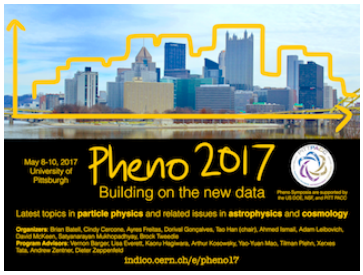

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Z'-portal right-handed neutrino dark matter in the minimal U(1)_X extended Standard Model

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We consider a concise dark matter (DM) scenario in the context of a non-exotic U(1) extension of the Standard Model (SM), where a new U(1)_X gauge symmetry is introduced along with three generation of right-handed neutrinos (RHNs) and an SM gauge singlet Higgs field. The model is a generalization of the minimal gauged U(1)_B-L (baryon number minus lepton number) extension of the SM, in which the extra U(1)_X gauge symmetry is expressed as a linear combination of the SM U(1)_Y and U(1)_B-L gauge symmetries. We introduce a Z_2-parity and assign an odd-parity only for one RHN among all particles, so that this Z_2-odd RHN plays a role of DM. The so-called minimal seesaw mechanism is implemented in this model with only two Z_2-even RHNs. In this context, we investigate physics of the RHN DM, focusing on the case that this DM particle communicates with the SM particles through the U(1)_X gauge boson (Z' boson). This "Z'-portal RHN DM" scenario is controlled by only three free parameters: the U(1)_X gauge coupling, the Z' boson mass, and the U(1)_X charge of the SM Higgs doublet. We consider various phenomenological constraints to identify a phenomenologically viable parameter space. The most important constraints are the observed DM relic abundance and the latest LHC Run-2 results on the search for a narrow resonance with the di-lepton final state. We find that these are complementary with each other and narrow the allowed parameter region, leading to the lower mass bound of > 2.7 TeV.

Summary

Primary authors: Dr OKADA, Nobuchika (University of Alabama); Mrs OKADA, Satomi (Yamagata University)

Presenter: Dr OKADA, Nobuchika (University of Alabama)

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