

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.