Special Colloquium

Bose-Einstein condensation in unusual circumstances

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Abstract:

There is robust evidence from the Relativistic Heavy Ion Collider (RHIC) in the USA, and now from the Large Hadron Collider (LHC) at CERN, that the matter produced in ultra-relativistic heavy ion collisions reaches (nearly) local equilibrium. According to our present understanding, the initial state of this matter consists of gluons, the quanta of the gluon field responsible for the strong interactions of elementary particles. These gluons are bosons, and are too numerous, given their energy, to be accommodated by an ordinary thermal distribution. If their number remains approximately constant as they evolve toward equilibrium, that is, if inelastic processes are sufficiently slow, a natural, albeit controversial, possibility is that the excess gluons form a Bose-Einstein condensate. Aside from its potential relevance to the problem of thermalization of the quark-gluon plasma in ultra-relativistic heavy ions, the dynamical formation of such a condensate is an interesting problem in itself, with connections to diverse fields of physics, ranging from cosmology to cold atom systems. Several aspects of this problem will be addressed in the talk.

Dr. Blaizot is Directeur de Recherche, classe exceptionnelle. He has served as Director of Service de Physique Theorique, Saclay and of the European Center for Theoretical Studies in Nuclear Physics and Related Areas, in Trento, Italy. His research interests include the physics of the quark-gluon plasma and phenomenology of ultra-relativistic heavy ion collisions, the theory of quantum fields at finite temperature and Bose-Einstein condensation.