

## ON THE RADIO EMISSION OF BARRED SPIRALS

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ABSTRACT. It is found that the relation between the presence of radio emission and the degree of central concentration (i.e. the Byurakan class) of spiral galaxies is valid only for barred spirals. Barred spirals are also found to have central radio sources more often than normal spirals which are generally disc radio emitters.

### 1. INTRODUCTION

Several papers have been written on the relationship between the presence of radio emission and the degree of central concentration of spiral galaxies. Most previous work, however, does not separate normal from barred spirals, consequently missing some important results (Kalloghlian and Kandalian, 1986).

In this contribution we study the dependence of radio emission on Byurakan concentration class separately for normal and barred spirals.

### 2. OBSERVATIONAL MATERIAL

We consider the radio observations at 1.4 GHz of Hummel (1980) for 204 galaxies with known Byurakan class and ellipticities larger than 0.2. Out of these 204 galaxies 73 are normal spirals (denoted here as SA), 54 are barred spirals (SB) and 77 are of intermediate type (SX). 60 galaxies have central radio emission and 96 are disc radio sources.

### 3. RESULTS

The following are the main conclusions from our investigations.

- a) The higher percentage of spiral galaxies of Byurakan classes 2, 2s, 4 and 5 relative to classes 1 and 3 is valid only for barred galaxies.

- b) As is shown in Table 1, central radio emission occurs more frequently in barred spirals while normal spirals are preferably disc radio sources.

Table 1. The percentage of central and disc radio components in different types of spirals

Component type	Central (C)	Central + Disc (C D)	Disc (D)
SB	37±11	28±9	34±10
SX	17±5	34±7	48± 9
SA	18±6	25±7	57±10

- c) The conclusion of Hummel (1981) that central radio sources are more frequent in early morphological types is valid only for barred spirals (Table 2).

Table 2. The percentage of various radio components in different morphological types

SB		
Morph. type component	o/a - bc	c - m
C	55±17	8±8
CD	25±11	33±7
D	20±10	58±22
SX		
C	18±6	15±9
CD	39±9	25±11
D	43±10	60±17
SA		
C	23±8	6±6
CD	32±10	12±8
D	44±11	82±22

#### 4. DISCUSSION

Ambartsumian (1965) suggested that the material that makes up spiral bars was ejected from the galaxy's nucleus during some explosive event. One may therefore assume that during such an event, the

magnetic fields acquire a configuration such that the outflow of relativistic electrons from the central parts of barred spirals is prevented. Thus, radio emission from barred galaxies will occur preferentially in the central regions. Conversely, in normal galaxies the relativistic electrons are apparently free to stream out of the nuclear regions into the disc where most of their radio emission is detected.

## REFERENCES

- Ambartsumian, V.A.: 1965, *The Structure and Evolution of Galaxies*, Interscience Publishers, London - New York - Sydney, p.1.  
Hummel, E.: 1980, *Astron. Astrophys. Suppl. Ser.*, **41**, 151.  
Hummel, E.: 1981, *Astron. Astrophys.*, **93**, 93.  
Kalloghlian, A.T., Kandalian, R.A.: 1986, *Astrofisika*, **24**, 47.