ON THE RADIO EMISSION FROM INTERACTING SPIRAL GALAXIES

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ABSTRACT. It is shown that the power of radio emission of spiral members of double galaxies depends on their projected distances. For example, the members of pairs with projected distances lower than 10 kpc are 2 - 2.5 times more powerful than members of pairs with distances larger than 50 kpc. Since 90% of "interacting" spiral galaxies belong to pairs with separations smaller than 50 kpc this means that the members of interacting pairs are more powerful radio emitters than the components of non-interacting pairs.

On the basis of a statistical investigation of radio emission from double galaxies selected from Karachentsev's catalogue (Karachentsev, 1972) it has been shown (Malumian, 1986) that the spiral members of doubles are on average 2.5 times more luminous radio sources than isolated spiral galaxies from Karachentseva's catalogue (Karachentseva, 1973). This result confirms the similar conclusion reached earlier by Altschuler and Pantoja (1984).

In order to investigate the relation between the power of radio emission of spiral members of pairs and linear projected distance between their components the sample of members of doubles is divided into three subsamples; close, intermediate and wide pairs with projected distances less than 10 kpc, more than 10 kpc, less than 50 kpc, and more than 50 kpc respectively. The data for these subsamples are given in the following table. The radio data for isolated galaxies and the members of pairs have been taken from Dressel and Condon (1978).

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Table: Distribution of radio emission among pairs of spirals

	Members of close pairs	Members of intermediate pairs	Members of wide pairs
No. of objects	16	57	20
Mean distance (Mpc)	38±6	49±4	41±6
% of detected radio sources	63±20	49±9	60±17
Mean absolute magnitudes	-19.2±0.4	-19.8±0.2	-19.9±0.3
Mean projected distance between members of pairs (Kpc)	6±1	25±1	86±6

The third line of the Table presents the percentages of objects with 2380 MHz flux densities equal to or greater than 9 mjy.

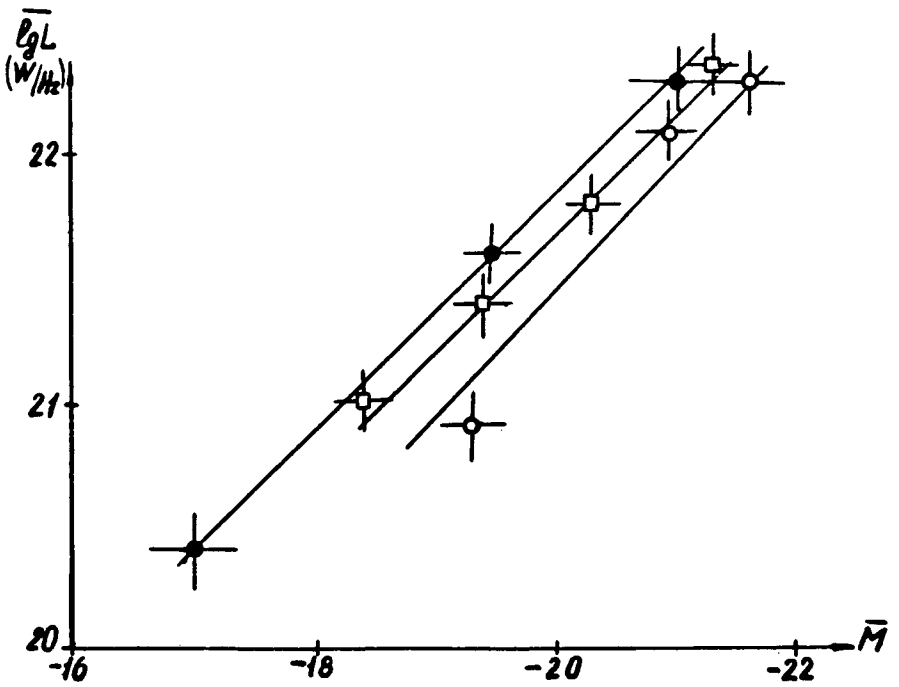

Figure 1. The dependence of radio and optical luminosities of spiral members of pairs. Closed circles: members of close pairs; squares: members of intermediate pairs; open circles: members of wide pairs. The rms dispersions of each bin are also shown.

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In order to analyze the relation between radio and optical luminosities we have binned our sample in magnitude intervals of $\delta M = 1$ or 2 mag. Figure 1 presents a plot of absolute magnitude versus the mean radio luminosity of each bin. Different symbols are used in the figure for close, intermediate and wide pairs.

From the Figure it is evident that the members of close pairs are 2.5-3 times more luminous than the members of wide pairs. The members of intermediate pairs are less powerful than members of close pairs and are more powerful than members of wide pairs.

Thus, the closer the components of binary galaxies are, the more powerful is their radio emission. From the Figure it is also evident that the spiral members of interacting pairs are more powerful radio sources than the members of non-interacting pairs since 25% of interacting galaxies of our sample are members of close pairs, 65% are members of intermediate pairs and only 10% are members of wide pairs.

The facts mentioned above mean that the spiral components of interacting double systems are in more active phases of their evolution than the members of pairs without interaction.

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