X49a The most accurate luminosity function of local infrared galaxies based on the AKARI all sky survey

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Local infrared (IR) luminosity functions (LFs) are necessary benchmarks for high-redshift IR galaxy evolution studies. Any accurate IR LF evolution studies require accordingly accurate local IR LFs.

We constructed IR galaxy LFs at $z \leq 0.3$ from *AKARI* space telescope, which performed an all-sky survey in six IR bands (9, 18, 65, 90, 140 and 160 μm) with 3-10 times better sensitivity than its precursor IRAS. Availability of 160 μm filter is critically important in accurately measuring total IR luminosity of galaxies, covering across the peak of the dust emission. By combining mid-IR data from *WISE*, and spectroscpic redshifts from SDSS DR13, 6dFGS, and 2MRS, we created a sample of 15,638 local IR galaxies with spectroscopic redshifts, i.e., by a factor of 20 larger than the well-cited previous work from IRAS, let alone IRAS limit to $<$100 μm. After carefully correcting for volume effects in both IR and optical, the obtained IR LFs agree well with previous studies, but comes with much smaller errors. Especially both faint- and bright-ends of the LFs are better-determined, due to much larger size of the spectroscpic redshifts and the IR photometry.

Measured local IR luminosity density is $\Omega_{IR} = 1.19 \pm 0.05 \times 10^8 L_\odot$ Mpc^{-3}. The contributions from luminous infrared galaxies and ultra luminous infrared galaxies to Ω_{IR} are very small, 9.3 per cent and 0.9 per cent, respectively. There exists no future all sky survey in far-infrared wavelengths in the foreseeable future. The IR LFs obtained in this work will therefore remain an important benchmark for high-redshift studies for decades.