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Chameleon Halo Modeling in $f(R)$ Gravity

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We model the chameleon effect on cosmological statistics for the modified gravity $f(R)$ model of cosmic acceleration. The chameleon effect, required to make the model compatible with local tests of gravity, reduces force enhancement as a function of the depth of the gravitational potential wells of collapsed structure and so is readily incorporated into a halo model by including parameters for the chameleon mass threshold and rapidity of transition. We show that the abundance of halos around the chameleon mass threshold are enhanced by both the merging from below and the lack of merging to larger masses. This property also controls the power spectrum in the nonlinear regime and we provide a description of the transition to the linear regime that is valid for a wide range of $f(R)$ models.

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