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The Non-Linear Matter Power Spectrum in Warm Dark Matter Cosmologies

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We investigate the non-linear evolution of the matter power spectrum by using a large set of high-resolution N-body/hydrodynamic simulations. The linear matter power in the initial conditions is consistently modified to accommodate warm dark matter particles which induce a small scale cut-off in the power as compared to standard cold dark matter scenarios. The impact of such thermal relics is addressed at small scales with k > 1 h/Mpc and at z < 5, which are particularly important for the next generation of Lyman-alpha forest, weak lensing and galaxy clustering surveys. We quantify the mass and redshift dependence of the warm dark matter non-linear matter power and we provide a fitting formula which is accurate at the ~2% level below z=3 and for masses m_wdm > 0.5 keV. The role of baryonic physics (cooling, star formation and feedback recipes) on the warm dark matter induced suppression is also quantified. Furthermore, we compare our findings with the halo model and show their impact on the cosmic shear power spectra.

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