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Soft Dark Energy and Soft Dark Matter

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Standard cosmology is based on the assumption that the dark fluids behave as standard, hard matter. On the other hand, soft matter is a well studied field in condensed matter physics. We investigate the possibility of soft cosmology”, namely the appearance (intrinsically or effectively) of soft-matter properties in the dark sectors. We propose a novel parametrization introducing the softness parameters”, which quantify the scale dependence of the dark sector’s EoS, i.e the difference between large and intermediate scales. Although the background evolution remains unaffected, even a slightly non-trivial softness parameter improves the clustering behavior and alleviates e.g. the $f\sigma_8$ tension. Soft dark energy and soft dark matter seem to be favoured by the data comparing to LambdaCDM scenario.

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