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\theta=\pi in SU(N)/Z_N Theory

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In SU(N) gauge theory, it is argued recently that there exists a "mixed anomaly" between the CP symmetry and the 1-form ZN symmetry at \theta=\pi, and the anomaly matching requires CP to be spontaneously broken at \theta=\pi if the system is in the confining phase. In this talk, we elaborate on this discussion by examining the large volume behavior of the partition functions of the SU(N)/Z_N theory on T^4 a la 't Hooft. The periodicity of the partition function in \theta, which is not 2\pi due to fractional instanton numbers, suggests the presence of a phase transition at \theta=\pi.

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