CCD OBSERVATIONS OF GALAXIES WITH RADIO JETS

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We present preliminary results of a CCD survey of nearby ($z \lesssim 0.1$) northern galaxies which have well defined radio jets. Our main objectives are to: 1) detect - or put constraints to - the presence of optical jets in these galaxies, 2) obtain high dynamic range maps of known optical jets, and 3) make a detailed comparison of our results with those available from the radio maps.

We began this project at the MPIA Calar Alto Observatory, Spain. We used a RCA CCD chip at the Cassegrain focus of the 2.2 m telescope (pixel size = 0.34"). We took at least two 30 minutes exposures in the g and r filters of the Thuan-Gunn photometric system for each object in our survey. We reduced the images in the standard way using flat fields of the twilight diffuse emission. In order to detect asymmetrical features, we subtracted elliptical or spherical models of the stellar light. Two of the observed objects are here briefly discussed.

3C120: This object is a Seyfert galaxy with a strong and variable starlike nucleus. Its associated nebulosity has a unique morphology as firstly noticed by Arp (1975). Wlérick (1981) and Arp (1981) classified some of the optical extensions as jets. The main goal of our observations of 3C120 is to determine which one, if any, of these "jets" is related to the radio jet. This identification is now possible with the help of a good 6 cm VLA map obtained by Walker (1984). The jet in the VLA map bends towards the NW lobe beyond a radio knot at about 4" from the nucleus. Subtracting a spherical galaxy template from the reduced r frame (Fig. 1a) we obtained the residual map (Fig. 1b) which shows an optical extension along the northern edge of the radio jet. The inner part of this optical jet was noticed by Wlérick (1981) who suggested a bending towards the NW optical extension. Comparison of our residual map with the radio one shows that the bending of the radio jet is less than expected for that interpretation. Although the inner optical jet is connected with the NW optical extension, Fig. 1b shows that it continues beyond the radio knot in the same direction as the radio jet.

3C75: This object is associated with the central galaxy of the

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cluster Abell 400. It is the first case, to our knowledge, having a pair of twin radio jets (Owen et al., 1985). They originate in the double nucleus of the galaxy. This multiple jet system puts strong constraints to models of the structure and kinematics of the intergalactic medium in clusters of galaxies. Our CCD data show an object superimposed on the eastern part of the northern radio jet at about 24" from the northern nucleus. This latter object appears slightly extended at a position where there is no apparent enhancement of the radio emission. Spectroscopic and polarimetric observations are needed to determine its nature.

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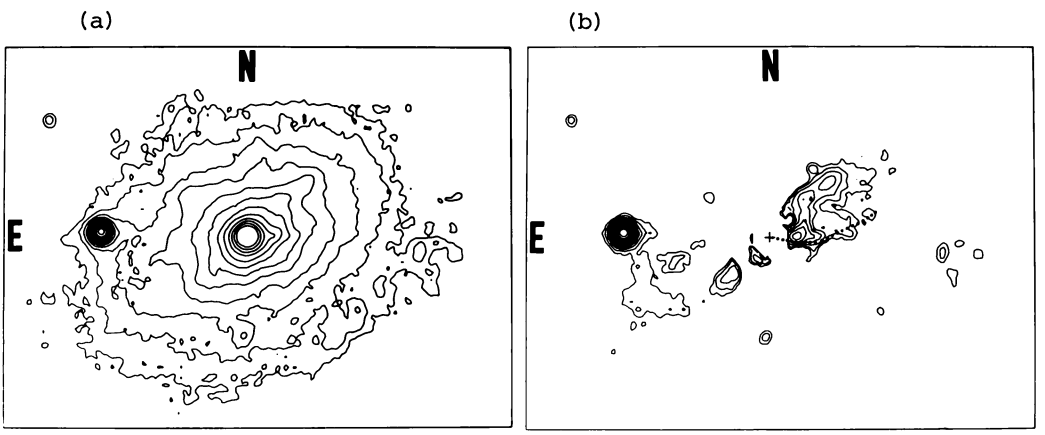

Figure 1. a) Contour map of 3C120 in the r filter. The interval between contours is 0.5 mag arcsec^{-2} and the minimum level corresponds to a surface brightness of 3% of the local sky background. The box size is 68" x 51". b) Residual map, excluding a central region of radius 2.4", obtained by subtraction of a spherical galaxy template from the image in the r filter (Fig. 1a). The interval between contours and box size are the same as in Fig. 1a. The dotted line shows the position of the radio jet, assuming that the central radio source coincides with the centroid of the central optical source.