

Plenary Talk

PV II Tue 9:00 PV-Rooms

Exploring the QCD Phase Diagram at the LHC — ●JOHANNA STACHEL — Physikalisches Institut, Universitaet Heidelberg

The theory of strong interaction, quantum-chromo-dynamics, predicts for high temperature and density a new state of matter in which the confinement of quarks and gluons is lifted. This state, the quark-gluon-plasma, existed in the early universe after the electro-weak phase transition up to about 10 microseconds. In the past 25 years accelerator-based experiments have been conducted in order to recreate this state of matter for a short time. The ideal tool are collisions of heavy nuclei

at energies as high as possible. Now with the Large Hadron Collider (LHC) at CERN an entirely new energy regime is accessible.

Two aspects of the data will be explored: (i) Experimental knowledge about the phase boundary between ordinary hadronic matter and the quark-gluon plasma. This is based on the measured yields of various hadronic species. Here a direct link can be made to the full statistical operator of QCD including its fluctuations. (ii) Evidence for deconfinement. This comes from the production of charmonia as a function of center of mass energy and centrality of the collision. The LHC data will be put into perspective vis-a-vis the results from lower energies.