The imprint of the interaction between dark sectors in galaxy clusters

Jian-Hua He, Bin Wang

INPAC and Department of Physics, Shanghai Jiao Tong University, 200240 Shanghai, China

Elcio Abdalla

Instituto de Fisica, Universidade de Sao Paulo, CP 66318, 05315-970, Sao Paulo, Brazil

Diego Pavon

Department of Physics, Autonomous University of Barcelona, 08193 Bellaterra, Barcelona, Spain

Abstract

Based on perturbation theory, we study the dynamics of how dark matter and dark energy in the collapsing system approach dynamical equilibrium when they are in interaction. We find that the interaction between dark sectors cannot ensure the dark energy to fully cluster along with dark matter. When dark energy does not trace dark matter, we present a new treatment on studying the structure formation in the spherical collapsing system. Furthermore we examine the cluster number counts dependence on the interaction between dark sectors and analyze how dark energy inhomogeneities affect cluster abundances. It is shown that cluster number counts can provide specific signature of dark sectors interaction and dark energy inhomogeneities.

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