

Color Glass Condensate and Quark-Gluon Plasma

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These lectures will provide a modern introduction to selected topics in the physics of ultrarelativistic heavy ion collisions which shed light on the fundamental theory of strong interactions, the Quantum Chromodynamics (QCD). The emphasis will be on the partonic forms of QCD matter which exist in the early and intermediate stages of a collision - the color glass condensate, the glasma, and the quark-gluon plasma - and on the effective theories that are used for their description.

These theories provide a first-principle framework for understanding a wealth of remarkable phenomena observed in proton-proton, proton-nucleus, and nucleus-nucleus collisions at RHIC and the LHC. They furthermore help clarifying the physics goals of future high-energy experiments, like the electron-ion collider (EIC) currently under study, and thus permit to optimize their conception.