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Partially Cannibalistic Dark Matter

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Cannibals are dark matter particles with a scattering process that allows three particles to annihilate to two. This exothermic process keeps the gas of the remaining particles warm long after they become non-relativistic. A cannibalizing dark sector which is decoupled from the Standard Model naturally arises from a pure-glue confining hidden sector. It has an effective field theory description with a single massive interacting real scalar field, the lightest glueball. Since warm dark matter strongly suppresses growth of structure cannibals cannot be all of the dark matter.

In this talk I propose a scenario where most dark matter is non-interacting and cold but about 1 percent is cannibalistic. I review the cannibals' unusual scaling of the temperature and energy and number densities with redshift and generalize the equations for the growth of matter density perturbations to the case of cannibals. I solve the equations numerically to predict the scaling of the Hubble parameter and the characteristic shape of the linear matter power spectrum as a function of model parameters. The results may have implications for the σ_8 and H_0 problems.

This talk is based on the paper arXiv:1803.08062.

Summary

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