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Spontaneous Symmetry Breaking and its Effects

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In physics, symmetry breaking is a phenomenon in which (infinitesimally) small fluctuations acting on a system crossing a critical point decide the system's fate, by determining which branch of bifurcation is taken. To an outside observer unaware of the fluctuations, the choice will appear arbitrary. This process is called symmetry breaking, because such transitions usually bring the system from a symmetric but disordered state into one or more definite states. Symmetry breaking can be distinguished into two types, explicit symmetry breaking and spontaneous symmetry breaking, characterized by whether the equations of motion fail to be invariant or the ground state fails to be invariant. In spontaneous symmetry breaking, the equations of motion of the system are invariant, but the system is not. This is because the background (spacetime) of the system, its vacuum, is variant. The full effective potential can be expressed as
VEff = VTree + VCW + VCT + VT
where VTree is the tree-level potential, VCW is the one-loop Coleman-Weinberg (CW) potential, VCT are counter-terms, and VT is the thermal contribution. Spontaneous symmetry breaking can happen in two ways: In theories for which Coleman-Weinberg potential breaks the symmetry (conformal symmetry), and symmetry breaking which happens at tree-level potential (non-conformal symmetry). We are calculating the loop-corrected effective potential at non-vanishing temperature for both conformal and non-conformal in two Higgs doublet model (2HDM).

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Please select: Experiment or Theory

Theory

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