

Multiband Photometry of NGC 7479 and NGC 7606

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1. Introduction

We present surface photometry in *UBVRI* passbands of the barred spiral galaxies NGC 7479 and NGC 7606, for which observations were obtained at the Cassegrain focus of the 2.5-m Isaac Newton Telescope at La Palma. Data are presented in the form of images and mean radial profiles from azimuthal fits of ellipses, giving the luminosity, ellipticities and position angles of the isophotes as functions of the galactocentric radii. Images in *I*-band are shown in Figure 1 of NGC 7479 (left) and NGC 7606 (right). These belong to a sample of galaxies with moderate circumnuclear starbursts. We are analyzing their structure to study the effects of departures from an axisymmetric potential for the dynamics of a galaxy. One objective of this study is to make a three-dimensional model of the bar and bulge using the method of photometric inversion. The sample consists of 27 spiral galaxies with and without a bar.

2. Observations and Data Reduction

The observations were obtained at the Cassegrain focus of the 2.5 m Isaac Newton Telescope at La Palma using the GEC P8603 CCD detector. The limiting theoretical angular resolution was determined by the CCD pixel size (0.54 arcseconds). The seeing was oscillating between 1.0 and 1.8 arcseconds during the observing runs. Data are presented in the form of color images and mean radial profiles from azimuthal fits of ellipses to the isophotes, giving the luminosities, color indices, ellipticities and position angles of the ellipses as functions of the galactocentric radius.

3. Results

The photometric data show clear differences between a galaxy with a strong bar (NGC 7479) and one without a bar (NGC 7606). In Figure 2 we can see that the ellipticity of NGC 7479 in the center is about 0.4. This increases and reaches a

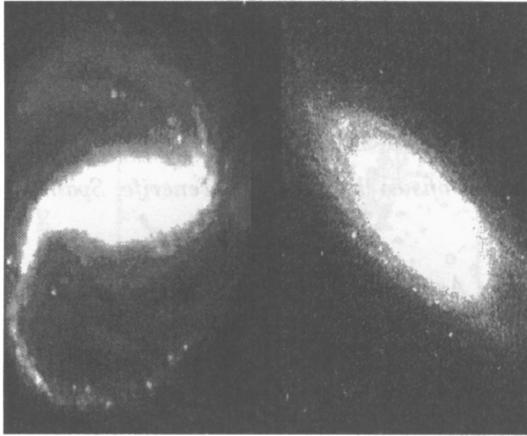


Figure 1. *I* band images of NGC 7479 (left) and NGC 7606 (right).

plateau and then decreases at the largest radii, which correspond to a disk with an inclination of 40° . The plateau value of the ellipticity is about 0.7 and caused by the presence of a bar. The position angle (Figure 2) of the bar is about 10° and hardly changes with the filters, while that of the disk is about 20° . This can be one of the most important photometric evidences for triaxiality in the bulge of this galaxy.

We can also see that the center region is not spherically symmetric since its ellipticity is not zero, and possibly not axisymmetric, since its position angle is different by 20° from that of the disk. In all bands, but most remarkably in *U*, we see a secondary peak in the ellipticity at about 5 arcseconds from the center. The position angle of the peak differs from that of the bar by 30° .

In the case of NGC 7606, the isophotes are close to circular in the nucleus, not a seeing effect. The ellipticity is therefore almost zero, which corresponds to a spherical bulge. The ellipticity then increases with the radius until it reaches a constant value (0.6), which corresponds to an inclination of 66° . Figure 2 shows that the position angle is nearly constant in all bands. This is a typical behavior for an axisymmetric spiral galaxy without a bar.

In Figure 2, the differences in ranges of color indices of these galaxies indicate that NGC 7606 is a more evolved galaxy than NGC 7479. The latter appears to have a very young stellar population. However, it has a very small and red central region, and likewise the bar is relatively red. The color index of NGC 7606 (Figure 2) shows a gradual decrease from the reddest values in the center to the bluest ones at the largest radii, as we would expect from a normal spiral galaxy.

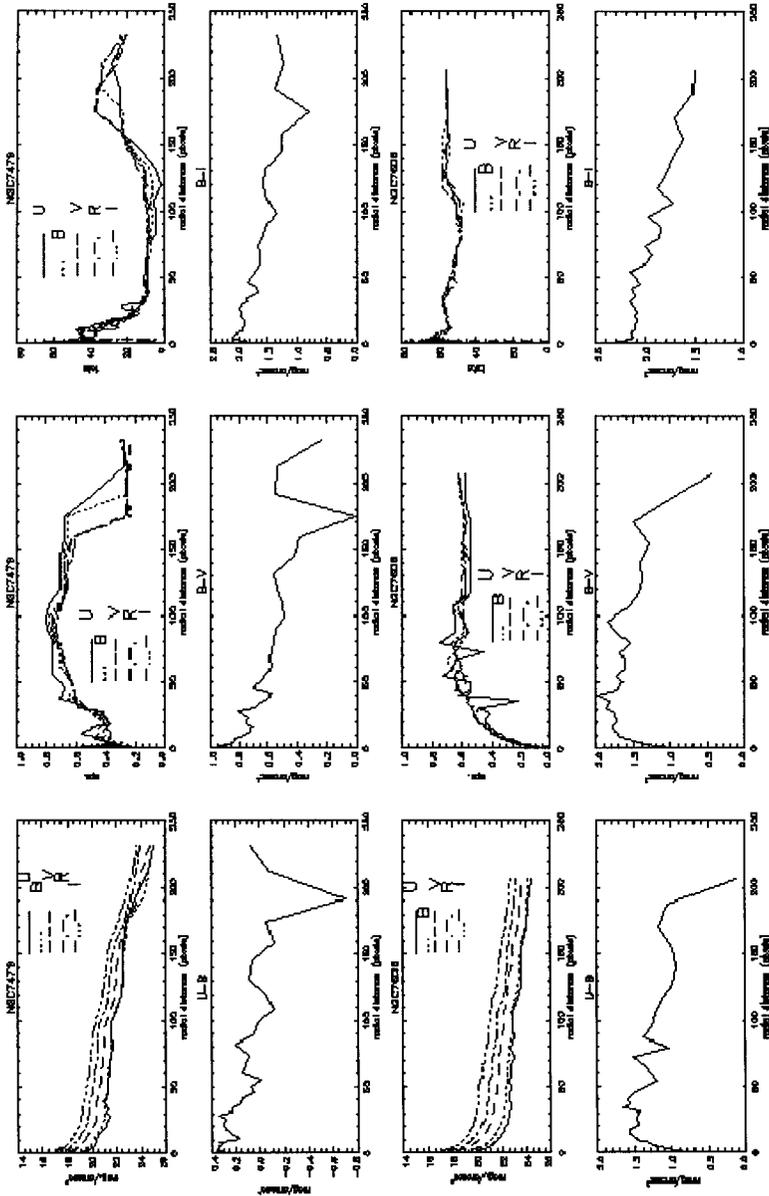


Figure 2. Results of isophote fitting in the U , B , V , R and I bands for the galaxies NGC 7479 and NGC 7606.