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Strings, integrability and beyond

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Domaines : hep-th

Titre : *Low temperature QCD phase structure study within lattice gauge field theories*

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Résumé : *We discuss the different ways to study gauge theories phase structure using lattice regularisation. Lattice approach allows direct numerical study of nonpertubative phenomena like different topological objects of the gauge field theory, phase transitions and finite volume effects. The one-dimensional and two-dimensional operators of SU(2) and compact U(1) theories are discussed. It is shown that the finite volume effects may lead to a low temperature deconfinement phase transition induced by the presence of boundaries in confining gauge theories. At small distances between the boundaries the vacuum looses the confinement property due to modification of vacuum fluctuations of virtual monopoles. It is shown that analysis of the string tension sigma in SU(2) theory, allows us to draw a conclusion that in very dense cold matter the quark-gluon plasma is in essence a weakly interacting gas of quarks and gluons without a magnetic screening mass in the system, sharply different from a quark-gluon plasma at large temperature.*