

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

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### Overview of Invited Talks and Sessions

(Lecture hall AM 00.014)

#### Tutorial

AKjDPG 1.1	Sun	14:00–15:00	AM 00.014	<b>Quantising Gravity: The Path from General Relativity to Loop Quantum Gravity</b> — •KRISTINA GIESEL
AKjDPG 1.2	Sun	15:00–16:00	AM 00.014	<b>Jets 101: Reconstruction, Calibration, and Substructure at the LHC</b> — •CHRIS MALENA DELITZSCH
AKjDPG 1.3	Sun	16:00–17:00	AM 00.014	<b>Probing hot and dense QCD matter with dileptons</b> — •ANTON ANDRONIC
AKjDPG 2.1	Sun	17:30–19:00	AM 00.014	<b>Resource-Aware Deep Learning: Tracking Energy Consumption in Scientific AI Applications</b> — •KEVIN SCHMITZ, ANNO KNIERIM, RAPHAEL FISCHER

#### Physicists beyond Academia

AKjDPG 3.1	Tue	13:00–13:25	AM 00.014	<b>From a career in academia to cutting-edge research in industry</b> — •ACHIM SCHÖLL
AKjDPG 4.1	Tue	19:00–19:25	AM 00.014	<b>from a nuclear physicist to a nuclear instrumentation architect</b> — •BANU OEZEL TASHENOV
AKjDPG 4.2	Tue	19:25–19:50	AM 00.014	<b>From ATLAS to Banking</b> — •ELIAS RÜTTINGER
AKjDPG 4.3	Tue	19:50–20:15	AM 00.014	<b>Podium discussion with the three speakers</b> — •MICHAEL LUPBERGER

#### Sessions

AKjDPG 1.1–1.3	Sun	14:00–17:00	AM 00.014	<b>jDPG Tutorials</b>
AKjDPG 2.1–2.1	Sun	17:30–19:00	AM 00.014	<b>jDPG/AKPIK Programmierworkshop (joint session AKjDPG/AKPIK)</b>
AKjDPG 3.1–3.1	Tue	13:00–13:25	AM 00.014	<b>yHEP/jDPG Physicists Beyond Academia I</b>
AKjDPG 4.1–4.3	Tue	19:00–21:00	AM 00.014	<b>yHEP/jDPG Physicists Beyond Academia II</b>
AKjDPG 5.1–5.4	Wed	13:45–15:45	KH 00.011	<b>Artificial Intelligence in Scientific Publishing (joint session AGI/AKjDPG/AKPIK)</b>

## AKjDPG 1: jDPG Tutorials

Time: Sunday 14:00–17:00

Location: AM 00.014

**Tutorial** AKjDPG 1.1 Sun 14:00 AM 00.014  
**Quantising Gravity: The Path from General Relativity to Loop Quantum Gravity** — ●KRISTINA GIESEL — FAU Erlangen-Nürnberg, Department Physik, Lehrstuhl für Quantengravitation, Staudtstr. 7B, 91058 Erlangen — FAU Erlangen-Nürnberg, ECAP, Nikolaus-Fiebiger-Str. 2, 91058 Erlangen

This talk provides a brief introduction to the central concepts and basic ideas of loop quantum gravity (LQG). Starting from general relativity, the conceptual and technical challenges that arise when applying quantisation to gravity are discussed, highlighting the essential differences to quantum mechanics and the standard model of particle physics. Within the framework of LQG, these concepts lead to the Quantum Einstein Equations, which encode the dynamics of LQG at the quantum level. Selected applications of the Quantum Einstein Equations to cosmology and black holes are presented and their physical implications are discussed.

**Tutorial** AKjDPG 1.2 Sun 15:00 AM 00.014  
**Jets 101: Reconstruction, Calibration, and Substructure at the LHC** — ●CHRIS MALENA DELITZSCH — TU Dortmund, Dortmund, Germany

Jets are collimated, high-energy streams of particles that act as proxies for the production of quarks and gluons at short distances. They

are ubiquitous at hadron colliders such as the Large Hadron Collider. Jet production and evolution are governed by the parton distribution functions, the strong coupling constant  $\alpha_s$ , and the rules of Quantum Chromodynamics.

Whether you are new to jet physics or looking to refresh key concepts, this tutorial provides a crash course on the essential tools needed to work with jets at the LHC. Understanding jets is central to many measurements and searches for new physics, and this tutorial offers the foundation needed to explore this rich and evolving field. An introduction is given to jet reconstruction in the ATLAS and CMS experiments, together with the complex calibration chain required before jets can be used in physics analyses. In addition, jet-substructure techniques are presented, which play an important role at the LHC because heavy particles such as e.g. the W/Z bosons or the top quark are frequently produced with large Lorentz boosts, causing their hadronic decay products to become collimated into single jets.

**Tutorial** AKjDPG 1.3 Sun 16:00 AM 00.014  
**Probing hot and dense QCD matter with dileptons** — ●ANTON ANDRONIC — University of Münster

I will introduce the dileptons as probes of the hot and dense QCD matter created in heavy-ion collisions and will explain the challenges of the measurement through examples in several experiments. The planned measurements in ALICE and CBM will also be discussed.

## AKjDPG 2: jDPG/AKPIK Programmierworkshop (joint session AKjDPG/AKPIK)

Time: Sunday 17:30–19:00

Location: AM 00.014

**Tutorial** AKjDPG 2.1 Sun 17:30 AM 00.014  
**Resource-Aware Deep Learning: Tracking Energy Consumption in Scientific AI Applications** — ●KEVIN SCHMITZ<sup>1</sup>, ANNO KNIERIM<sup>1</sup>, and RAPHAEL FISCHER<sup>2</sup> — <sup>1</sup>TU Dortmund University, Dortmund, Germany — <sup>2</sup>Lamarr Institute for ML & AI, Dortmund, Germany

Deep learning has become an indispensable tool across physics and astronomy, yet its growing computational demands increasingly raise questions about energy efficiency and sustainability. This tutorial introduces physicists to the principles of resource-aware deep learning, focusing on practically quantifying, understanding, and optimizing the energy consumption of deep learning models. We begin by outlining different approaches for tracking model power usage, ranging

from static estimation methods to dynamic profiling tools validated against ground-truth measurements, and demonstrate how these concepts are implemented in practice using the Lamarr Energy Tracker, developed at the Lamarr Institute for Machine Learning and Artificial Intelligence, for straightforward monitoring of GPU and CPU utilization during training or inference. Finally, we show how resource metrics can be visualized together with reconstruction accuracy using an example from radio interferometric imaging, where super-resolution neural networks reconstruct astrophysical sources from sparse visibility data. The session provides conceptual foundations and practical guidance for integrating sustainability into scientific machine learning workflows, empowering researchers to balance predictive performance with environmental responsibility.

## AKjDPG 3: yHEP/jDPG Physicists Beyond Academia I

Time: Tuesday 13:00–13:25

Location: AM 00.014

**Invited Talk** AKjDPG 3.1 Tue 13:00 AM 00.014  
**From a career in academia to cutting-edge research in industry** — ●ACHIM SCHÖLL — Carl Zeiss SMT GmbH Rudolf-Eber-Strasse 2 73447 Oberkochen; Germany

In this talk, I will share my journey from a career in academia to my current role as a research scientist in EUV lithography at ZEISS

SMT. I will discuss the challenges and opportunities encountered during this transition and how my background has shaped my work in a cutting-edge technology industry. Additionally, I will emphasize how physicists can thrive in diverse career paths beyond traditional academic roles and the impact they can have in a dynamic industrial environment.

## AKjDPG 4: yHEP/jDPG Physicists Beyond Academia II

Time: Tuesday 19:00–21:00

Location: AM 00.014

**Invited Talk** AKjDPG 4.1 Tue 19:00 AM 00.014  
**from a nuclear physicist to a nuclear instrumentation architect** — ●BANU OEZEL TASHENOV — Framatome GmbH, Erlangen, Germany

In this invited talk, I will introduce my professional journey as a nuclear physicist, highlighting the key stages of my education, career development, and transition into my current role in industry.

I will outline my education and early research experience in experimental nuclear physics, highlighting how this training influenced my analytical thinking and problem-solving approach.

The talk will then focus on my professional experience beyond academia, including my work at Framatome GmbH, where I currently serve as a Nuclear Instrumentation Architect. I will describe the mission of the company, the nature of our work, ongoing projects, my current responsibilities, and how physics-based thinking contributes to real-world applications and technological innovation.

This presentation aims to provide an overview of my personal and professional path, while offering perspective on career development for nuclear physicists working at the interface of science, technology, and industry.

**Invited Talk** AKjDPG 4.2 Tue 19:25 AM 00.014  
**From ATLAS to Banking** — ●ELIAS RÜTTINGER — Deutsche Kreditbank AG

Although many physicists do not plan it initially, their professional paths often lead outside academic research. This talk traces my transi-

sition from high-energy physics into the banking sector, with a focus on applied data science at Deutsche Kreditbank (DKB). After completing a PhD, I first worked at a project management organization for the German Federal Ministry for Economic Affairs and Climate Action (BMWi), evaluating industrial research projects. I then joined DKB in risk controlling, where I worked on analytical tasks and Monte Carlo simulations for practical risk assessment. In a subsequent step, my work shifted toward fraud prevention, where I now develop machine-learning models for operational use. The talk illustrates how methods familiar from physics – such as modeling, statistics, and software development – can be transferred to a regulated, industry-driven environment and create tangible impact.

**Invited Talk** AKjDPG 4.3 Tue 19:50 AM 00.014  
**Podium discussion with the three speakers** — ●MICHAEL LUPBERGER — Albert-Ludwigs-Universität Freiburg, Freiburg, Germany — yHEP

A podium discussion follows the presentations of the three speakers. They are all former physicists from our field now working outside academia. The audience is welcome to ask questions, in particular regarding e.g. career path, skills learned in physics usable in the commercial sector, working atmosphere, decision-making for leaving academia and much more. I will moderate the discussion and co-chair the presentations of the speakers.

**get together with Beer & Brezel**

## AKjDPG 5: Artificial Intelligence in Scientific Publishing (joint session AGI/AKjDPG/AKPIK)

Time: Wednesday 13:45–15:45

Location: KH 00.011

**Invited Talk** AKjDPG 5.1 Wed 13:45 KH 00.011  
**Scientific publishing in the era of AI** — ●DOMINIK ELSÄSSER — TU Dortmund, Department of Physics

The dissemination of results to colleagues and to the general public has been an indispensable part of the scientific process for as long as humankind has expanded our treasure of knowledge with scientific methods. The forms and the means by which this dissemination happens have however been subject to fundamental changes over time. One such change surely was that many fields of physics have moved towards working in large and international collaborations. And a more recent, yet profound change is the emergence of AI systems, which can be used to support many steps of the publication process, but also pose new challenges. In this talk, I will present key steps of the publication process typically encountered in fundamental physics and adjacent areas, and discuss options, methods, and tools available to the publishing scientist in the era of AI, with a specific focus on modern Large Language Models (LLMs), and on systems based on LLMs. While a focus will be on publication in peer-reviewed journals, there will also be a discussion of other forms of publication.

**Invited Talk** AKjDPG 5.2 Wed 14:15 KH 00.011  
**Intelligence and the Art of Scientific Publishing - an Editor's Perspective** — ●ANDREAS BUCHLEITNER — Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

Artificial intelligence (AI) shatters fundamental rules of the scientific publishing process. It induces a certain level of perplexity and disorientation within the academic realm, on how to react and/or to adapt - at a speed which is dictated from the outside, by a rapidly developing technology, together with the economic traction which comes with it. Different stakeholders of the publication process suggest distinct remedies, certainly guided by their respective perspectives, levels of expertise, and interests. And, clearly, there are highly nonlinear interdependencies between the thus reorganizing publication process, standards of good scientific practice, and the - in many respects highly

disputable - incentives which constrain science and, in particular, academic careers. After stating some of the immediate challenges AI poses to the inner workings of the editorial process, the talk will expand upon the above interdependencies, and contemplate the genuine role and responsibility of the scientific community in shaping them.

**Invited Talk** AKjDPG 5.3 Wed 14:35 KH 00.011  
**Prompt or perish - the research life cycle in times of genAI** — ●SANDRA GEISLER — RWTH Aachen University, Aachen, Deutschland  
 Large Language Models (LLMs) are rapidly reshaping how research is conducted and communicated. In this talk we will explore and spark discussions about where generative AI could or already does add value along the research life cycle, as well as the limitations and risks that must be carefully considered. From brainstorming and literature discovery to FAIR-compliant research data management, science communication and the review process, LLMs offer powerful new opportunities for researchers. At the same time, researchers face significant uncertainty, ethical concerns, and policy gaps. Drawing on recent studies and practical examples from our own research projects, this presentation highlights both the promise and the perils of an AI-assisted research life cycle.

**Discussion** AKjDPG 5.4 Wed 15:05 KH 00.011  
**Discussion** — ANDREAS BUCHLEITNER<sup>1</sup>, DOMINIK ELSÄSSER<sup>2</sup>, SANDRA GEISLER<sup>3</sup>, ●UWE KAHLERT<sup>3</sup>, SIMON NEUHAUS<sup>4</sup>, and ●TIM RUHE<sup>2</sup> — <sup>1</sup>Physikalisches Institut, Albert-Ludwigs-Universität Freiburg — <sup>2</sup>TU Dortmund, Department of Physics — <sup>3</sup>RWTH Aachen University — <sup>4</sup>Bergische Universität Wuppertal

Scientific publishing has long been said to be in crisis. "Publish or perish" is too often the prevailing motto. AI tools can now be used at almost every stage of the process. What risks and perhaps also opportunities does this development present? We will discuss this with the speakers of this session.