[구GC-09] On the origin of post-merger features in galaxy clusters

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Sheen et al. 2012 reported a high fraction of galaxies with post-merger features in clusters. The fraction is much higher than what analytic calculation predicts based on the fact that subhalos inside galaxy clusters have high relative velocities. In this study, we aim to address the origin of the post-merger features and to draw an implication for the assembly history of the cluster galaxies.

We have performed high-resolution hydrodynamic zoom-in simulations on a cluster of ~1015M using the publicly available Adaptive Mesh Refinements (AMR) code, RAMSES. From the simulations, we have constructed mock images of cluster galaxies taking into account age, metallicity, mass of stellar populations and extinction. The mock images enable us to directly compare the simulation result with deep observation data of cluster galaxies. We discuss possible scenarios for the origin of the post-merger features. We also discuss caveats and future perspectives from the study.

[구GC-10] Strong Accretion Shock Waves in Cluster Outskirts and Possibility of Cosmic-Ray Population Inversion

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We analyzed the properties of shock waves in galaxy clusters, by using the data of simulations for the large-scale structure of the universe with the spatial resolution of up to 25 kpc/h. In a substantial fraction of clusters, we found that strong shocks with Mach number of several or larger exist in outskirts within the virial radius. They are produced by the accretion of warm gas flowing from filaments to clusters, and generate large cosmic-ray fluxes. The cosmic rays advect into cluster cores, but may temporally induce the population inversion, that is, larger population at larger radius, suggested by recent radio and γ-ray observations.