NUMBER COUNTS OF CLUSTERS OF GALAXIES IN X-RAY AND SUBMM BANDS

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We compute the number counts of clusters of galaxies, the log$N$–log$S$ relation, in several X-ray and submm bands on the basis of the Press–Schechter theory (Kitayama et al. 1998). We pay particular attention to a set of theoretical models which well reproduce the *ROSAT* 0.5-2 keV band log$N$–log$S$ (Ebeling et al. 1997; Rosati et al. 1997), and explore possibilities to further constrain the models from future observations with *ASCA* and/or at submm bands. The latter is closely related to the European *PLANCK* mission and the Japanese *LMSA* project. We exhibit that one can break the degeneracy in an acceptable parameter region on the $\Omega_0 - \sigma_8$ plane by combining the *ROSAT* log$N$–log$S$ and the submm number counts. Models which reproduce the *ROSAT* band log$N$–log$S$ will have $N(>S) \sim (150 - 300)(S/10^{-12}\mathrm{erg\ cm^{-2}\ s^{-1}})^{-1.3}\ \mathrm{str^{-1}}$ at $S \gtrsim 10^{-12}\mathrm{erg\ cm^{-2}\ s^{-1}}$ in the *ASCA* 2-10 keV band, and $N(>S_\nu) \sim (10^2 - 10^4)(S_\nu/100\mathrm{mJy})^{-1.5}\ \mathrm{str^{-1}}$ at $S_\nu \gtrsim 100$mJy in the submm (0.85mm) band. The amplitude of the log$N$–log$S$ is very sensitive to the model parameters in the submm band. We also compute the redshift evolution of the cluster number counts and compare with that of the X-ray brightest Abell-type clusters (Ebeling et al. 1996). The results, although still preliminary, point to low density ($\Omega_0 \sim 0.3$) universes. The contribution of clusters to the X-ray and submm background radiations is shown to be insignificant in any model compatible with the *ROSAT* log$N$–log$S$.

References

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