



# PHYSICS AND ASTRONOMY COLLOQUIUM

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## **“A Cold Dark Matter Controversy in Dwarf Galaxies”**

### Abstract

The cold dark matter (CDM) cosmological model has been very successful in explaining cosmic structure on large scales and over a vast span of cosmic time, but it has faced persistent challenges from observations that probe the innermost regions of dwarf galaxies in the local universe.

Cosmological simulations that incorporate only gravity and collisionless CDM predict central densities that are too high to match constraints from galaxy dynamics. The solution could lie in baryonic physics: gravitational potential fluctuations associated with supernova feedback can lower central densities. However, it is not clear that this solution can work for the faintest galaxies, where basic energetic arguments suggest that feedback alone cannot solve the problem. Alternatively, the anomalous dark matter densities could be evidence of more complex physics in the dark sector itself. For example, elastic scattering from strong dark matter self-interactions can alter predicted halo mass profiles, leading to good agreement with observations across a wide range of galaxy mass. I will discuss ways forward for discriminating between these scenarios.

Wednesday, October 16, 2013

3:30 p.m.

Bob Wright Centre

Room A104