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Prediction of an extra gauge-boson coupling for scalar bosons ROLAND ALLEN, Texas A&M University — A fundamental statistical picture that was proposed earlier is shown to lead to three predictions for scalar bosons (Higgses or sfermions) that should be testable in the near future at the LHC. The first is a modification of the propagators, and consequently the cross sections or probabilities for virtual processes. The second is an unrenormalized value near zero for the self-coupling coefficient λ. The third is an extra gauge-boson coupling for scalar bosons, with a doubling of fields and the Lagrangian containing

$$\Phi_b^\dagger(x)\left[D^\mu D_\mu - \sigma^k B_k\right]\Phi_b(x)\ ,\ B_k = -\frac{1}{2}F_{lm}\epsilon^{lm}{}_k$$

where $F_{\mu\nu}$ is the field-strength tensor for the gauge fields to which the scalar boson is coupled. The extra term violates Lorentz invariance because $k = 1, 2, 3$ (with $\mu = 0, 1, 2, 3$), and B_k is just the magnetic-field part of $F_{\mu\nu}$. This extra term for scalar bosons is the only feature of the theory that violates Lorentz invariance far below the Planck scale. There are precedents, when violation of P and CP were found to arise from the left-handed weak-interaction coupling and the 3-generation Yukawa couplings.

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