R20b The Luminosity Function of *IRAS* PSCz Galaxies

○ Tsutomu T. Takeuchi (Nagoya Univ.), Kohji Yoshikawa, Takako T. Ishii (Kyoto Univ.)

We estimated the luminosity function (LF) of *IRAS* galaxies in the PSCz catalogue (Saunders et al. 2000). We found that the faint-end slope of the PSCz LF has a slope steeper than that of the LF previously derived by Saunders et al. (1990). Using an analytical expression for the LF of Saunders et al. (1990), we obtained the parameter set $\alpha = 1.38$, $L_* = 6.87 \times 10^8 h^{-2}\ L_\odot$, $\phi_* = 2.29 \times 10^{-2} h^3$ Mpc^{-3}, and $\sigma = 0.70$. Next, we divided the PSCz sample into warm and cool galaxy groups. The dividing line is $\beta \equiv S_{100}/S_{60} = 2.1$. We estimated the LF for each group and found the faintest end ($L_{60} < 10^7\ L_\odot$) of the LF of warm galaxies to be very steep ($\alpha = 1.52$). Based on this new LF, we examined how the faint-end slope of the LF affects the estimation of galaxy evolution through galaxy number counts and cosmic infrared background. We evaluate the effect using an empirical model of Takeuchi et al. (2001). In their original discussion, they used the LF of Soifer et al. (1987). We searched a solution for the history of IR galaxy evolution to reproduce the cosmic infrared background following the calculation of Takeuchi et al. (2001) except that we used the LF of PSCz galaxies. If we assume a pure luminosity evolution, the required amplitude of evolution is found to be unchanged at $z \lesssim 0.5$, but significantly higher by a factor of 2–3 at $z \gtrsim 0.5$ compared with that of Takeuchi et al. (2001). A flat faint-end LF yields a high-z inclined interpretation of the redshift distribution of IR galaxies. On the other hand, the difference of the LF does not significantly affect the prediction of galaxy number counts within the observed flux ranges. In summary, we should keep the shape of the adopted LF in mind when we interpret the observed cosmic IR background through a certain galaxy evolution model.