R31b Extended Fluctuation Analysis for the Estimation of the Galaxy Evolution from the Cosmic Background Radiation

○竹内 努 (国立天文台)、石井 貴子 (京都大)

Fluctuation analysis has long been known as a useful method for the studies on the numbers and evolutionary status of extragalactic sources (e.g., Scheuer 1957; Hewish 1961; Condon et al. 1978; Barcons 1990; Oliver et al. 1997; Matsuhara et al. 2000; Lagache et al. 2000; Miville-Deschênes et al. 2002). It is a complementary method for the direct number counting of extragalactic sources, being free from confusion noise.

However, the fluctuation in background radiation depends on the clustering properties of the sources. In principle, the evolution of the sources and the source clustering can give rise to the same results, hence these two different physical phenomena are indistinguishable by the method. Surprisingly, this serious drawback in this method has been almost completely overlooked in previous studies.

In order to address the problem, we deveoped a new theoretical analysis to estimate the galaxy evolution from the fluctuation of the cosmic background radiation. We succeeded in extending the previous theory to include the effect of source clustering analytically. By this new formula, we can disentangle the degeneracy between evolution of source luminosity and clustering.

Practically, if we have some clues to the evolution of clustering, we can extract the information of source luminosity evolution. We examined the effect of clustering in the existing infrared/submm galaxy counts. We found that the effect of clustering is significant, and the evolution is overestimated in these surveys.