Global symmetry breaking in gauge theories: the case of multiflavor scalar chromodynamics

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Universal features of second order phase phase transitions can be investigated by studying the phi-to-the-fourth field theory with the corresponding global symmetry breaking pattern. When gauge symmetries are present, the same technique is usually applied to a gauge invariant order parameter field, as in the Pisarski-Wilczek analysis of the QCD chiral phase transition. Gauge fields are thus assumed to be irrelevant in the effective critical model, a fact that is however far from trivial. We will investigate the validity of this approach using three dimensional scalar lattice models with non-abelian global and local symmetries, for which critical exponents and scaling functions can be numerically determined with high accuracy.

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