Dark matter structure in galactic and sub-galactic scales

Masashi Chiba[1*]

[1]*Astronomical Institute, Tohoku University, Aoba-ku, Sendai 980-8578, Japan*

Abstract

The cold dark matter (CDM) scenario for structure formation in the Universe has been quite successful to explain a wide variety of observational results, such as the characteristic fluctuations of the cosmic microwave background and large-scale structure of galaxy distribution, on the spatial scales larger than ~ 1 Mpc. However, the recent advent of high-resolution N-body simulations on CDM-based structure formation has enabled to highlight various discrepancies with existing observations on the spatial scales smaller than ~ 1 Mpc. One of the most serious issues is that CDM models predict the existence of several hundred dark satellites or ``CDM subhalos'' (with masses of M ~ 10^{7-9} Msun) in a galaxy-sized halo (with M ~ 10^{12} Msun), in sharp contrast to the observed number of about twenty Milky Way satellites. Other issues include strongly cusped central density and triaxial global shape of a theoretically predicted CDM halo, which are not in good agreement with observationally suggested halo properties [1]. Here we review the current view on dark matter structure in galactic and sub-galactic scales.

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*chiba@astr.tohoku.ac.jp