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Spontaneously Broken (−1)-Form U(1) Symmetries

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Spontaneous breaking of symmetries leads to universal phenomena. We extend this notion to (−1)-form U(1) symmetries. The spontaneous breaking is diagnosed by a dependence of the vacuum energy on a constant background field θ, which can be probed by the topological susceptibility. This leads to a reinterpretation of the Strong CP problem as arising from a spontaneously broken instantonic symmetry in QCD. We discuss how known solutions to the problem are unified in this framework and explore some, so far unsuccessful, attempts to find new solutions. I will also discuss the explicit breaking by monopoles.

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