

IMPLEMENTATION OF GRAVITATIONAL POTENTIAL SCREENING ON LARGE SCALES IN AN N-BODY CODE

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There was considered the Universe filled with cold dark matter in the form of discrete inhomogeneities (e.g., galaxies) and dark energy in the form of arbitrary continuous perfect fluids. The background space-time geometry is defined by the Friedmann metric. It was developed the first-order scalar and vector cosmological perturbation theory in the weak gravitational field [1]. Such approach works at all cosmological scales and incorporates linear and nonlinear effects with respect to energy density fluctuations. The gravitational potentials produced by matter fluctuations are characterized by a finite time-dependent Yukawa interaction range being the same for each individual contribution and which is of the order of 3700 Mpc at the present time. Therefore, the gravitational potential of the n -th fluctuation is exponentially suppressed at such scales. This suppression is called the cosmological screening. At smaller scales the Newtonian expression for the gravitational potential was reproduced [2]. The gravitational potential screening at large scales was implemented in an N-body code by adding the cosmological screening for taking into account Yukawa suppression on a large scale by the dynamic evolution of density perturbations.

[1] M.Eingorn, *ApJ* 825, 84 (2016).

[2] M.Eingorn, C.Kiefler, A.Zhuk, *JCAP* 09 (2016) 032.