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Dynamical scalegenesis via multiple seesaw mechanisms

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We propose a model which accounts for the dynamical origin of the electroweak symmetry breaking (EWSB), directly linking to the mass generation of dark matter (DM) candidates and active neutrinos. The standard model (SM) is weakly charged under the U(1) B-L gauge symmetry, in conjunction with newly introduced three right-handed Majorana neutrinos and the B-L Higgs. The model is built on the classical scale invariance, that is dynamically broken by a new strongly coupled sector, that is called the hypercolor (HC) sector, which is also weakly coupled to the B-L gauge. At the HC strong scale, the simultaneous breaking of the EW and B-L gauge symmetries is triggered by dynamically induced multiple seesaw mechanisms, namely bosonic seesaw mechanisms. Thus, all of the origins of masses are provided singly by the HC dynamics: that is what we call the dynamical scalegenesis. We also find that a HC baryon, with a mass on the order of a few TeV, can be stabilized by the HC baryon number and the B-L charge, so identified as a DM candidate. The HC-baryon DM can be measured through the large magnetic moment coupling generated from the HC dynamics, or the B-L gauge boson portal in direct detection experiments.

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