

Interacting galaxies in the NGC 697 group of galaxies

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Abstract. We studied the morphology of two brightest members of the nearby NGC 697 group of galaxies, and found evidence of satellite accretion onto the primary galaxy NGC 697 of the group as well as outer and inner irregularities of the only early-type galaxy NGC 680 of the group, which are probably shaped by recent dry merging event(s).

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The NGC 697 group ($D \simeq 40$ Mpc) consists of 7 luminous galaxies and 6 newly detected dwarf satellite galaxies (Hopp & Vennik 2014). This particular group includes two interacting pairs of galaxies – NGC 678/NGC 680 (projected separation $R_p = 48$ kpc) and NGC 694/IC 167 ($R_p = 49$ kpc). Here we analyzed the inner and outer structure and environment of two luminous group members - the peculiar elliptical galaxy NGC 680 and the late-type spiral galaxy NGC 697 - both exhibiting some interaction signatures. We carried out detailed surface photometry of these galaxies on optical (*gri*) SDSS frames and on ultraviolet (*FUV, NUV*) GALEX frames, and combined the photometry of the stellar component with HI data of the gaseous component, obtained from the literature (van Moorsel 1988). To enhance the visibility of LSB features on stacked optical frames we applied an adaptive smoothing algorithm, implemented in MIDAS software package. The presence of fine structures (shells, ripples) in the HSB disk and bulge region was disclosed using adaptive laplacian filtering technique (Lorenz *et al.* 1993).

Main results:

- A new stellar shell structure was disclosed by laplacian contours in the eastern part of the NGC 680, at the galactocentric distance of ~ 6 kpc.
- Disturbed inner structure of the NGC 680 along with its fairly uniform reddish colour ($\langle g - i \rangle \simeq 1.2$) and surviving tidal features in its outskirts, studied by Duc *et al.* (2011), is consistent with a relatively recent dry merger scenario.
- The NGC 697 shows distorted disk outskirts towards SE of its center, which could have been shaped by disrupted satellite(s). The parent galaxy is possibly accreting its satellites from a filament, consisting of four spectroscopically confirmed dwarf galaxies. The colours of distorted disk outskirts match closely the integral colours of the satellites.
- An intergalactic HI cloud with no optical counterpart, located between two interacting galaxy pairs, is probably a collisional debris from ongoing interactions in the group.

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References

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