

THE VELOCITY FIELD OF NGC 1068

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ABSTRACT. Sixty spectra taken at 24 position angles of every 15° were measured for NGC 1068. The result reveals that a noncircular motion of about 50 km/s occurs within a spiral disk of 30"-40" in radius.

A precise knowledge of the large scale velocity field of NGC 1068 may be very important to understand the nuclear and star-forming activities taking place in the galaxy.

We have measured 60 spectra of NGC 1068 to obtain the velocity curves of $H\alpha$ and $[NII]\lambda 6583$ in 24 position angles of every 15° from the major axis (p.a. 52°) of the inner arm region. Observational procedure and the spectrograms measured are described by Nishimura et al. (1984). Short-exposure spectra obtained in 1984 and 1985 were also measured to study the central region. The isovelocity contour diagram drawn from the 24 velocity curves is presented in Figure 1, where dotted lines indicate the region where emission lines were measured. This region shows an extension similar to the optical morphology (Ichikawa et al. 1987).

The velocity structure of Figure 1 is quite similar to that of the CO molecular gas observed by Kaneko et al. (1988) with the NRO 45-m telescope. Although the position angle of 82° is suggested for a kinematic major axis, the velocity field is very complex and different from that of a pure circular motion. In Figure 2 we plot the mean of two velocities at the positions symmetric with respect to the center, $[V(p.a.) + V(p.a. + 180^\circ)]/2$, against the radius from the center. This plot evidently contradicts a circular motion of the disk, because in this case we might have a flat distribution corresponding to the systemic velocity.

Therefore, we may conclude that a galactic scale noncircular motion of about 50 km/s occurs within a spiral disk of 30"-40" in radius. One of the possibilities to explain the origin of noncircular motion is that NGC 1068 is in the process of merging.

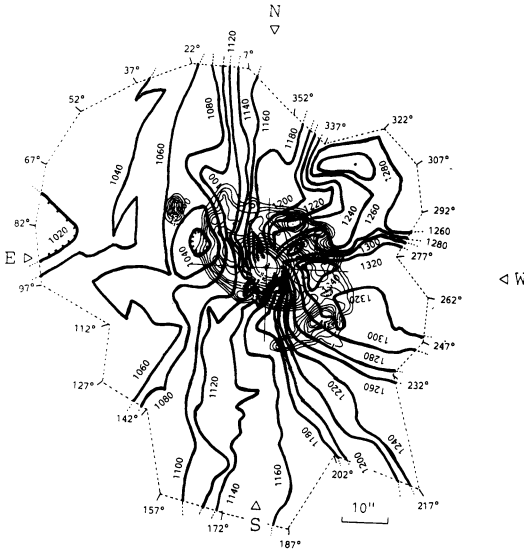


Figure 1. The velocity field of H α and [NII] λ 6583 from NGC 1068. IsovLOCITY contours are heliocentric (km/s). Dotted lines indicate the region where emission lines were measured. U-band isophotes drawn by one of the authors (N.K.), Nishimura, and Toyama are superposed for comparison.

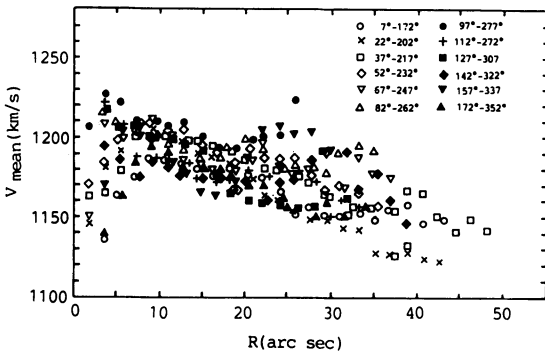


Figure 2. The mean velocity as a function of distance from the center. The mean velocity is defined by $[V(R;p.a.)+V(R;p.a.+180^\circ)]/2$, the mean of two velocities at the positions symmetric with respect to the center. Note a large deviation from a systemic velocity.

REFERENCES

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