

THE STRUCTURE OF THE RADIO NUCLEUS OF M81 ⁺

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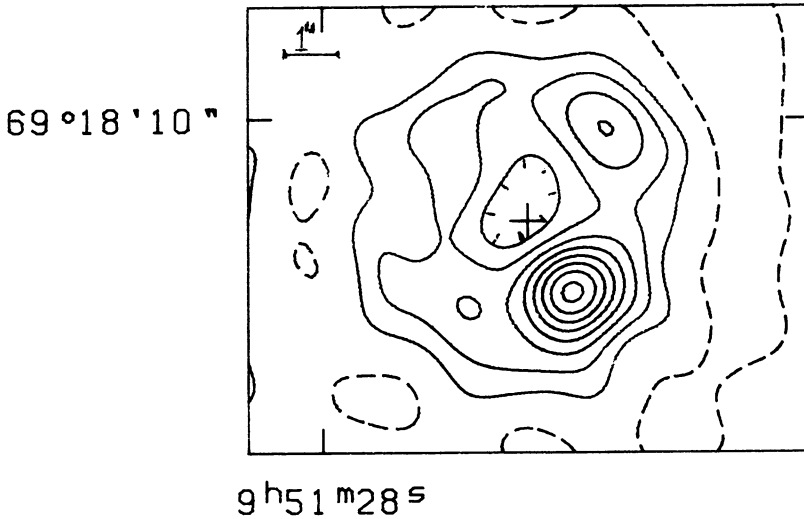
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New observations of the radio nucleus of the nearby bright spiral galaxy M81 (NGC 3031) show that the structure of the nucleus is considerably more complex than previously thought. The radio nucleus has a slightly inverted, variable spectrum (de Bruyn et al. 1976; Crane, Guffrida, and Carlson 1976). The variability and VLBI observations (Kellermann et al. 1976; Jones, Sramek, and Terzian 1981) both indicate a linear dimension of ~ 1500 AU. The recent VLBI observations of Bartel et al. (1982) determined that nearly 100% of the emission originates in an elongated region with linear dimensions of 1000-4000 AU. Peimbert and Torres-Peimbert (1981) have classified the optical nucleus of M81 as Seyfert type 1.5 (the weakest known) with the narrow-emission-line region extending over $\sim 5''$ (Münch 1959).

The new radio observations reported here were obtained at 4885 MHz with the Very Large Array in the A configuration. The position and flux-density calibrators were 0836+710 and 3C286, respectively. The data were self-calibrated, and four components were identified from the final maps. The parameters obtained from Gaussian fits are summarized in the Table. The Figure shows a cleaned map of components 3 and 4 (contour interval of 80 μ Jy); components 1 and 2 were subtracted prior to mapping. The dynamic range obtained is 1600:1.

Earlier observations lacked the resolution and dynamic range to detect components 2-4. No optical counterparts of components 2 and 3 are known; component 2 is at least 300 times as large as the broad-emission-line region. Component 4 coincides with the narrow-emission-line region and a significant fraction of the emission ($\geq 10\%$) may be thermal (Osmer, Smith, and Weedman 1974; Peimbert and Torres-Peimbert 1981). Component 3 is offset from component 1 by $1''.45$ (22.9 pc) at a position angle of 209° , 33° less than that of the rotation axis (Rots and Shane 1975) and 20° - 50° less than the position angles of the major axes of the VLBI sources measured by Bartel et al. (1982). The properties of components 2-4 will be clarified as additional observations become available.

⁺ Discussion on page 452



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Component	S_{4885}	α_{1950}	δ_{1950}	$\theta(L)$
1	69.6 ± 0.9 mJy	$09^{\text{h}}51^{\text{m}}27^{\text{s}}.315$	$69^{\circ}18'08''.17$	$0''.00$ (0pc)
2	17.9 ± 1.4	27.313	08.16	0.24 ± 0.01 (3.8)
3	0.8 ± 0.1	27.183	06.90	0.68 ± 0.07 (10.7)
4	2.2 ± 0.8	27.404	08.62	4.4 ± 1.2 (69)

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