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Colour and stellar population gradients of galaxies in poor groups of galaxies

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Abstract. We studied the color distribution of satellite galaxies in three groups of galaxies and found that nearly a half of galaxies show statistically significant radial color gradients, which are indicative of changing stellar ages and metallicities. We found that the disk-dominated satellite galaxies with positive color and age gradients (i.e., evolving in outside-in fashion) are residing, predominantly, in the inner, dense group regions, within the characteristic radius R_{200}, while those galaxies, residing in the outer group in-fall region, show typically zero or negative gradients.

Keywords. galaxies: groups — galaxies: photometry — galaxies: stellar content

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We carried out optical and near-IR surface photometry of 83 satellite galaxies in three poor groups around the NGC 3665, NGC 6962, and UGC 2019, using imaging frames from the SDSS DR8, 2MASS and/or UKIRT databases. We interpreted the observed colors with the evolutionary synthesis models GALEV (www.galev.org) in terms of stellar population ages and metallicities and analysed the color, age and metallicity differences a) within galaxies, as a function of galactocentric radius, scaled with the half-light radius R_{ef}, and b) within groups, as a function of group-centric radius, scaled with the R_{200}.

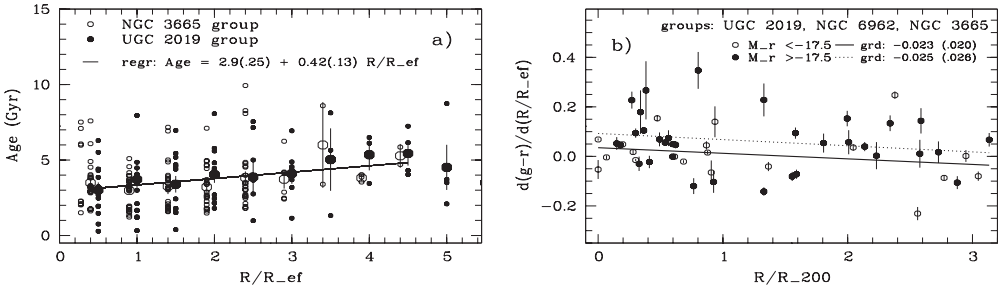

Figure 1. a) The stellar ages of disk-dominated satellite galaxies as a function of scaled galactocentric radius. Small symbols are for individual galaxies; big symbols are for medians in $0.5R_{ef}$ radial bins. b) The dependence of the $(g-r)$ color gradients of faint ($M_r > -17.5$) and luminous ($M_r \leqslant -17.5$) satellite galaxies upon the scaled group-centric distance. Linear regressions (lines) and their gradients (grd) with the 1σ deviations are indicated.

Some results of radial dependencies: 1) The stellar ages tend to increase, as a mean, with increasing galactocentric radius, within $\sim 5R_{ef}$ (Fig. 1a); 2) Color (and age) gradients tend to be positive near the group center and are stronger in dwarf satellites, compared to luminous satellites (Fig. 1b); 3) Metallicity gradients are always negative and, as a mean, stay nearly constant in full radial extent of the groups. We conclude that the star-formation in the outer parts of the disks of satellite galaxies is quenched by some physical process(es), which act in dense (virialized) region of their host group.