

BOXY ISOPHOTES AND DUST LANES IN BRIGHT VIRGO ELLIPTICALS

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The CCD camera of the Landessternwarte Heidelberg was used at the 1.2 m Calar Alto Telescope for a V, R, I - survey of ~70 dusty and non-dusty elliptical galaxies. We report here about morphological studies of ten bright elliptical galaxies in the Virgo cluster. After the usual CCD data reduction the following procedures were carried through:

1. The CCD-frames were filtered and centered to an accuracy of ~0.2 pixels. By division we obtained V-R, V-I, R-I color index images which allow to separate dust absorption and gaseous emission from the stellar distribution. Five of the 10 bright Virgo ellipticals evidently show dust/gas, two other objects have weak features. The dust lanes in NGC 4261 (cf. Fig. 1), NGC 4365 and NGC 4552 were detected for the first time. A dust lane must be visible in all three color index frames in order to avoid fake identifications.

2. The isophotes in all three colors were fitted by least square ellipses. From these fits we obtained in dependence from the radius: color profiles, color index profiles, ellipticity profiles, isophote twists (cf. Fig. 2). The deviations of the isophotes from ideal ellipses were studied by a Fourier series analysis. The fourth coefficient is the main indicator for such deviations. Six of ten galaxies show box-shaped isophotes of an amount between 0.3 % and 1.5 % of the semi major axis (cf. Fig. 3), two galaxies show disc components (0.8 %, 1.5 %), only one galaxy is a perfect elliptical up to an error of ± 0.2 %. The deviations are equal in all three colors and therefore are not produced by dust.

Conclusion: Dust/gas and box-shaped isophotes seem to be quite common among the bright Virgo ellipticals. Both phenomena may be interpreted as a consequence of merging or accretion processes (Binney, Petrou 1985).

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Results of Isophote Analysis and Color Index Images:

NGC	Dust/Gas	$4 \cdot \cos/a$	$\Delta(\text{P.A.})$	$\Delta(b/a)$
4261	dust lane, P.A. $\sim 0^\circ$	-1.2 %	5°	0.1
4278	patches, complex	± 0.5 %	18°	0.05
4365	major axis dust lane	-1.0 %	5°	0.05
4374=M84	dust lane, P.A. $\sim 90^\circ$	-0.4 %	3°	0.1
4382=M85		+0.8 %	10°	0.2
4406=M86	H α pointsource	-0.5 %	7°	0.11
4472=M49		-0.3 %	4°	0.14
4552=M89	patches, minor axis	(-0.5 %)	30°	0.05
4621=M59		+1.5 %	0°	0.25
4636	gas in center	0.0 %	16°	0.26
3379	(not Virgo)	0.0 %	5°	0.1
errors		± 0.2 %	$\pm 1^\circ$	± 0.01

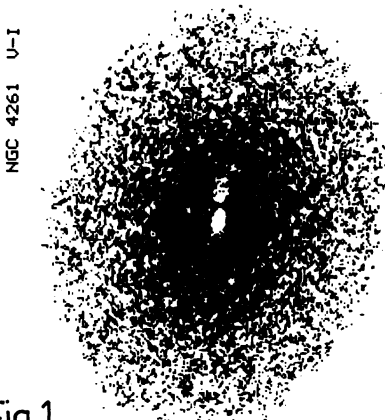
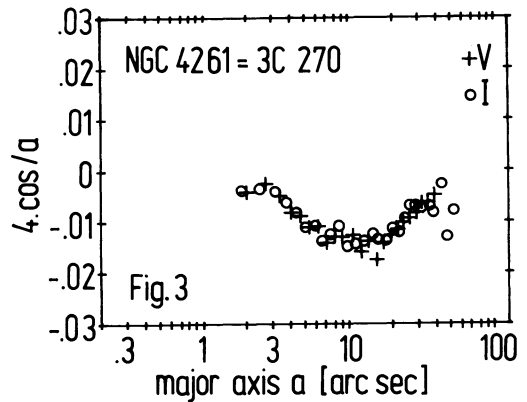
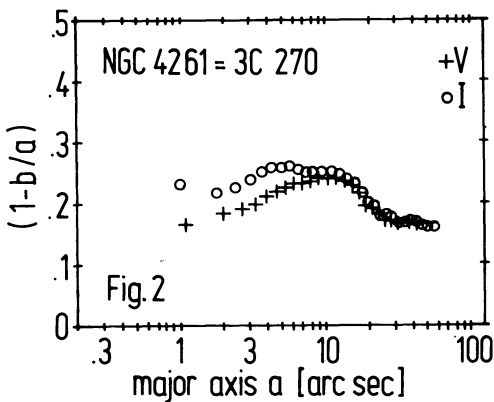


Figure 1. V-I color index image of NGC 4261. The dust lane is orthogonal to the radio jet (Birkinshaw, Davies 1985)

Figure 2. Due to the dust lane the ellipticity in V decreases faster towards the center.

Figure 3. The negative 4th Fourier coefficient indicates a color-independent 1.5 % boxiness of NGC 4261.

Fig.1



REFERENCES

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