BARYONIC FRACTION IN THE COLD PLUS HOT DARK MATTER UNIVERSE

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We report a study to constrain the fraction of baryonic matter in the cold plus hot dark matter (CHDM) universe by numerical simulations which include the hydrodynamics of baryonic matter as well as the particle dynamics of dark matter. Spatially flat, COBE-normalized CHDM models with the fraction of hot component $\Omega_h \leq 0.2$ are considered. We show that the models with $h/n/\Omega_h$=0.5/0.9/0.1 and 0.5/0.9/0.2 give a linear power spectrum which agrees well with observations. Here, h is the Hubble constant in unit of 100km/s/Mpc and n is the spectral index of the initial power spectrum. Then, for the models with $h/n/\Omega_h$=0.5/0.9/0.2 and baryonic fraction Ω_b=0.05 and 0.1 we calculate the properties of X-ray clusters, such as luminosity function, temperature distribution function, luminosity-temperature relation, histogram of gas to total mass ratio, and change of average temperature with redshift z. Comparison with the observed data of X-ray clusters indicates that the model with Ω_b=0.05 is preferred. The COBE-normalized CHDM model with Ω_b>0.1 may be ruled out by the present work, since it produces too many X-ray bright clusters.

TOPOLOGY AND CORRELATION FUNCTION IN SIMULATED CMB ANISOTROPIES FROM MAP IN CDM COSMOGONIES

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We have simulated Cosmic Microwave Background (hereafter CMB) anisotropy maps, under several cosmological models, to predict the results of the MAP experiment, the second generation whole sky observation of the CMB fluctuation following the COBE DMR experiment.

We have studied sensitivity of the simulated MAP data to cosmology, sky coverage, and instrumental noise. We find that the MAP data will discriminate among a range of standard cosmological models, constrain the cosmological parameters with unprecedented accuracies, and describe the topology of the initial fluctuations superbly.