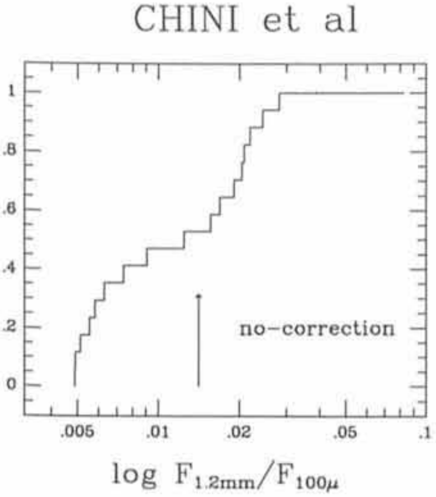

Figure 2: *The same as Figure 1 for the Chini et al.'s results.*

optical extension of the galaxy. The use of large enough beam apertures, some times larger than the diffraction limit, with current mm telescopes is discouraged by the dramatic increase of the sky noise with respect to diffraction-limited observations.

The alternative is to obtain information on the spatial distribution of light emission at submm-mm wavelengths by suitably mapping some bright nearby sources. This will be the goal of our next observing runs at La Silla.

Let us briefly discuss currently available information on the subject.

A direct comparison of optical and far-IR profiles (at $\lambda = 50$ and 100 μm) has been done by Wainscoat et al. (1987) on three nearby edge-on spirals using the IRAS CPC (Chopped Photometric Channel) instrument. Unfortunately, edge-on galaxies do not allow a detailed study of the radial disk structure. However, a comparison between the far-IR emission along the major axis can be performed with the optical old-disk light. From their study of NGC 891 it seems that the 100-μm emission is more extended than the 50-μm one. They suggest that the cold diffuse interstellar component dominates with respect to the optical emission at distances beyond 9 kpc from the centre. For the other two objects (NGC 4565 and NGC 5907) similar far-IR and optical light profiles can be inferred from these observations. This seems to indicate that the cold dust emission at mm wavelengths might be quite extended with respect to the warm component and the optical emission, although IRAS maps at large radii are too noisy for any definitive conclusion to be drawn.

For a sample of large galaxies partially resolved by IRAS (Rice et al., 1988) the mean ratio of the far-IR (60 μm) D_{IR} to blue-light D_B isophotal diameters turns out to be 0.98 ± 0.25, which means that on average galaxies have far-IR extensions comparable to their optical sizes, quite in agreement with previously mentioned results. In this case, however, the observed mean of the ratio of the effective far-IR aperture diameter A_e (which include half of the galaxy's light) to the isophotal radius for 11 objects of this sample, turns out to be almost half of that of the blue light: $< (A_e/D)_{IR} > \sim 0.17$, $< (A_e/D)_B > \sim 0.35$. This difference indicates that the IR emission could be more centrally concentrated than that of the blue light.

A more centrally concentrated mm emission with respect to the optical may be due to the effect of extinction on the blue radiation toward the central regions of the galaxies. This indication agrees with recent reinterpretations of the optical galaxy profiles which seem to show non negligible light absorptions in the galaxy cores (Valentijn, 1990 and 1991; Davies, 1990).

Conclusions

Our knowledge of galaxy spectra in the submm band is still subject to relevant uncertainties. Should galaxy sizes at such wavelengths be comparable, or even larger, than those in the optical light, then mm emission and the corresponding amount of cold dust in the interstellar material would be significantly larger than expected. Detailed observations are planned to clarify this issue.

Several important consequences can be envisaged.

(A) Since the millimetric flux is proportional to the dust mass emitting at these energies, the amount of cold material in galaxies could have been underestimated. This fact could lower the gas-to-dust ratio ($< \frac{M_{gas}}{M_{dust}} >_{spirals} = 570 \pm 50$) claimed for spirals from CO and far-IR measurements (Young et al., 1989), to values comparable to that observed in the ISM of the Galaxy ($< \frac{M_{gas}}{M_{dust}} >_{ISM}$ is roughly 100).

(B) The contribution of discrete sources to the fluctuations of the Cosmic Microwave Background at small and intermediate scales is strongly sensitive to the galaxy spectra in the long wavelength spectral domain (Franceschini et al., 1989). An enhanced thermal dust emission from normal galaxies with respect to current estimates would eventually prevent detections of any intrinsic anisotropies of the CMB.

(C) More precise definitions of galaxy spectral energy distributions and local luminosity function would allow to improve the estimates of number counts and contributions to the diffuse background. Observations by FIRAS on COBE would eventually detect such a background.

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Centrefold
THE ROSETTA NEBULA

The "Rosetta Nebula" is situated just north of the celestial equator, in the constellation of Monoceros (the Unicorn). In its middle is the stellar cluster NGC 2244, one of the youngest of its kind known. The distance to the nebula and the cluster is about 4000–5000 light-years.

There is little doubt that the young stars – they are probably less than 1 million years old – were born in the Rosetta Nebula and have only recently become visible. This is because they have blown away the gas and dust from their immediate surroundings.

The Rosetta Nebula displays a number of dark lanes which are caused by the shadowing effect of dust clouds. Its red colour is caused by the light emission of hydrogen atoms and the different colour hues reflect local variations in the temperature and composition of the nebula.

This photo is a composite from three black-and-white photos obtained with the ESO 1-m Schmidt telescope at La Silla. Observer: D. Block; photographic work: C. Madsen.