[포GC-25] Turbulence in Clusters of Galaxies

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Clusters of galaxies are the largest virialized structures in the universe, which serve as laboratories for the study of astrophysical processes on very large scales. Observations and theoretical arguments suggest that intracluster media is turbulent. The media are very hot and dynamic, highly rarefied, and probably magnetized at some level. The physics involved is complex and high-resolution simulations help us understand the physics and consequent phenomena. We are engaged in a simulation study designed to understand in this context how subsonic turbulence with very weak initial magnetic fields develops and evolves with imposed forcing. We find that the resulting turbulence is sensitive to the nature of forcing as well as the dissipation properties of the media.

[포GC-26] Diffusive Shock Acceleration Modeling of Radio Relics in Clusters of Galaxies

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Cosmological shock waves result from supersonic flow motions induced by hierarchical clustering during the large-scale structure formation in the Universe. Suprathermal particles are known to be produced via plasma interactions at collisionless shocks in tenuous plasmas and they can be further accelerated to become cosmic rays (CRs) via diffusive shock acceleration (DSA). The presence of CR electrons has been inferred from observations of diffuse radio halos and relics in some merging galaxy clusters. We have calculated the emissions from CR electrons accelerated at weak planar shocks, using time-dependent DSA simulations that include energy losses via synchrotron emission and Inverse Compton scattering. The simulated nonthermal emission are used to model the synchrotron emission from several observed radio relics.