[구GC-03] Development of a New Cosmological Hydro Simulation Code

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We have implemented the Smoothed Particle Hydrodynamics (SPH) into the cosmological N-body simulation code. The pre-initial particle distribution is set to follow the glacial conditions and the initial temperature of hydro particles is calculated based on the adiabatic process in the expanding backgrounds. Typical adiabatic SPH equations are adopted and, additionally, non-adiabatic processes such as heating/cooling and supernova explosion are added. We study the effect of star formation criteria on the global star formation rate and compare it with the observations.

[구GC-04] Galaxy overdensities at intermediate to high redshift

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We searched and studied galaxy overdensities at $0.6 < z < 4.5$ in the areas of two GOODS fields. These overdensities are identified by running top-hat filters on the two dimensional spatial distribution of two galaxy samples - a K-band limited, photometric redshift sample at $0.6 < z < 4.5$, and BVz-color selected sample targeting overdensities at $z \sim 3.7$ and $z \sim 4.0$. Here photometric redshifts are derived from multi-wavelength data ranging from U-band through 8 micron band of the Spitzer. We find 52 overdensities with significances of 3.5-7 σ. The derived masses found to be a $> 10^{13}$ $M_{\odot}$ with the comoving number density of a few $\times 10^{-6}$ Mpc^{-3} at $z \sim 3$. In order to understand the high number density of massive overdensities at high redshift, we carried out an analysis of galaxy overdensities using the mock galaxy catalog based on Millennium simulation selected in the same way as the analysis of the observational data. In the simulation, we find 650 galaxy overdensities with a 3.5 σ detection threshold over $2^{\circ 2}$ sky field. The number density of the very massive overdensities ($M > 10^{14}$ $M_{\odot}$) in simulation shows a similar trend with the observation. We further discuss implications of our results.