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An introduction to the Higgs mechanism based on classical physics secondary school curriculum

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The Higgs mechanism is introduced in a completely classical framework in which the concept of energy is reviewed. After a brief review of the classical energy of a particle in a gravitational or electromagnetic fields, we show that postulating the existence of a new field (the Higgs field) one can easily introduce a new term in the energy that is consistent with the relativistic energy at rest of a particle, making the mass of a particle the result of a dynamic effect of the interaction with a scalar field. Our model also gives rise to interaction terms between particles and the new field, as well as to the mass of such a field (i.e. to the Higgs boson).

Our approach allows a formal introduction of the Higgs field dynamics, much similar to other topics of classical textbooks, that does not require any knowledge of quantum field theory.

Experimental Collaboration

CMS

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