PHOTOMETRY, KINEMATICS AND DYNAMICS OF THE BARRED GALAXY NGC 5383

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NGC 5383 has often been used as a prototype of SB(s)b type galaxies, particulary in studies of gas flow. We have therefore set out to complement the existing data with surface photometry, velocity measurements in the bar and a dynamical model.

The surface photometry of this galaxy shows the existence of four components: a bulge, a disk, a bar and a lens (Fig. 1). Their geometrical parameters are given below:

	position of the major axis	$<b/a> = q$
bulge	90° ± 5°E	0.71 ± 0.04
bar	135° ± 2°E	0.38 ± 0.02
lens	107° ± 2°E	0.88 ± 0.02
disk	85° ± 3°E	0.66 ± 0.03

Their effective luminosity distributions are described for the bulge and the disk by the classical formulas:

bulge $\quad \log I_b = 0.08 - 3.33 [(r*/0.16)^{1/4} - 1] \quad I_{o_b} = 3.2 \ 10^5 \ L_\odot \ pc^{-2}$

disk $\quad \log I_d = -0.9 - 0.456 \ r* \quad\quad\quad\quad I_{o_d} = 15.5 \ L_\odot \ pc^{-2}$

We obtain: $\quad L_b/L_T = 0.32 \quad$ and $\quad L_d/L_T = 0.33$

From the luminosity profiles of the bar and the lens, we deduce the best representative simple laws :

bar $\quad I_B = 0.42(1-(r*/0.60)^2)^{1/2} \quad\quad I_{o_B} = 51.9 \ L_\odot \ pc^{-2}$

lens $\quad I_\ell = 0.18(1-(r*/1.35)^2) \quad\quad$ for r* > 0.6 and

$\quad\quad I_\ell = 0. \quad$ for r* < 0.6

(r* in arcmin)
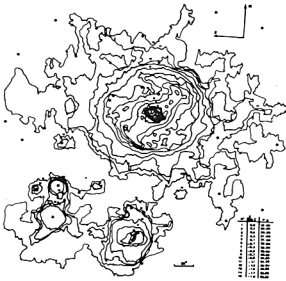So that: $\quad L_B/L_T = L_\ell/L_T = 0.15$

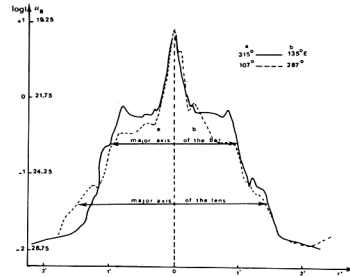Figure 1. Isophotal map in blue
       light

Figure 2. Luminosity profiles

Several spectra have been taken with slit positions complementing those
of Duval (1977) and Peterson et al. (1978), thus providing good coverage
of the bar region despite the fact that the bar does not contain much
ionized gas.

    Using the photometric properties of the four components, a set of
models has been built and the velocity fields calculated with the help
of the beam scheme, and compared to the observations. From the best
fitting model we deduce the M/L ratios of each component after correction
for galactic and internal absorption :

bulge	bar	lens	disk + halo	
$1.4h^{-1}$	$6.5h^{-1}$	$9.3h^{-1}$	$27h^{-1}$	in $M_\odot/L_\odot$

(distance : 23.5h Mpc and h = 100/H km s^{-1} Mpc^{-1})

We note the similarity of the M/L ratios of the bar and the lens. Various
"rotation curves" (Fig. 3) issued from the adopted model have been
compared to the axisymmetric curve derived from HI data
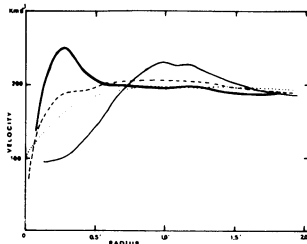(Sancisi et al., 1979).

Figure 3.

   - cut along the bar
   — cut across the bar
  --- rotation velocities
      meaned in annuli
  ... Axisymmetric rotation
     curve from HI data

REFERENCES

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Peterson, C.J., Rubin, V.C., Ford, W.K., Thonnard, N.: 1978, Astrophys.
    J. 219, 31.
Sancisi, R., Allen, R.J., Sullivan, W.T.: 1979, Astron. Astrophys. 78, 217.