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Theory of EW interactions with dynamically generated scalars, gauge fixings, and masses of Z and W bosons

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A new theory of the EW interactions without spontaneous symmetry breaking, Higgs, and Fadeev-Popov procedure is presented
in this talk. It consists of three parts: $SU(2)_L \times U(1)$ gauge fields, massive fermion fields, and their interactions.
New mechanism of $SU(2)_L \times U(1)$ symmetry breaking caused by the fermion masses are found. Nonperturbative solutions are found.
The vacuum polarization of the Z field is expressed as
\[\Pi_{\mu\nu}(q^2)=\{F_1(q^2)(q_\mu q_\nu-q^2 g_{\mu\nu})+F_2(q^2)q_\mu q_\nu+{1\over2}\Delta m^2_Z g_{\mu\nu}\}.\]
Therefore, both the gauge fixing term(F_2) and the mass term of the field are dynamically generated from
the fermion masses. Top quark mass plays a dominant role.
No zero $\partial_\mu Z^\mu$ leads to a scalar field and a gauge fixing term for the Z field. The mass of the scalar field is determined to be
\[m_{\phi^0}=m_t e^{\frac{m^2_Z}{m^2_t}\frac{16\pi^2}{3\bar{g}^2}+1}=3.78\times10^{14}GeV.\]
The gauge fixing is determined to be
\[\xi_z=-1.18\times10^{-25}.\]
After renormalization it is determined
\[m_z={1\over2}\bar{g}^2 m^2_t\]
it agrees well with the data.
Similarly, the vacuum polarization of W boson is found. A charge scalar field is dynamically generated
\[m_{\phi^{\pm}}=m_t e^{\frac{m^2_W}{m^2_t}\frac{16\pi^2}{3g^2}}=9.31\times10^{13}GeV.\]
\[\xi_W=-3.73\times10^{-25}.\]
After renormalization the mass of the W boson is determined as
\[m^2_W={1\over2}g^2 m^2_t.\]
It agrees well with the data. It also obtain
\[\frac{m^2_W}{m^2_Z}=\frac{g^2}{\bar{g}^2}=cos^2\theta_W.\]
\[G_F=\frac{1}{2\sqrt{2}m^2_t}.\]
The Fermi coupling constant in good agreement with data.
The propergators of Z- and W- fields are derived as
\[\Delta_{\mu\nu}^Z=
\frac{1}{q^2-m^2_Z}\{-g_{\mu\nu}+(1+\frac{1}{2\xi_Z})\frac{q_\mu q_\nu}{
q^2-m^2_{\phi^0}}\}\]
\[\Delta^W_{\mu\nu}=
\frac{1}{q^2-m^2_W}\{-g_{\mu\nu}+(1+\frac{1}{2\xi_W})\frac{q_\mu q_\nu}{
q^2-m^2_{\phi_W}}\}\]
This theory can be tested by LHC experiments.

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