REFERENCES

Bottinelli, L., Gouguenheim, L., Hamabe, M., Heidmann, J., Maehara, H., and Takase, B.: 1987, this symposium.
Maehara, H., Inoue, M., Takase, B., and Noguchi, T.: 1985, Publ. Astron. Soc. Japan 37, 451.
Maehara, H., Noguchi, T., and Takase, B.: 1986a, Ann. Tokyo Astron. Obs. 2nd. Ser. 21, in press.
Maehara, H., Noguchi, T., Takase, B., and Handa, T.: 1986b, in preparation.
Takase, B., and Miyauchi-Isobe, N.: 1984, Ann. Tokyo Astron. Obs. 2nd. Ser. 19, 595.
Takase, B., and Miyauchi-Isobe, N.: 1985a, Ann. Tokyo Astron. Obs. 2nd. Ser. 20, 237.
Takase, B., and Miyauchi-Isobe, N.: 1985b, Ann. Tokyo Astron. Obs. 2nd Ser. 20, 335.
Takase, B., Noguchi, T., and Maehara, H.: 1983, Ann. Tokyo Astron. Obs. 2nd. Ser. 19, 440.

FIR AND BLUE LUMINOSITIES AND GAS MASS IN SPIRAL GALAXIES

T.N. Rengarajan, R.P. Verma
Tata Institute of Fundamental Research
Homi Bhabha Road, Bombay-400 005, India

We present results on correlations between gas mass in spiral galaxies and their FIR and blue luminosities. We have used the published ^{12}CO emission data of the University of Massachusetts and the FIR data from IRAS Galaxy Catalogue. In order to derive the H_2 mass from ^{12}CO data, we have used a relation of the form, $N(H_2) = A\ T_A\ dV\ cm^{-2}$ with $A = 2\times10^{20}\ K^{-1}\ km\ s^{-1}\ cm^{-2}$. The total gas mass M_g was obtained using an additional factor of 1.36 to take care of the fraction of mass in He. Those galaxies that were classified as peculiar, interacting or included in Arp's catalogue were termed peculiar and the rest normal.

Figures 1a-b, show plots of M_g in the central 45" against L_{IR} for samples A and B, which are normal and peculiar galaxies respectively, observed with 45" or 50" beams. A good correlation is seen between the two quantities. Samples C and D include all normal and peculiar galaxies. In Figures 1 c-d, we plot the gas mass in the central 2' (roughly the same as IRAS beam sampling) against L_{IR}, for these two samples. For computing the gas mass within the 2' from the central beam observations, an exponential radial scale size of 5 kpc was assumed. Corrections were also made for the inclination of the galaxies. The values of slopes and r^2 for the fits are given in Table 1. The difference in the slope for normal and peculiar galaxies, is mainly due to high luminosity interacting galaxies. In general, there is a good correlation between M_g and L_{IR}, the mean value being $\sim 10\ L_\odot/M_\odot$, about the same as for the giant molecular clouds of the Galaxy. Figure 2 shows that there is also a good correlation between the face on integrated absolute B magnitude of the galaxy and the computed gas mass within the optical size of the galaxy. Taking B magnitude as a measure of the mass of the galaxy, we infer that the gas mass as a fraction of total mass does not change much from galaxy to galaxy.

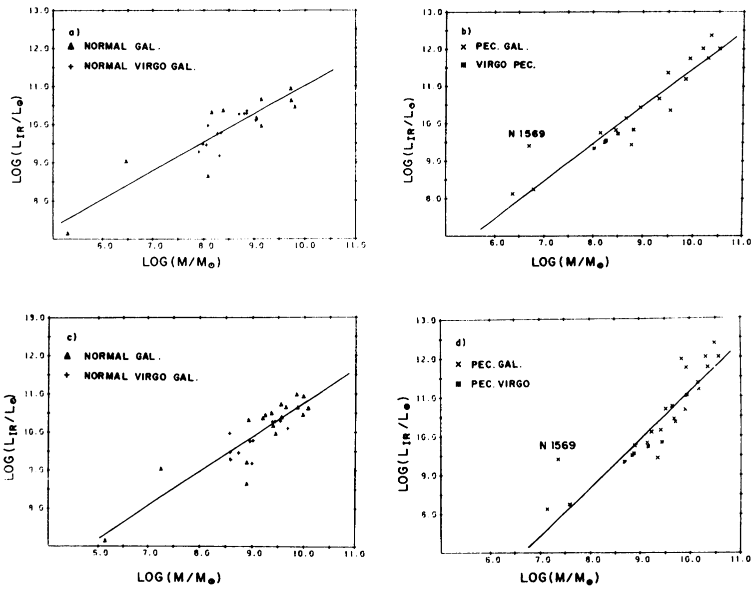

Fig. 1. Plots of gas mass in the central 45" beam (a,b) and 2 (c,d) against IR luminosity.

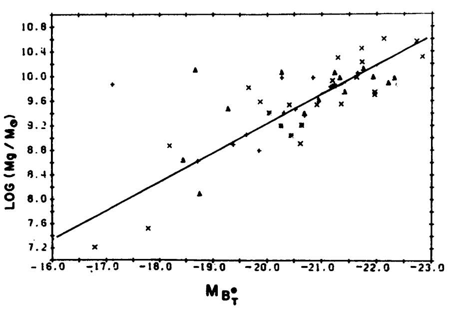

Fig. 2. Face-on integrated absolute blue magnitude plotted against computed gas mass within optical size.

Parameters of Fit : $L_{IR} = A\ M_g^{\ B}$

Sample	No.	Slope	r^2
A: M_g (45")	24	0.74 ± .08	0.89
B: (PEC) M_g (45")	22	1.01 ± .08	0.94
A & B	46	0.89 ± .06	0.92
C: M_g (2')	31	0.89 ± .09	0.88
D: (PEC) M_g (2')	27	1.25 ± .11	0.91
C & D	58	1.08 ± .12	0.89