3:30 pm • Friday April 18, 2014 • 2241 Chamberlin Hall • Coffee at 4:30 pm

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UC Santa Cruz

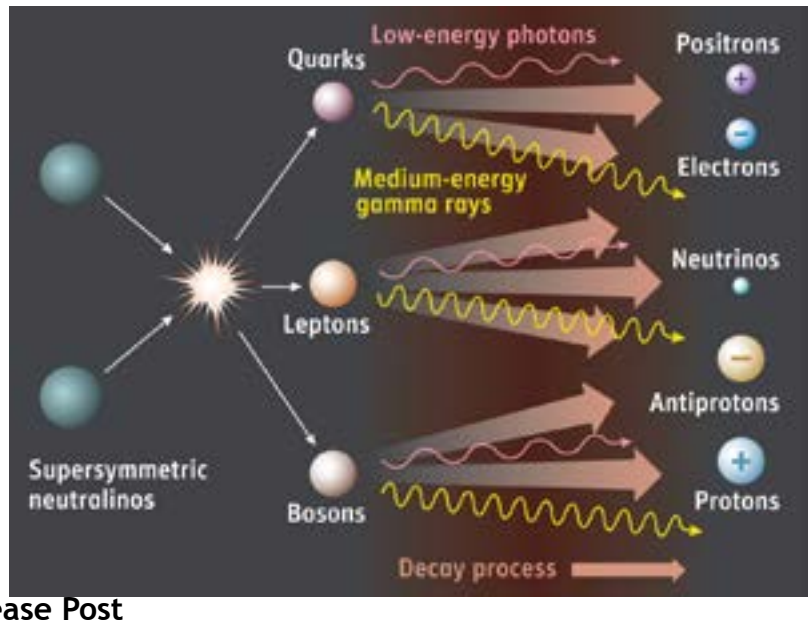
New Physics from the Sky:

Cosmic Rays, Gamma Rays and the Hunt for Dark Matter

Department of Physics Colloquium

WISCONSIN

Can we learn about New Physics with astronomical and astro-particle data? Understanding how this is possible is key to unraveling one of the most pressing mysteries at the interface of cosmology and particle physics: the fundamental nature of dark matter. I will discuss some of the recent puzzling findings in cosmic-ray electron-positron data and in gamma-ray observations that might be related to dark matter. I will argue that cosmic-ray data, most notably from the AMS, Pamela and Fermi satellites, indicate that previously unaccounted-for powerful sources in the Galaxy inject high-energy electrons and positrons. Interestingly, this new source class might be related to new fundamental particle physics, and specifically to pair-annihilation or decay of galactic dark matter. This exciting scenario is directly constrained by Fermi gamma-ray observations, which also inform us on astrophysical source counterparts that could be responsible for the high-energy electron-positron excess. Observations of the gamma-ray emission from the central regions of the Galaxy as well as claims about a gamma-ray line at around 130 GeV also recently triggered a wide-spread interest: I will address the question of whether we are really observing signals from dark matter annihilation, how to test this hypothesis, and which astrophysical mechanisms constitute the relevant background.



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