R28b Prospects of Submillimeter and Millimeter Galaxy Surveys for the Study of Galaxy Formation and Evolution

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We investigate what we can learn on the galaxy formation and evolution from the data which will be provided by the forthcoming new submillimeter and millimeter facilities, especially by ASTE and LMSA. We first calculate the number counts from 350 μm to 3 mm by using the empirical infrared galaxy number count model of Takeuchi et al. (2000). Based on these number counts, we then derive the source confusion noise and estimate the confusion limits at various wavebands as a function of the characteristic beam size. We find that, at the submillimeter wavelengths, source confusion of the 10 – 15-m class facilities becomes severe at 0.1 to 1 mJy level, and astrometry and flux measurement are difficult. However, we show that very large-area survey of the submillimeter sources brighter than $\sim$ 100 mJy can provide a unique constraint on the infrared galaxy evolution at $z = 1 \sim 2$. Such a survey is quite suitable for ASTE. We also find that the 5σ-confusion limit of LMSA reaches to 1 μJy, which enables us to study the contribution of the sources at extremely large redshift. The source counts at such faint flux level give an important information of galaxy formation epoch. We then discuss the possibility to use the multiband photometric measurements at the infrared (by *IRIS*) to millimeter as a rough redshift estimator. This method has an advantage compared with some other redshift estimation based on an empirical correlation of far infrared and radio fluxes, because our method uses only a single blackbody component emitted by big grain dust. In addition, we show the comparison of the observed 1.4 GHz source count and our model count, to examine the contribution of star forming galaxies to the faint radio galaxies. At 1.4-GHz flux $S_\nu < 0.1$ mJy, contribution from star-forming galaxies dominates the counts.