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Exploring the Higgs mechanism in U(1) and SU(2) model

The Higgs mechanism is fundamental to understanding how gauge bosons acquire mass in classical field theories through spontaneous symmetry breaking. In the U(1) Abelian case, a complex scalar field interacts with a gauge field, and a scalar potential that leads to a non-zero vacuum expectation value (VEV). This breaks the symmetry and results in a massive gauge boson, while the remaining scalar excitation manifests itself as the Higgs boson [1]. The non-Abelian SU(2) scenario involves a scalar doublet field. The spontaneous symmetry breaking occurs when the scalar field acquires a VEV, reducing the symmetry from SU(2) to U(1). This generates three massless Goldstone bosons, which are ”eaten” by the gauge fields, giving mass to the corresponding gauge bosons. The orthogonal scalar degree of freedom becomes the Higgs boson [2]. Although both models rely on spontaneous symmetry breaking to generate mass, their structural differences are significant. For example, SU(2) model leads to self-interactions among gauge fields, adding complexity to the dynamics. This framework is crucial in the development of electroweak theory and the Standard Model of particle physics [3].

Keywords: HIGGS MECHANICS, U(1) MODEL, SU(2) MODEL.

References

[1] Mark Thomson. Modern particle physics. Cambridge University Press, New York, 10 2013.
[2] V. A. Rubakov. Classical theory of gauge fields. Princeton University Press, Princeton, New Jersey, 5 2002.
[3] Ahmed Abokhalil. The Higgs Mechanism and Higgs Boson: Unveiling the Symmetry of the Universe. 6 2023

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