A SYSTEMATIC STUDY OF M81

Frank Bash
Department of Astronomy, University of Texas
Austin, Texas

ABSTRACT

　　We describe a series of observational studies of M81 which are presently underway. We hope that these studies will allow improved understanding of this one, simple, density-wave spiral galaxy.

RADIO MAPS

　　Bash and Kaufman (Ohio State) have observed M81 using the VLA in the radio continuum at wavelengths of 6 cm and 20 cm using configurations B, C and D, and in the polarization mode. At this time we have only pre-liminary results. The strongest source in M81 is the VLBI source at the center which has a flux density ranging from ~50 to ~100 mJy/beam-area depending on the frequency and configuration. Regions which are very bright on the Hodge and Kennicutt (1983) Hα plates and the central part show up also on the 20 cm B-configuration maps and the 6 cm D-configuration maps while essentially only the center can be seen at 6 cm on the B-configura-tion.

　　Perhaps the most interesting of our continuum maps up to this point is that made using the C-configuration at 20 cm. Figure 1 shows that map. The faint radio emission along the arms between the HII regions can now be seen. Although it is saturated in Figure 1, the central part shows a source northeast of the center whose peak brightness is about 0.8 mJy/beam area. The VLA beam here is 12$''$.7 x 12$''$.5 and the brightness of the cen-tral source is ~90 mJy/beam area.

　　In addition to the continuum study, Hine (Texas) and Rots (VLA) are making a HI, 21-cm line map of M81 with the VLA's D and B configurations.

HII-REGION RADIAL VELOCITIES

　　Levreault, Leisawitz and Bash have observed 15 HII regions in M81 and measured their radial velocities to an accuracy of typically better than 10 km s^{-1}. These data are partly reduced and they should allow us to check Bash and Visser (1981), who predict non-circular velocities of up to 20 km s^{-1}.

STELLAR-POPULATION SYNTHESIS

Hilton and Bash are studying the surface photometry, in the U, B, V
and I bands, and spectrophotometry, with about 10 Å resolution, of the
spiral arms of M81 and NGC2841. This differs from the pioneering work of
Schweizer (1976) in that it uses standard photometric bands, adds a longer-
wavelength filter and adds spectra. We desire to determine the stellar
populations of the arms of M81 which are consistent with the observed
photometry and spectroscopy, and to contrast those populations with the
arms of NGC2841. NGC2841 is a classical chaotic, non-density-wave galaxy
(Kormendy and Norman, 1979).

REFERENCES

Bash, F. N., and Visser, H. C. D. 1981, Astrophys. J., 247, 488.
Hodge, P. W., and Kennicutt, R. C., Jr. 1983, Astrophys. J., 267, 563.
Kormendy, J. and Norman, C. 1979, Astrophys. J., 233, 539.
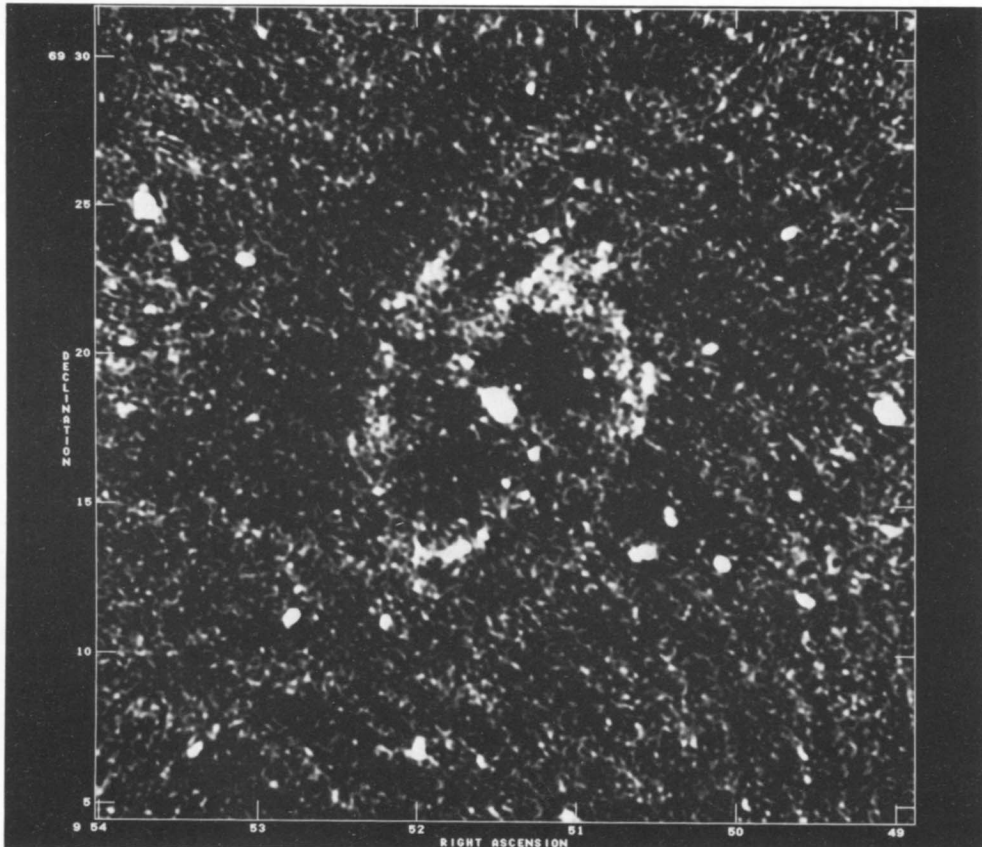Schweizer, F. 1976, Astrophys. J. Suppl. 31, 313.

Fig. 1 - VLA radio map of M81 at 20 cm using the C-configuration. The in-
tensity scale saturates at 1 mJy/beam-area; the noise is 60 µJy/beam-area.