Contribution ID: **53** Type: **not specified**

Heavy quarkonium and dynamical gluon mass at non-zero temperature in instanton vacuum model

Heavy quarkoinium $Q\bar{Q}$ states created (together with hot hadron/quark-gluon matter) in high energy hadron-hadron/ion-ion collisions can be used as a thermometer. This is one of the motivation to study the heavy quarks dynamics in a broad range of temperatures T . On the other hand, not only light but also heavy quarks physics is sensitive to one of the properties of QCD vacuum –instantons.
In the present talk we discuss various applications of the instanton liquid model (ILM) at non-zero T:
1. Different scenarios for the T -dependence of the mean instanton size $\bar{\rho}(T)$ and density n(T).
2. Direct contribution of the instantons to the central $Q\bar{Q}$ potential, which might be essential at the distances of the order of the mean instanton size $\bar{\rho}(T)$.
3. Modification of the gluon properties in ILM, affects the perturbative one-gluon exchange contribution, important for to the $Q\bar{Q}$ potential. We found that in ILM the gluons acquire a dynamical "electric"gluon mass M el (q, T), which depends on temperature. At typical $\bar{\rho}(0) = 1/3$ f m and n(0) = 1 f m −4 gluons acquire mass M el (0, 0) ≈ 362 MeV, which decreases with T . The T -dependence of the mass strongly correlates with the temperature dependence of the instanton vacuum parameters $\bar{\rho}(T)$, n(T). The inclusion of one-loop thermal gluon corrections leads to a rising with temperature contribution M pert,el (0, T) ~ T and allows to reproduce the lattice results for the dynamical gluon mass.

Primary author: Prof. MUSAKHANOV, Mirzayusuf (National University of Uzbekistan)

Track Classification: Diffraction and photon physics in hadron-hadron and heavy-ion collisions