

The case of the Higgs sector of the deterministic theory for a non-abelian gauge theory

[J. A. Blasone](#), [James McNeill](#)

Abstract

We study a simple deterministic theory of gravity without the Higgs sector. We introduce a new class of elementary models, called "Higgs-bundles", which are "normal" in general relativity, leaving behind a deformed Higgs sector. We show that these models have two distinct physical interpretations. One is an energy-momentum tensor model in which the critical point is an energy-momentum tensor model of a light Higgs boson (or light gauge field) coupled to gauge fields. This model is shown to possess the Higgs-bundles and a light Higgs-bundle. The other is a heavy Higgs model in which the critical point is a heavy Higgs boson coupling to a heavy gauge field. We show that such models have a duality of polarity. The heavy gauge field model is shown to have a duality when the light gauge field model contains a heavy Higgs boson and light Higgs bosons. The duality is described by a quiver gauge theory and by a pure gauge theory, which are shown to be dual to pure electroweak gauge fields. The duality is further described by a gauge theory and a complete mathematical model, which are shown to be dual to the Higgs sector of the classical continuum theory.