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## The halo mass function in clustering dark energy models as a tool versus the $\sigma_8$ tension

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“When N-body simulations deal with dark energy, they consider its effect only at the background level, modifying the Hubble expansion. A notable exception is the K-evolution code which simulates k-essence models with a low sound-speed using the effective field theory approach at the non-linear level. It has been demonstrated that this leads to divergences. Hence, a few authors recently proposed to investigate this issue by developing a code which can simulate a dark energy fluid in a way analogous to what normally done with dark matter and baryons modifying the Euler equation taking into account pressure contributions. In this talk I will explore the effects of this additional term in the formalism of the spherical collapse model and show how the evolution of perturbations compare to the standard equations and how the halo mass function is modified. A modification in the evolution of perturbations, also taking into account dark energy perturbations, will lead to a different normalization of the matter power spectrum,  $\sigma_8$ . This quantity can be further constrained with observed measurements of the halo mass function and indicate whether the  $\sigma_8$  tension is alleviated or enhanced.”

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