STUDIES (SCUBA-2 Ultra Deep Imaging EAO Survey) Current Status and Results

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The infrared portion of the extragalactic background light (EBL) is as strong as the optical EBL, implying that dust obscured activities (star formation and supermassive black hole accretion) are as important as those directly observed in deep optical/near-IR surveys. In order to obtain a complete picture of galaxy formation and evolution, we need to resolve the IR EBL into discrete sources and study them. To achieve this, we carry out extremely deep 450 um imaging survey on JCMT: STUDIES. STUDIES is a three-year Large Program, aiming for a confusion limited 450 um map in the COSMOS-CANDELS area for the studies of the high-z dusty galaxy population. In this talk, we will report the results derived from the data taken in 2015/2016. The SCUBA-2 daisy map has an rms noise of < 0.9 mJy at its center (~ 10x deeper than *Herschel*), with 140 sources detected at > 3.5 sigma over ~ 150 arcmin^2. Nearly all >4 sigma sources (98) have MIPS and IRAC counterparts. They have a broad redshift distribution between z = 0.5 and 3.0, with a median of 1.5. The faintest ones at z ~ 1 have IR luminosities slightly above 10^{11} L_{sun}. The 450 um source counts derived with >4 sigma sources and fluctuation analyses are consistent with a single power law between 1 and 20 mJy and show no evidence of a faint-end turn-over. Our integrated surface brightness down to 1 mJy can account for 35% to 45% of the extragalactic background measured by COBE and Planck, implying a substantial population at < 1 mJy. On the other hand, all existing counts at 1 mJy, including those derived from lensing cluster surveys, still have large error bars. The final three-year STUDIES map should help to better pin down the unresolved fraction below 1 mJy.