THEORETICAL PHYSICS SEMINAR

Title: The axial U(1) anomaly and topological structures in finite temperature QCD

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Date/Time/Venue: 11th January (Monday)/2:30 PM/ Room No. 469

Abstract

The magnitude of axial U(1) symmetry breaking is believed to affect nature of Nf = 2 QCD chiral phase transition. The explicit breaking of chiral symmetry due to realistic light quark masses is small hence it is important to use fermions which do not break chiral symmetry on the lattice, to understand the fate of axial U(1) near the chiral crossover temperature, Tc. I discuss on our recent study of the eigenvalue spectrum of QCD with two different lattice fermion discretizations which retain a remnant of the continuum chiral symmetry. Studying the eigenvalue spectrum we do not observe any hints of the effective restoration of axial U(1) near Tc. A pile up of the near-zero eigenmodes is observed to persist even at 1.5Tc which are primarily responsible for its breaking. These eigenmodes are localized unlike those in the bulk, with a mobility edge similar to a Mott-Anderson like system. The origin of such near-zero mode spectrum can be traced back to the dilute instanton gas ensemble already setting in at 1.5 Tc. Our study for the first time also investigates in great detail the topological structures in QCD just near the chiral crossover transition from the data for topological susceptibility. I also discuss the consequences of our results for topological susceptibility in QCD for the prediction of the amount of axion dark matter.

All are welcome to attend