Higgs-free derivation of gauge boson masses using complex dynamics of Levy flights ERVIN GOLDFAIN, OptiSolve Consulting — Gauge bosons are fundamental spin-1 fields that mediate the electroweak interaction of quarks and leptons. The physical mechanism explaining how gauge bosons acquire mass is neither definitively settled nor universally accepted and several theories coexist. The prevailing paradigm is that boson masses arise by coupling to a hypothetical scalar field called the Higgs boson. As of today, experimental evidence supporting the existence of the Higgs boson is missing. We discuss a Higgs-free derivation of gauge boson masses that is formulated on the basis of complexity theory. The key premise of our model is that the dynamics of boson field may be described as a stochastic process at the energy scale of the electroweak interaction. It is found that, if this process is driven by Levy statistics, mass generation in the electroweak sector can be naturally accounted for. Theoretical predictions are shown to agree well with experimental data.

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