

Studying galaxy and hot gas interactions in halos through cross-correlations of the thermal Sunyaev-Zeldovich effect and galaxy surveys

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In addition to dark matter, massive halos also contain galaxies and hot gas. These latter two components interact and influence each other. On the one hand, galaxies and stars therein form from gas, cooling towards the halo center. On the other hand, galaxies also influence the gas dynamics through a number of feedback processes, including stellar radiation, supernovae, and AGN feedback. In order to study these feedback processes and to understand the effect of the environment (mainly the gas thermodynamics) on the galaxy stellar population, it is useful to measure the joint distribution of galaxies and hot gas.

In our study, we cross-correlate the thermal Sunyaev-Zeldovich (tSZ) map provided by the *Planck* satellite with the CMASS galaxy sample from BOSS. Binning galaxies on stellar mass, we can more finely study the interactions between gas and galaxies, in addition to obtaining a better understanding of galaxy small-scale clustering. Making use of the halo model formalism, we model the gas distribution inside galaxy clusters and determine how its pressure depends on galaxy stellar mass. We find a hint that the gas pressure decreases slightly in the vicinity of the most massive galaxies, which could help to constrain feedback models.