Shapes of Milky Way Dark Matter Halos

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1 Observations

In this section we summarize the constraints on the shape of the Milky Way dark matter halo.

2 Simulation

We use a large N-body simulation dubbed `Bolshoi`. The data in this paper is available to the public throug a database [1] presented by Riebe et al. [2011]. The `Bolshoi` simulation follows the non-linear evolution of dark matter density field in a cubic volume of side $250h^{-1}$Mpc sampled with 2048^3 particles. The code adaptive mesh refinment code ART was used [Klypin et al., 2009]. A detailed description of this simulation can be found in Klypin et al. [2011].

The cosmological parameters are compatible with the results from the fifth and seventh year of data from the Wilkinson Microwave Anisotropy Probe [Komatsu et al., 2009, Jarosik et al., 2011], with $\Omega_m = 0.27$, $\Omega_\Lambda = 0.73$, $n_s = 0.95$, $h = 0.70$ and $\sigma_8 = 0.82$ for the matter density, dark energy density, slope of the matter fluctuations, the Hubble constant at $z = 0$ in units of 100km s^{-1} Mpc^{-1} and the normalization of the power spectrum. The mass of a simulation particle is $m_p = 1.4 \times 10^8 h^{-1}\mathrm{M}_\odot$.

2.1 Halo finding

We use halos that were defined using the Bound Density Maxima (BDM) algorithm [Klypin et al., 1999]. The first step in the algorithm is finding the density at the particles' positions in the simulation around which spheres of radius R are built to contain a mass overdensity $M_\Delta = \frac{4\pi}{3}\Delta\rho_{\mathrm{cr}}(z)R_\Delta^3$, where ρ is the critical density of the Universe and Δ is a desired overdensity threshold. We use the results obtained for $\Delta = 200$.

[1] `http://www.multidark.org/MultiDark/MyDB`

2.2 Concentration and shape measurements

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