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Exploring the link between baryons and the matter power spectrum

Upcoming weak lensing surveys require a detailed theoretical understanding of the matter power spectrum in order to derive accurate and precise cosmological parameter values. While galaxy formation is known to play an important role, its precise effects are currently unknown. We present the results of a detailed investigation of the dependence of the relative difference between the total matter power spectra in hydrodynamical and collisionless simulations on the effectiveness of stellar and AGN feedback, cosmology and redshift, based on a new library of simulation power spectra. Using this same library, we have found a strong correlation between the effects of feedback on clustering and the mean baryon fraction in groups, and based on this present an empirical model capable of predicting the effect of galaxy formation on the matter power spectrum at $z=0$ to within 1% for $k < 1 \text{ h/Mpc}$.

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