On the photometric characteristics of ellipticals and bulges of spirals in interacting systems

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Abstract. The results of the study of the global photometric parameters of ellipticals and bulges of spiral galaxies are presented.

Key words: interacting galaxies - photometry

1. Introduction.

In order to gain additional information about the influence of tidal interactions on the photometric properties of the involved galaxies, a **R** band CCD photometric study was conducted for a sample of close interacting galaxies (Reshetnikov et al. 1993). Observations were made during 1990 October 8-11 and 1991 May 7-8 using 6-m telescope of Special Astrophysical Observatory and CCD detector with 512×512 pixels. The observations were made with the filter **R**, that realized a pass band close to $\mathbf{R_C}$ system of Cousins. Details of our observations and data reductions can be found in Reshetnikov et al. (1993).

For analysis of photometric structure of interacting galaxies we chose their *equivalent profiles*. For the decomposition of equivalent profiles in the contributions of the bulge and disk we used an interactive procedure similar to that described by Kormendy (1977).

2. Results and discussion

2.1. Bulges of spiral galaxies

Fig.1a plots the distribution of bulges of interacting spirals in the $\mu_e - \log R_e$ plane (values of μ_e are in $\mathbf{R_C}$ band and $\mathbf{H_0} = 75$ km/s Mpc). The solid lines represents the standard relations for the bulges of ordinary spiral galaxies according to the data of various authers. As one can see, the bulges of interacting spirals are placed in the plane $\mu_e - \log R_e$ along the average relation for the bulges of normal galaxies. This may means that even strong tidal interaction has a small influence on the inner regions of spiral galaxies and keep the general photometric properties of their bulges without large changes.

2.2. Ellipticals and SO bulges

Fig.1b plots the distribution of our sample ellipticals and SO bulges in the $\mu_e - \log R_e$ plane as *rectangles*. Elliptical galaxies belonging to close binary systems according to the data by Peletier et al. (1990) are shown as *rhombs*. The solid lines represents the standard relations for the normal galaxies according to different

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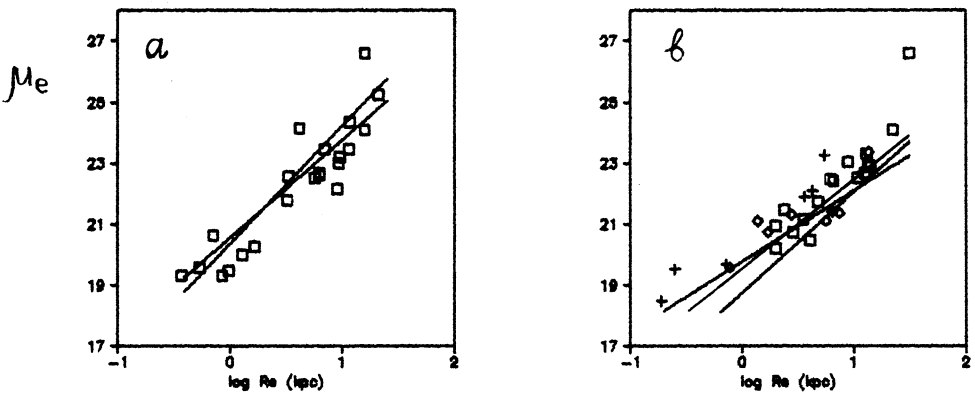

Fig. 1.

authers. ¿From the examination of Fig.1b, it is apparent that the interacting E-SO galaxies, on average, lie above the mean relation for normal ellipticals and SO galaxies. This shift in the location of interacting galaxies relative to normal E-SO galaxies is in opposite direction to that of for brightest cluster members (Schombert 1986). We find that the effective radii of interacting ellipticals and SO bulges are about 30% smaller at a given effective brighnesses than radii of normal galaxies. Therefore, interacting galaxies are more compact and shrinkaged with respect to the average structure of ordinary ellipticals and SO galaxies.

2.3. Bulges of polar-ring galaxies

Polar-ring galaxies (PRG) are among the most interesting examples of interactions between galaxies (Whitmore et al. 1990). Accretion, either from tidal capture of matter from a nearby system or the merger of a gas-rich companion, is generally considered as an explanation of the observed structure of PRG.

The *crosses* in Fig.1b are the bulges characteristics of six SO galaxies with polar rings. For three galaxies (NGC 4650A, ESO 415-G26, A0136-0801) we have taken values of R_e from Whitmore et al. (1987) and have calculated μ_e assuming $\mathbf{r^{1/4}}$ model with absolute magnitudes of bulges from this work. For the galaxies NGC 2685, IC 1689, and UGC 7576 we have obtained μ_e and R_e parameters by the decomposition of their major axis profiles published in Whitmore et al. (1990). In this figure one can see that PRG are placed in the plane of the effective parameters in the same region as an interacting galaxies. Therefore, the photometric structure of PRG give us a new surprising evidence of the interaction events in its recent history.

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