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Nonlinearly Realized Gauge Theories for LHC physics

We consider a model with a mass generation mechanism \‘a la Stueckelebrg, which incorporates a physical scalar resonance.
The gauge symmetry is non-linearly realized and we control its
deformation through quantum correction by the Local Functional Equation.
Moreover, the perturbative expansion is governed by the Weak
Power-Counting (WPC), which selects uniquely the Hopf algebra of the theory.
Under these requirements, we find that the minimal choice of the physical scalars, compatible with the WPC, is a SU(2) doublet
(no Higgs singlet is allowed).
The theory interpolates between a purely linear representation
of the gauge symmetry (Higgs mechanism) and a Stueckelberg scenario.
Since the recent results by LHC experiments show that the data are
in good agreement with the Standard Model predictions and that
new physics cannot be the dominating effect, one can study
within such a theory whether a fraction of the mass is possibly
generated by the Stueckelberg mechanism. This in turn allows to
verify whether the linear Higgs mechanism is the one mechanism at work
in Electroweak Spontaneous Symmetry Breaking. A set of observables relevant for that purpose is identified and briefly discussed.

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