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R-symmetry Breaking in Broken Supersymmetric Vacuum in SUSY Gauge Theory

R-symmetry and supersymmetry in abelian gauge Wess-Zumino model are determined to be broken spontaneously. At tree level potential, if R-symmetry is spontaneously broken by generalized O'Raifeartaigh superpotential with a Feyet-Iliopoulos term, gauge symmetry will also be broken. If it does not break, gauge symmetry will be preserved. Therefore, an analysis of the one-loop effective potential has to be done when spontaneous R-symmetry breaking without broken U(1) gauge symmetry is possible. At the broken R-symmetry and the broken supersymmetric vacua, a gaugino mass is determined from one-loop self energy.

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