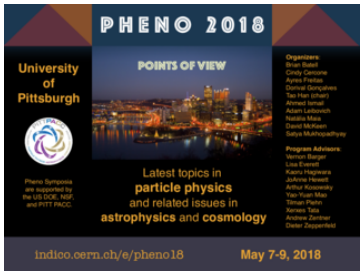

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SU(5)×U(1)$_X$ Grand Unification with Minimal Seesaw and Z′-portal Dark Matter

Monday 7 May 2018 16:30 (15 minutes)

We propose a grand unified SU(5)×U(1)$_X$ model, where the standard SU(5) grand unified theory is supplemented by minimal seesaw and a right-handed neutrino dark matter with an introduction of a global Z_2-symmetry. In the presence of three right-handed neutrinos (RHNs), the model is free from all gauge and mixed-gravitational anomalies. The SU(5) symmetry is broken into the Standard Model (SM) gauge group at $M_{\rm GUT} \simeq 4 \times 10^{16}$ GeV in the standard manner, while the $U(1)_X$ symmetry breaking occurs at the TeV scale, which generates the TeV-scale mass of the $U(1)_X$ gauge boson (Z′ boson) and the three Majorana RHNs. A unique Z_2-odd RHN is stable and serves as the dark matter (DM) in the present Universe, while the remaining two RHNs work to generate the SM neutrino masses through the minimal seesaw. We investigate the Z′-portal RHN DM scenario in this model context, and find that the constraints from the DM relic abundance and the search results for a Z′ boson resonance at the Large Hadron Collider (LHC) are complementary to narrow down the allowed parameter region, which will be fully covered by the future LHC experiments (for the Z′ boson mass < 5 TeV). We also briefly discuss the successful implementation of Baryogenesis and cosmological inflation scenarios in the present model.

Summary

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