

I construct various generalizations of partition function in non-supersymmetric theories, including few fairly close to QCD, that do not undergo a phase transition upon circle compactification. This is similar to what happens in supersymmetric index calculations but there it is guaranteed by supersymmetry, and Bose-Fermi grading of Hilbert space. In manifestly non-supersymmetric theories in QM, 2d and 4d, I will show that by constructing similar symmetry graded state sums, one can achieve similar degree of cancellation among states in Hilbert space even in non-supersymmetric theories. This leads to a weakly coupled non-perturbatively calculable regime in interesting QFTs adiabatically connected to strong coupling regime, and provides a weak coupling mechanism of chiral symmetry breaking.