



Department of Physics Colloquium

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3:00 PM

Classical lumps and their quantum descendants in QCD at high energies

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Nearly all visible matter in the universe is made up of fundamental quarks and gluons, whose interactions are described by Quantum Chromodynamics (QCD). At very high energies, the complex many-body dynamics of quarks and glue can be represented by semi-classical metastable lumps representing very strong chromo-electromagnetic fields; their dynamics is described by the Color Glass Condensate (CGC) effective theory. We describe some of the remarkable features of this matter; in particular, the collision of two CGC's in ultrarelativistic heavy-ion collisions thermalizes to form a Quark-Gluon Plasma which previously existed only a few microseconds after the Big Bang. We discuss the rich interdisciplinary connections of this many-body physics to similar dynamics across wide energy scales, ranging from a quantum portrait of primordial Black Holes in gravity, to topological "transitions" in QCD, to that of turbulent non-thermal attractors in ultra-cold atomic gases.

**This colloquium will be held in-person, at SERC 116
unless announced otherwise.**