

XVth Quark Confinement and the Hadron Spectrum



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Understanding the temperature dependence of fractional topological charge objects

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This presentation will focus on defining the net topological charge within distinct topological objects in the nontrivial ground-state fields of $SU(N)$ lattice gauge theory. Such an analysis has been called for by the growing number of models for Yang-Mills topological structure which propose the existence of fractionally charged objects. We perform this investigation for $SU(3)$ colour at a range of temperatures across the deconfinement phase transition, providing an assessment of how the topological structure evolves with temperature. This reveals a connection between the topological charge and holonomy of the system which must be satisfied by finite-temperature models of QCD vacuum structure. We then proceed to discuss instanton-dyons, one such model which exhibits a promising consistency with our results. To conclude, we will present preliminary findings for the gauge groups $SU(2)$ and $SU(4)$ at zero temperature to analyse the dependence of the topological structure on the number of colours.

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