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## Interplay between deconfinement and chiral properties

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We study the relation between quark confinement and chiral symmetry breaking, and investigate interplay between confinement/deconfinement and chiral properties at finite temperatures. We analytically derive some relations of the Polyakov loop or its fluctuations with Dirac eigenmodes in temporally odd-number lattice QCD [1,2]. For these quantities related to confinement, the contribution from the low-lying Dirac eigenmodes is found to be negligibly small, while the modes are essential for chiral symmetry breaking. This result indicates that there is no direct, one-to-one correspondence between confinement/deconfinement and chiral symmetry breaking in QCD.

[1] T. M. Doi, K. Redlich, C. Sasaki and H. Suganuma, Phys. Rev. D92, 094004 (2015).

[2] T. M. Doi, H. Suganuma and T. Iritani, Phys. Rev. D90, 094505 (2014); H. Suganuma, T. M. Doi and T. Iritani, Prog. Theor. Exp. Phys. 2016, 013B06 (2016).

**Primary author:** SUGANUMA, Hideo (Kyoto University)

**Presenter:** SUGANUMA, Hideo (Kyoto University)

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