RCNP, OSAKA UNIVERSITY NUCLEAR PHYSICS THEORY SEMINAR

Title	Novel features of a familiar theory QCD near
	phase boundary analyzed through large scale
	numerical simulations
Speaker	Yasumichi Aoki
	(RIKEN Center for Computational Science)
Date and Time	Feb 25th (Mon.) in 2019 11:00
Place	Lecture room 1 on the 6th floor of RCNP main
	building

Abstract:

Understanding the chiral symmetry and its spontaneous breakdown is essential to theoretically reveal the nature of QCD (Quantum Chromo Dynamics) in the Standard Model of particle physics. To this end non-perturbative approaches to QCD dynamics are indispensable and numerical computation based on lattice QCD is only one available method to pursue this for targeted precision in the state-of-the-art application. Ever since the first trial in this approach started in 1980, tremendous effort to improve the algorithms has been made. With that and the increased computer capability we (lattice community) now achieved percent level precision computation for not all, but, some important physical quantities. On the other hand, if one's focus is at the boundary of chiral symmetric - broken "phases", then a delicate treatment of the chiral symmetry is required to even predict the qualitative nature of the system. Such a treatment has become possible only recently in large-scale numerical simulations, which have led to some hints of novel features of QCD. Taking the latter examples, this talk describes such features of QCD, which appears in two different contexts: 1) when the numbers of quarks are increased and 2) in the finite temperature phase transition of two-flavor QCD. The implication to the physics beyond the Standard Model 1); and also the impact to the real world 2) are discussed with the results obtained from large scale numerical simulations. Finally problems which needs to be solved in the next generation supercomputers are also discussed.

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