

**The $Z(2)$ gauge model revisited: as a possible testbed for the
confinement and chiral symmetry phase transition of $SU(2)$
lattice gauge theory**

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Abstract: By smoothing the discontinuous $Z(2)$ lattice gauge field, we found that on $SU(2)$ gauge configurations obtained by this smoothing there exists clear discontinuity of the topological property at almost the same point as the confinement-deconfinement phase transition of the original $Z(2)$ gauge theory. This observation suggests the possibility that $Z(2)$ gauge model might be a testbed for analyzing the relation between the confinement and the chiral phase transition in which the topological objects are believed to play crucial roles.