heating schemes, the program will also include studies of the MHD stability at high plasma pressures and confinement of fast ions. Installation of the water-cooled divertor targets will allow high power plasma discharges (10 MW) lasting up

to 30 minutes. The aim is to show that a stellarator fusion reactor is viable. The advantages would be steady state operation and absence of large scale instabilities (disruptions).

10 min break

Tutorial   AKjDPG 1.2   Sun 16:55   K 1.011
What's up in complex/dusty plasmas? — •Dietmar Block — Institute of Experimental and Applied Physics, Kiel University, Germany

This tutorial will introduce you to the field of dusty/complex plasmas. More than 25 years of intensive research on plasmas containing additional nano- or micrometer-size particles have provided us with a wealth of information on strongly correlated systems and plasma-particle-interaction. Complex plasmas have proven to be a valuable model system to study strongly coupled systems at a kinetic level as well as to study fundamentally the interaction of plasmas with objects. Starting with a review of basic features of complex plasmas and standard diagnostics, the talk will provide a reference frame for you to successfully relate recent progress in the field with contributions being presented at this DPG meeting.

AKjDPG 2: Tutorial Quantum Computing

Time: Sunday 16:00–17:40   Location: K 1.016

Tutorial   AKjDPG 2.1   Sun 16:00   K 1.016
An Introduction to Quantum Computers — •Norbert Schuch — Max-Planck-Institut für Quantenoptik, Garching, Germany

Quantum computers use the laws of quantum mechanics to carry out computations much more efficiently than classical computers. This lecture will provide an introduction to the theory of quantum computers, assuming only basic knowledge of quantum mechanics. I will explain how quantum superpositions can in principle be used to speed up computations by quantum parallelism, why it is yet so challenging to find new quantum algorithms, and which promises make quantum computers such an exciting topic. Throughout, the discussion will be guided by simple examples of quantum algorithms. Towards the end, I will also briefly discuss how quantum computers can be made robust against noise.

10 min break

Tutorial   AKjDPG 2.2   Sun 16:55   K 1.016
The Quantum Way of Doing Computations — •Rainer Blatt — Institut für Experimentalphysik, Universität Innsbruck — Institut für Quantenoptik und Quanteninformation Innsbruck, Österreichische

Akademie der Wissenschaften

Since the mid-nineties of the 20th century, it became apparent that one of the centuries' most important technological inventions, computers in general and many of their applications could possibly be further enhanced by using operations based on quantum physics. This is timely since the classical roadmap for the development of computational devices, commonly known as Moore's law, will cease to be applicable within the next decade. This is due to the ever-smaller sizes of the electronic components that will enter the realm of quantum physics. Building a quantum computer requires the implementation of quantum bits (qubits) as storage sites for quantum information, quantum registers and quantum gates for data handling and processing as well as the development of quantum algorithms.

In this talk, the basic functional principle of a quantum computer will be reviewed. It will be shown how strings of trapped ions can be used to build a quantum information processor and how basic computations can be performed using quantum techniques. In particular, the quantum way of doing computations will be illustrated with analog and digital quantum simulations, which range from the simulation of quantum many-body spin systems over open quantum systems to the quantum simulation of a lattice gauge theory.

AKjDPG 3: Tutorial Molecular Physics

Time: Sunday 16:00–17:40   Location: K 2.016

Tutorial   AKjDPG 3.1   Sun 16:00   K 2.016
Molekülphysik - ein Tutorial — •Gereon Niedner-Schatteburg — TU Kaiserslautern

Masterstudenten und junge Doktoranden stehen schnell auf dem Schlauch, wenn sie eine große internationalen Tagung das erste Mal mit voller Wucht erwischt - noch dazu auf Englisch. Nur nicht einschüchtern lassen!

Und damit das halbwegs klappt, bietet diese Präsentation erste Orientierung für den Bereich Molekülphysik an. Es werden die Teilgebiete und aktuellen Trends im Überblick dargestellt, so wie sie auch auf der Tagung vertreten sind. Meßverfahren und theoretische Methoden (jeweils mit Abkürzungen) werden eingeführt, ansatzweise erklärt und dabei darauf geachtet, daß nicht "der Faden reißt". Alles kann nicht erklärt werden, aber einen guten Einsteig werden wir gemeinsam hinbekommen.

Der Vortragende hat den Molekülphysik-Teil dieser Tagung drei Jahre lang selber organisiert, freut sich auf zahlreiches Erscheinen und noch mehr auf angeregte Fragen.

10 min break

Tutorial   AKjDPG 3.2   Sun 16:55   K 2.016
Controlled molecules to investigate ultrafast chemical dynamics in the molecular frame — •Sebastian Trippel — Center for Free-Electron Laser Science, DESY, Hamburg — Center for Ultrafast Imaging, Universität Hamburg

A molecule's chemical behavior is governed by its electronic properties, which are the properties of the involved molecular orbitals. Studying the temporal evolution of these orbitals during the process of a chemical reaction, therefore, provides insight into the fundamentals of

chemistry. Furthermore, additional information about the dynamics of a molecular system can be obtained by mapping the position of the individual atoms during a chemical reaction.

State-selected, strongly aligned and oriented molecular ensembles serve as ideal samples to study ultrafast chemistry in the molecular frame. In this tutorial methods for controlling the orientation of molecules in the gas phase as well as techniques to separate various species from a molecular beam will be discussed. Furthermore, state of the art experiments on controlled molecules will be presented.

AKjDPG 4: The Future of our Publication System (joint session AKjDPG/AGI)

Time: Tuesday 12:45–13:45   Location: RW HS

Discussion   AKjDPG 4.1   Tue 12:45   RW HS
The Future of Our Publication System — ●Uwe Kahlert[1], Konstanze Söllner[2], Andrea Taroni[3], Gerard Meijer[4], and Enrico Stein[5] — [1]RWTH Aachen — [2]UB Erlangen, Director of the University Library of the FAU Erlangen and chairwoman of the VDB — [3]London, Chief Editor Nature Physics — [4]Berlin, Professor at Fritz-Haber-Institut of Max-Planck-Gesellschaft — [5]TU Kaiserslautern

Since the very beginning of the Internet the scientific community discusses how scientific communication could and should benefit from the new technical possibilities. Completely new ways to share and discuss scientific ideas and results seemed possible and Openness became a mayor keyword like in Open Access, Open Science, Open Peer Review. A variety of new concepts has been tested but very little new standards got established.

Especially in the field of scientific publication the traditional subscription model still dominates (with the well known journal crisis as one side effect). Is there no better way to distribute our knowledge or what prevents alternatives to gain a relevant "market share"? What are the requirements for such a new system?

We will discuss this question with representatives from the three players in this market: science, libraries and publishers, starting with the question how the participants envisage their work for science and scientific communication vis-à-vis a changing information landscape.