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Confinement/deconfinement phase transition in dense medium

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Confinement/deconfinement phase transition in dense medium

In this talk we report the lattice observation of deconfinement in dense matter. The study of the deconfinement transition was conducted within lattice simulation of dense two-color QCD at zero temperature. We reach very large baryon density (up to quark chemical potential $\mu_q > 2000$ MeV). In the region $\mu_q \sim 1000$ MeV we observe for the first time the confinement/deconfinement transition which manifests itself in a rising of the Polyakov loop and vanishing of the string tension. After the deconfinement at $\mu_q > 1000$ MeV we observe a monotonous decrease of the spatial string tension which ends up with its vanishing at $\mu_q > 2000$ MeV. From this observation we draw the conclusion that the confinement/deconfinement transition at finite density and zero temperature is quite different from that at finite temperature and zero density. Our results indicate that in very dense matter the quark-gluon plasma is similar to a weakly interacting gas of quarks and gluons without magnetic screening mass in the system, sharply different from a quark-gluon plasma at large temperature. Implications of our results to properties of real QCD are briefly discussed.

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