Contribution ID: **30** Type: **Talk**

On the metric of the space of states in a modified QCD

Saturday 4 May 2013 12:00 (30 minutes)

The form of the resulting Feynman propagators in the recently proposed local and gauge invariant QCD for massive fermions, suggests the existence of indefinite metric associated to quark states, a property that might relate it with the known Lee-Wick theories. Thus, the nature of the asymptotic free quark states in the theory is investigated here. For this purpose the quadratic part of the quark action is quantized. As opposite to the case in the standard QCD, the free fermion theory does not show Hamiltonian constraints. The propagation modes include a family of massless waves, which is identical to the ones in massless QCD, and a complementary set of massive oscillations. After expressing the full interacting Lagrangian in terms of new field variables, it follows that the theory can be quantized in way that the massive modes show positive metric. The massless ones on the contrary have negative norms. Thus, the massive quark states of the modified theory, in the quantization adopted, become basically the same ones as in the usual QCD. It is remarked that, since QCD is expected to not exhibit gluon or quark asymptotic states, the presence of negative metric massless modes does not not constitute a definite drawback of the theory. In addition, the fact that the positive metric quark states are massive, seem to be a positive feature of the model, being consistent with the approximate existence of asymptotically free states in high energy processes.

Author: CABO MONTES DE OCA, Alejandro (Departamento de Física Teórica, ICIMAF, La Habana, Cuba)

Presenter: CABO MONTES DE OCA, Alejandro (Departamento de Física Teórica, ICIMAF, La Habana, Cuba)

Track Classification: STARS2013