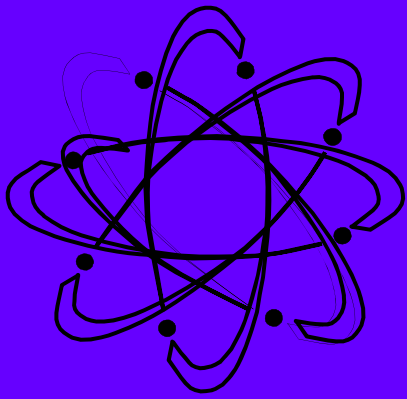


The Department of
Physics



Carnegie Mellon

McWilliams Center for Cosmology Colloquium

Stefano Profumo
University of California,
Santa Cruz

**“Fundamental Physics from the Sky:
Cosmic Rays, Gamma Rays and the
Hunt for Dark Matter”**

Thursday, January 13, 2011

4:30pm

Doherty Hall A301D

Abstract:

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 recent cosmic-ray data, notably from the 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 also be responsible for the high-energy electron-positron excess. Anomalous diffuse gamma-ray emission from the central regions of the Galaxy also recently triggered a wide-spread interest: I will address the question of whether we are really observing dark matter annihilation in the galactic center, and whether the diffuse radio and gamma-ray excesses from that region (the WMAP and Fermi “haze”) might be related to new particle physics.