Astrophysics > Cosmology and Extragalactic Astrophysics

# Evolution of Infrared Luminosity functions of Galaxies in the AKARI NEP-Deep field: Revealing the cosmic star formation history hidden by dust

Tomotsugu Goto (ifa, University of Hawaii), T. Takagi, H. Matsuhara (ISAS/JAXA), T.T. Takeuchi (Nagoya), C. Pearson (Rutherford), T. Wada, T. Nakagawa (ISAS/JAXA), O. Ilbert (Marseille), E.Le Floc'h (CEA), S. Oyabu (ISAS/JAXA), Y. Ohyama (ASIAA), M. Malkan (UCLA), H.M. Lee, M.G. Lee (SNU), H. Inami (SSC), N. Hwang (NAOJ), H. Hanami (Iwate), M. Im (SNU), K. Imai (TOME R&D), T. Ishigaki (Asahikawa), S. Serjeant (Open Univ.), H. Shim (SNU)

*(Submitted on 30 Dec 2009 (v1), last revised 8 Jan 2010 (this version, v2))*

Dust-obscured star-formation becomes much more important with increasing intensity, and increasing redshift. We aim to reveal cosmic star-formation history obscured by dust using deep infrared observation with the AKARI.
We construct restframe 8um, 12um, and total infrared (TIR) luminosity functions (LFs) at 0.15<z<2.2 using 4128 infrared sources in the AKARI NEP-Deep field. A continuous filter coverage in the mid-IR wavelength (2.4, 3.2, 4.1, 7, 9, 11, 15, 18, and 24um) by the AKARI satellite allows us to estimate restframe 8um and 12um luminosities without using a large extrapolation based on a SED fit, which was the largest uncertainty in previous work. We have found that all 8um (0.38<z<2.2), 12um (0.15<z<1.16), and TIR LFs (0.2<z<1.6), show a continuous and strong evolution toward higher redshift. In terms of cosmic infrared luminosity density (Omega_IR), which was obtained by integrating analytic fits to the LFs, we found a good agreement with previous work at z<1.2, and that the Omega_IR evolves as propto (1+z)^4.4+-1.0. When we separate contributions to Omega_IR by LIRGs and ULIRGs, we found more IR luminous sources are increasingly more important at higher redshift. We found that the ULIRG (LIRG) contribution increases by a factor of 10 (1.8) from z=0.35 to z=1.4.

Comments: Accepted for publication in A&A AKARI special issue
Subjects: **Cosmology and Extragalactic Astrophysics (astro-ph.CO)**
Cite as: **arXiv:1001.0013v2 [astro-ph.CO]**

## Submission history

From: Tomotsugu Goto [view email]
**[v1]** Wed, 30 Dec 2009 21:10:33 GMT (227kb)
**[v2]** Fri, 8 Jan 2010 21:42:51 GMT (232kb)

*Which authors of this paper are endorsers?*