RADIO EMISSION FROM SPIRAL GALAXIES

I. Detection of spiral galaxies

A. Rare (<1% of sources) in general surveys

1. Low "visibility function $L^{5/2}\rho$"

2. $L \lesssim 10^{22}$ W Hz^{-1} at 1400 MHz

B. Radio surveys of optically selected spirals

1. Catalogs of bright "normal" galaxies and "active" galaxies

2. Low- and medium-resolution surveys

II. Results from detection surveys

A. Most spirals are weak but detectable sources

B. $L_r \propto L_o$, $\log R \equiv \left(\frac{B-12.5}{2.5}\right) S_{mJy} \approx 1 \pm 1$

C. Dependence on Hubble stage, color

D. Radio spectra

1. $\langle\alpha\rangle \equiv -d(\text{Ln } S)/d(\text{Ln } \nu) = +0.7$ normal

2. Exceptions

E. Radio morphologies

1. Central core

2. Disk $\langle T_d \rangle \equiv \frac{2c^2}{\pi k \nu^2} \left(\frac{S_d}{D_o{}^2}\right) \approx 0.3$ K at $\nu = 1400$ MHz

III. Emission mechanisms

A. Thermal bremsstrahlung

B. Synchrotron radiation

1. Transparent

2. Opaque

C. Other

IV. Energy sources

A. Ordinary sources

1. HII regions

2. Supernova remnants

a. energy problems with galactic SNR's

b. ages

3. Other stellar objects

4. Compression and diffusion

B. Monster in nucleus

V. Results from high resolution observations of strong sources in sprial galaxies

A. Strong cores (log R > 2)

1. Extent and morphology

2. Associated emission

3. Galaxy-galaxy collisions

B. Bright disks (T_d > 2.5 K)

1. Brightness distributions

2. Parker stability

3. Galaxy-gas cloud collisions

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