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FROM ISO TO SIRTF COSMOLOGICAL SURVEYS: EXPLORING THE COSMIC INFRARED BACKGROUND

Hervé Dole[1]

Understanding and observing the sources contributing to the extragalactic background at all wavelengths has become one of the most rapidly evolving fields in observational cosmology since the discovery of the Cosmic Infrared Background (CIB, Puget et al, 1996; Hauser & Dwek, 2000). Cosmological surveys conducted from space with ISO (Infrared Space Observatory) and from the ground in the mm/submm range, together with observations at other wavelengths for source identification, begin to provide a global view of galaxy evolution. In particular, ISO (Genzel & Cesarsky, 2000, Franceschini et al, 2001) performed many deep surveys in the mid and far infrared, mainly at 15 μm (Elbaz et al, 2002) and at 170 μm (Dole et al, 2001).

The next step is SIRTF (Space Infrared Telescope Facility, to be launched in early 2003). It will perform deep multiband surveys between 3.5 and 160 μm, covering more that 80 Sq. Deg. SIRTF has three instruments: IRAC, the infrared camera; MIPS, the multiband mid- and far-infrared imaging photometer; IRS, the spectrograph. We will be able to resolve a significant part of the CIB into galaxies: 69, 54 and 24% at 24, 70 and 160 microns respectively (Dole et al, 2002). This will lead us to build multiband source counts (Fig. 1) and catalogs, as well as to derive photometric redshifts and extract the luminosity functions, and to derive the star formation rate. The sensitivity should allow us to probe the infrared universe up to redshift $\sim$ 3 in 7 bands from 3.5 to 160 μm, with an unprecedented accuracy (e.g. at 24 μm, Fig. 2).

More information, plots and figures available at **http://lully.as.arizona.edu**

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[1] Steward Observatory, University of Arizona, 933 N Cherry Ave, Tucson AZ 85721 (hdole@as.arizona.edu).

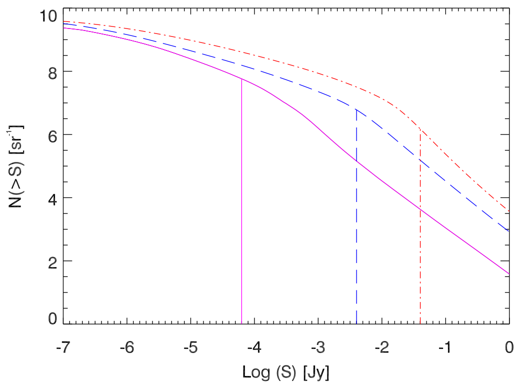

Fig. 1. Predicted integral source counts at 24 μm (solid line), 70 μm (dash) and 160 μm (dash-dot). The vertical lines represent the confusion limits for MIPS/SIRTF at 50 μJy, 3.2 mJy and 36 mJy at 24, 70 and 160 μm respectively (Dole et al, 2002 using the model of Lagache et al, 2002).

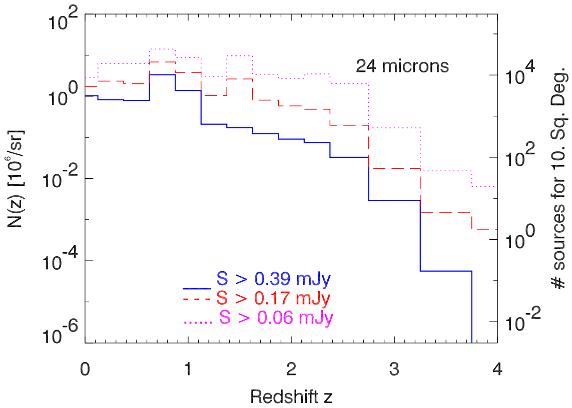

Fig. 2. Predicted redshift distributions (log scale) at 24 μm with MIPS: Shallow Surveys (solid line), Deep Surveys (dash) and Ultra Deep Surveys (dot), with flux limits of 400, 170, and 60 μJy respectively. Left axis gives the source density, right axis gives the number of sources in a 10. Sq. Deg. field. (Dole et al, 2002, Lagache et al, 2002). Notice the increase of source density around z=1.5 at fainter fluxes (due to the detection of PAH redshifted bands). A significant number of sources up to z$\sim$3 should be detected.

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