indeed your data amply demonstrate this point. The issue is, do they play a role in promoting more vigorous star formation where they exist. Hence, it is important to compare the star-forming rates in a *representative* sample of grand design spirals of a fixed luminosity with a *representative* sample of irregular galaxies at fixed luminosity. Representative means: all systems of a fixed red luminosity, independently of whether they are forming stars vigorously and with adequate total gas content, make stars. Could you comment on the selection criteria used in defining your sample and whether you believe these criteria really admit a critical test?

HUNTER: The actively star-forming irregulars were simply chosen because they are blue and/or because they contain many star-forming regions; the dwarfs were chosen from Fischer and Tully's list on the basis of classification as irregular. They do not represent a complete sample. However, the fact that there are irregular galaxies at all which are just as successful as spirals in forming stars shows that spiral density waves are not necessary in a global sense.

DOWNES: In your papers, you have pointed out that some of these irregular galaxies have long "arcs" or "chains" of large H II regions. Do you think these may be related to large-scale, organized velocity patterns (possibly not yet detected for reasons of resolution or sensitivity)?

HUNTER: In NGC 4449, for example, there are several loops of H II regions and in NGC 4214 there is a nice chain of about 4 regions. In the case of NGC 4449 van Gorkom has a velocity map obtained with the VLA which shows no obvious connection between the velocity field and the star formation activity.

STAR FORMATION IN BARRED GALAXIES

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Examination of IRAS results for a sample of nearby galaxies with RC2 types between S0/a and Scd (inclusive) suggests that the only galaxies in which the IRAS colours are dominated by emission from warm dust in star formation regions are barred (Hawarden *et al.* 1985). Figure 1 is a 2-colour diagram of all Shapley-Ames spiral galaxies of the above types detected by IRAS in all four wavebands. It shows the ratio of fluxes in the IRAS 25 and 12 micron bands as a function of the ratio of fluxes in the 100 and 25 micron bands. On this diagram the SA systems, with the exception of a few Seyferts, have small 25/12 ratios and large

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100/25 ratios. In sharp contrast, a large fraction of the SB galaxies and many SAB galaxies (not shown) have greatly enhanced 25 micron fluxes indicative of large amounts of dust at temperatures such as are commonly observed in regions of current star formation.

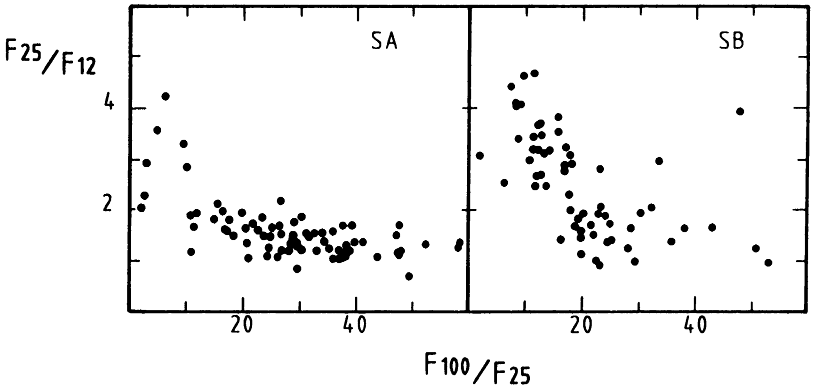

Fig. 1

Star formation in disks is common to both barred and unbarred galaxies; consequently this is unlikely to be the source of the 25 micron excess. Two characteristic features of barred spiral galaxies of early to intermediate type are the dust lanes which trace hydrodynamic shocks in the bar and the (probably associated) rings of H II regions around the nucleus. Theoretical models (e.g. Combes and Gerin 1985) suggest that these circumnuclear rings may be situated near one of the inner resonances where material swept inwards by the bar would be expected to accumulate. Since at least one of these rings (in NGC 1097) is unambiguously the location of enhanced star formation (Telesco and Gatley 1981), we hypothesized that they are the only location where activity of such vigour can occur in normal spirals (in the absence of 'violent' interaction or an active nucleus). Hence our 2-colour diagram can be seen as a means of discriminating against the galactic disk emission.

Radio observations (Hummel 1980 and 1981) support this interpretation by showing that barred galaxies have enhanced centrally concentrated 1415 MHz continuum emission compared to unbarred galaxies. Hummel defines "centrally concentrated" as < 20", distinguishing it from the disk emission which shows no difference between barred and unbarred systems.

We conclude that the radio and IRAS results are consistent if it is believed that the 100 micron emission is dominated by underlying star formation in the disk and the 25 micron component represents a vigorous centrally concentrated star formation episode found only in barred galaxies.

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THE INTERSTELLAR MEDIUM IN STAR BURST GALAXIES

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We report far-infrared observations of [O I], [C II] and [O III] fine structure emission lines toward the nuclei of M82 and 7 other galaxies with a high rate of star formation. The far-infrared line emission is bright, contains about 0.5% of the bolometric luminosity in the central 60", and is spatially concentrated toward the nuclei. In these galaxies between 10 and 30% of the interstellar gas near the nuclei is contained in a warm, atomic component. This atomic gas is probably located at the UV photodissociated surfaces of molecular clouds. The neutral gas in M82 has a temperature of $\sim$ 200 K, hydrogen density of $\sim 3 \times 10^4$ cm^{-3} and is very clumpy, indicating that the interstellar medium in this star burst galaxy is very different from that in the disk of our own galaxy. We discuss the implications of the infrared observations for the interpretation of mm molecular lines and for star formation at the nuclei of star burst galaxies.

A 200 pc RING OF MOLECULAR GAS AND AN OUTBURST IN THE GALAXY M82

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ABSTRACT. The CO (J=1-0) emission in M82 has been mapped with the Nobeyama 45-m telescope. The CO intensity distribution in the central re-