PHYSICS AND ASTRONOMY
SEMINAR

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"Dwarf galaxies and their satellites as extreme probes of LCDM"

Abstract

Dwarf galaxies are extremely diverse in their morphology, from rotationally-supported star-forming disks to gas-free spheroidal stellar systems with no star-formation and negligible rotation. We use cosmological hydrodynamical simulations to show that environment plays a significant role on the assembly history, star formation and globular cluster population of dwarfs, solving a long-standing issue on the origin of dwarf ellipticals in galaxy clusters. But as observations push deeper into fainter and fainter galaxies, the theoretical predictions become more extreme. LCDM galaxy formation models make two clear predictions: i) galaxy formation should become increasingly inefficient in lower mass halos, implying that dwarfs are only able to collect a few percent of their baryonic content, and (ii) dwarfs, like any galaxy, should be surrounded by a wealth of dark-matter substructure, implying that faint satellites of dwarfs should be common. I will use cosmological simulations to address these predictions and to compare them with available observational constraints, such as the Baryonic Tully-Fisher relation and the inventory of dwarfs in the Local Volume. The recent detection by the DES survey of several dwarfs potentially associated with the Magellanic Clouds is an exciting discovery that confirms that the hierarchical nature of galaxy formation extends down to the faintest limits probed, just as predicted by LCDM. On the other hand, the extreme baryon content of some isolated dwarfs presents a newly recognized challenge to the paradigm that still awaits resolution.

Friday, March 11, 2016
10:30 a.m.
Elliott Building
Room 061