Three Higgs-related predictions, including $Z^0 \rightarrow$ new spin 1/2 particles

ROLAND ALLEN, Texas A&M University — A fundamental statistical picture that was proposed earlier is shown to lead to three predictions for scalar bosons $\phi_b$ that may be testable in the foreseeable future, perhaps at a 13 TeV LHC. The first is a modification of the propagators, and consequently of cross sections involving virtual processes. The second is an unrenormalized value near zero for the self-coupling coefficient $\lambda_b$. The third is an extra term in the Lagrangian with the form

$$\mathcal{L}_\chi = -\chi_b^\dagger \phi_b^\dagger (x) \sigma^k B_k (x) \chi_b \ , \quad B_k = -\frac{1}{2} F_{k'k''} e^{k'k''} \ , \quad k = 1, 2, 3 .$$

With $\chi_b$ taken to transform as a spinor, this term is invariant under a rotation, but not under a Lorentz boost. There is then a violation of Lorentz invariance, associated with the new "spinon" field $\chi_b$ and isolated in the term involving this field. This term also predicts new spin 1/2 particles which can be produced in pairs. For example, a sufficiently energetic $Z^0$ can decay to 2 Higgs-related spinons in the presence of a neutral Higgs condensate.

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