

Astrophysical vs. dark matter interpretations of gamma-ray observations in dwarf galaxies

Deep, all-sky gamma-ray observations combined with recent discoveries of nearby dwarf galaxies have set the stage for the potential detection of dark matter annihilation. I will discuss a few issues, both conceptual and technical, required to rigorously establish the existence of a signal and to identify it as new physics. This includes assessing significance given limitations in our understanding of the gamma-ray background, especially regarding populations of faint astrophysical sources. I will present ongoing work on new methods to test the dark matter hypothesis against alternatives, which carefully handle partial knowledge of both the dark matter properties and of the background. Given an apparent excess I will show how comparing its energy spectrum to those of conventional sources can help explain its origin. I will present these new techniques in applications to the dwarf galaxies Reticulum II and the recently discovered Carina II/III pair. Such methods will become essential when the next generation of sky surveys discovers a plethora of new dark matter-dominated satellites surrounding the Milky Way.