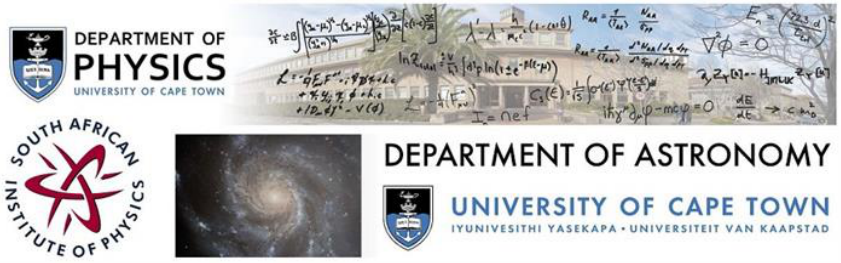

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How Cool is the Gluon Plasma?

Wednesday, 6 July 2016 09:40 (20 minutes)

Abstract content
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It has been established that the initial stages of a heavy-ion collision is characterized by an overoccupied gluon density. Furthermore, it has been postulated by Blaizot et. al. that the early stages of the evolution may exhibit approximate conservation of the gluon number density. This necessitates the introduction of a non-zero gluon chemical potential hence establishing the possible dynamical formation of a gluonic Bose-Einstein condensate (BEC). Following this argument, we make an assumption that the plasma may reach a transient, quasi-equilibrium state in which the system reaches thermal equilibrium, with gluon number being conserved. We investigate the thermodynamic properties of this quasi-equilibrium, overoccupied gluon plasma within a quasiparticle framework in which QCD interaction effects are encapsulated in an effective gluon thermal mass. The results indicate that a gluon plasma may be quite cool, possibly being 'supercooled' to temperatures as low as about 20% of the usual confinement temperature Tc. It was also possible to deduce a gluonic phase diagram in which phase boundaries between a gluon plasma, gluon BEC and glueballs are proposed.

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