HIGH RESOLUTION HI OBSERVATIONS OF NGC 1068

ELIAS BRINKS
NRAO, Socorro, NM 87801, USA*

EVAN D. SKILLMAN
Univ. of Minnesota, MN 55455, USA

and

ROBERTO J. TERLEVICH and ELENA TERLEVICH
RGO, Cambridge CB3 0EZ, UK

1. Observations and Results

Surprisingly few Seyfert galaxies have been mapped at near optical resolution in the 21–cm line of neutral atomic hydrogen, despite the fact that studies of the gaseous component hold out the possibility of identifying the cause of infall of gas to or outflow from the central region. We therefore decided to observe the Seyfert 2 galaxy NGC 1068 with the NRAO–Very Large Array. The spatial resolution of the final images is about 8 $''$ or 700 parsec at a distance of 18 Mpc; the velocity resolution is 5.2 km s^{-1}.

Several features are apparent in our maps. The HI column density map divides into 3 distinct regions: a central minimum ($r \leq 30\ ''$); a high surface brightness inner ring ($30\ '' \leq r \leq 80\ ''$); and a lower surface brightness outer extension which is detected out to $\sim 200\ ''$. The inner minimum is partly due to the fact that HI is absorbed against the strong continuum of the central source (see below). The very high surface brightness bar and inner spiral structure of NGC 1068 are all within a radius of 15 $''$ of the nucleus, and therefore coincide with the central HI minimum. The pronounced CO torus extends from 10 to 25 $''$ (0.9 to 2.4 kpc; Planesas *et al.* 1991, ApJ 369, 364).

A tilted–ring analysis of the HI velocity field shows that the inclination of NGC 1068 remains constant throughout the disk. The position angle varies, though, from 95^o in the inner part of the ring to 115^o further out, indicating substantial warping of the disk. The rotation curve shows a very fast rise to a maximum of 220 km s^{-1}, and a gradual decline after which it stays constant at a velocity of roughly 150 km s^{-1}.

NGC 1068 has a strong central radio continuum source. It is extended over about 1$'$ and has a peak value of about 4.5 Jy. We find broad ($\sim$ 300 km s^{-1} wide absorption at the systemic velocity reflecting the fast rotation within the inner 10$''$ of this galaxy. In addition redshifted HI indicating infall is seen at a velocity of about 175 km s^{-1} with respect to systemic.

* The National Radio Astronomy Observatory is operated by Associated Universities, Inc., under contract with the NSF

T. J.-L. Courvoisier and A. Blecha: Multi-Wavelength Continuum Emission of AGN, 422.