Three Higgs-related predictions, including $Z^0 \to$ 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 ϕ_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 λ_b. The third is an extra term in the Lagrangian with the form

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

With χ_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 χ_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.

Roland Allen
Texas A&M University