The Source Counts of Submillimetre Galaxies Detected at $\lambda = 1.1$ mm

SCOTT, Kimberly S.[1], WILSON, Grant W.[2], YUN, Min S.[2], WELCH, D.[2], ARETXAGA, Itziar[3]
HUGHES, David H.[3], MONTANA, A.[3], ZEBALLOS, Milagro[3], AUSTERMANN, Jay E.[4]
KOHNO, Kotaro[5], TAMURA, Yoichil[5], HATSUKADE, Bunyo[6], KAWABE, Ryohei[7], OSHIMA, Tai[7]
EZAWA, Hajime[7], NAKANISHI, Koichiro[7], CHAPIN, E. L.[8], HALPERN, M.[8], SCOTT, Duglous[8]
DUNLOP, J. S.[9], SANDERS, Dave[10], SCOVILLE, Nick Z.[11], KIM, S.[12], LOWENTHAL, J. D.[13]

1: National Radio Astronomy Observatory, 2: University of Massachusetts, 3: INAOE, 4: University of Colorado, 5: University of Tokyo, 6: Kyoto University, 7: NAOJ, 8: University of British Columbia, 9: University of Edinburgh, 10: University of Hawaii, 11: Caltech, 12: Sejong University, 13: Smith College

The source counts of galaxies discovered at submillimetre and millimetre wavelengths provide important information on the evolution of infrared-bright galaxies. We combine the data from six blank-field surveys carried out at 1.1 mm with AzTEC (Table 1), totalling 1.6 deg^2 in area with root-mean-square depths ranging from 0.4 to 1.7 mJy, and derive the strongest constraints to date on the 1.1 mm source counts at flux densities $S_{1.1\,\mathrm{mm}} = 1-12$ mJy (Figure 1). Using additional data from the AzTEC Cluster Environment Survey to extend the counts to $S_{1.1\,\mathrm{mm}} \sim 20$ mJy, we see tentative evidence for an enhancement relative to the exponential drop in the counts at $S_{1.1\,\mathrm{mm}} \sim 13$ mJy and a smooth connection to the bright source counts at > 20 mJy measured by the South Pole Telescope; this excess may be due to strong-lensing effects.

We compare these counts to predictions from several semi-analytical and phenomenological models and find that for most the agreement is quite good at flux densities ≥ 4 mJy; however, we find significant discrepancies ($\geq 3\sigma$) between the models and the observed 1.1 mm counts at lower flux densities, and none of them is consistent with the observed turnover in the Euclideannormalized counts at $S_{1.1\,\mathrm{mm}} \leq 2$ mJy. Our new results therefore may require modifications to existing evolutionary models for low-luminosity galaxies. Alternatively, the discrepancy between the measured counts at the faint end and predictions from phenomenological models could arise from limited knowledge of the spectral energy distributions of faint galaxies in the local Universe [1].

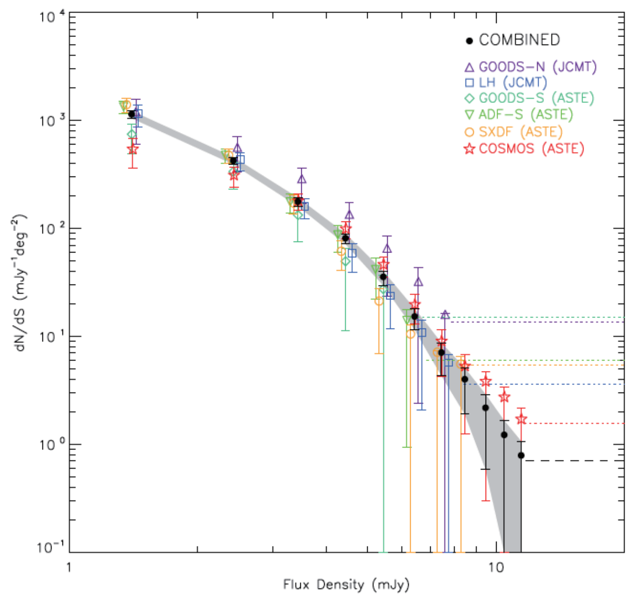

Figure 1: Differential source counts derived from six blank-field surveys carried out with AzTEC on JCMT and ASTE. The shaded region highlights the 68 % confidence range on the combined counts from all six surveys.

Table 1: Summary of AzTEC blank-field surveys.

Field	Telescope	Area (deg^2)	Num. of sources	Ref.
GOODS-N	JCMT	0.08	50	[2]
LH	JCMT	0.30	180	[3]
GOODS-S	ASTE	0.08	66	[4]
ADF-S	ASTE	0.20	279	[5]
SXDF	ASTE	0.21	271	[5]
COSMOS	ASTE	0.72	230	[6]
Total:		1.60	1076	

References

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