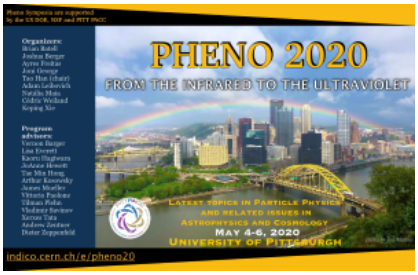

Contribution ID: **993** Type: **Parallel Talk**

A multicomponent dark matter scenario consistent with experiment

Tuesday 5 May 2020 18:00 (15 minutes)

We review a dark matter scenario which is ideal in many respects [1-4], and which appears to be supported by recent analyses of observations from major satellite experiments, which can provide indirect detection of dark matter particles resulting from their annihilation in space. In this scenario, with both supersymmetry and an extended Higgs sector, there is a doubly rich plethora of new particles and new physics to be discovered in the near or foreseeable future. The mass of the dominant dark matter WIMP (weakly interacting massive particle) is ≤ 125 GeV, its gauge couplings are precisely defined, and its Higgs-mediated couplings should be comparable to those of the neutralino of supersymmetry. Recent (and earlier) analyses of the data from Planck, Fermi-LAT, AMS-02, and other
experiments indicate that (i) the positron excess at ˜ 800 GeV or above is not evidence of high-mass dark matter particles (which would have disconfirmed the present theory with a rigorous upper limit of 125 GeV), (ii) the Galactic center excess of gamma rays observed by Fermi is evidence for dark matter particles with a mass below or near 100 GeV, (iii) the gamma-ray excess from Omega Centauri is similar evidence of annihilation of such relatively low-mass particles, and (iv) the antiproton excess observed by AMS is again evidence of roughly 100 GeV dark matter particles. The present scenario, with two stable spin 1/2 WIMPs (a high-mass neutralino and a more abundant "Higgson"with a mass of ≤ 125 GeV) is consistent with these results (as well as all others which have been verified), and it also suggests that detection should be near in a variety of experiments for direct, indirect, and collider detection.
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[3] Maxwell Throm, Reagan Thornberry, John Killough, Brian Sun, Gentill Abdulla, and Roland E. Allen. Mod. Phys. Lett. A 34, 1930001 (2019).
[4] Reagan Thornberry, Maxwell Throm, John Killough, Dylan Blend, Michael Erickson, Brian Sun, Brett Bays, Gabe Frohaug, and Roland E. Allen, "A natural multicomponent dark matter scenario with two coexisting stable WIMPs", submitted.

Summary

Author: ALLEN, Roland (Texas A&M University)

Presenter: ALLEN, Roland (Texas A&M University)

Session Classification: SUSY II

Track Classification: SUSY