



Contribution ID: 170

Type: Plenary/Parallel talk

The cosmology dependence of the concentration-mass-redshift relation

The concentrations of dark matter haloes provide crucial information about their internal structure and how it depends on mass and redshift – the so-called $c(M, z)$ relation. I will present an extensive study of the cosmology-dependence of halo concentrations based on a suite of 72 dark matter-only simulations in which the following cosmological parameters are varied: σ_8 , Ω_M , Ω_b , n_s , h , M_ν , w_0 and w_a . I will analyze how different cosmological parameters impact the values of the concentrations for different halo masses and redshifts. In agreement with previous work, and for all cosmologies studied, there exists a tight correlation between the characteristic densities of dark matter haloes and the critical density of the Universe at suitably defined formation time. This finding, when combined with excursion set modeling of halo formation histories, allows us to accurately predict the concentrations of dark matter haloes for arbitrary masses, redshifts, and values of the cosmological parameters.

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Session Classification: Poster session