

## INTERACTIONS OF THE DWARF IRREGULAR GALAXY UGC 7636 WITH THE GIANT ELLIPTICAL GALAXY NGC 4472

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### I. INTRODUCTION

UGC 7636 is a dwarf irregular galaxy located very close to the giant elliptical galaxy NGC 4472, the brightest galaxy in Virgo cluster. Its very short distance ( $\sim 5'.6$ ) from the center of the giant elliptical galaxy implies that UGC 7636 might be experiencing strong interactions with NGC 4472. In this paper we present a study of the interactions of UGC 7636 with NGC 4472.

Deep Washington  $CT_1$  CCD images centered at NGC 4472 were obtained using the KPNO 4m telescope. In order to remove the smoothly varying background due to the halo light of NGC 4472, we have subtracted the model elliptical galaxy from the original image. The photometry of point-like sources were obtained using the digital stellar photometry software IRAF/DAOPHOT.

### II. RESULTS

We have selected four regions from the galaxy-subtracted image of UGC 7636 to investigate the characteristics of the color-magnitude diagram (CMD) of the point sources (Fig. 1). Fig. 2 shows the CMD of the measured objects in the CCD image of NGC 4472 and UGC 7636. There are three dominant features in this CMD; the bright blue objects, large populations of the globular cluster candidates, and the background faint galaxies. See Geisler *et al.* (1996) for more discussions about the globular cluster population of NGC 4472. The majority of the bright blue objects have  $(C - T_1) \simeq 0$ ,  $T_1 \simeq 21$  ( $M_{T_1} \simeq -10$  for a distance modulus of NGC 4472 of  $(m - M)_o = 31.2$ ). These objects are much brighter than typical globular clusters in the Milky Way galaxy, implying that they may be progenitors of globular clusters.

The position of HI cloud (McNamara *et al.*, 1994) is well overlapped with our interacting region. This suggests that there might be young star clusters in the interacting region, which is actually shown by the presence of three bright blue clusters near the peak of the HI gas.

The  $(C - T_1)$  color distribution functions of measured objects for the sample of  $T_1 < 22.5$  are shown in Fig. 3.

Surface brightness and color profiles of UGC 7636 show that there are large differences in profiles according to their position angle ( $\theta$ ), measured from north to east (Fig. 4). The blue excess of  $(C - T_1)$  color for

the galactocentric radius of  $40'' \leq r \leq 95''$  toward the center of NGC 4472 suggests that there was a strong formation of stars in the course of the violent interactions between UGC 7636 and NGC 4472. The surface profiles of  $C$  and  $T_1$  images are well fitted by a simple exponential law at the inner region ( $r \leq 30''$ ). The overall scale lengths of  $C$  and  $T_1$  are  $\sim 1.2$  kpc and  $\sim 1.6$  kpc, respectively. However, the scale length of the  $C$  profile for the position angle of  $330^\circ \leq \theta \leq 360^\circ$  is  $\sim 1.6$  kpc. This also suggests that there is an extended stellar population toward the center of NGC 4472.

### ACKNOWLEDGEMENTS

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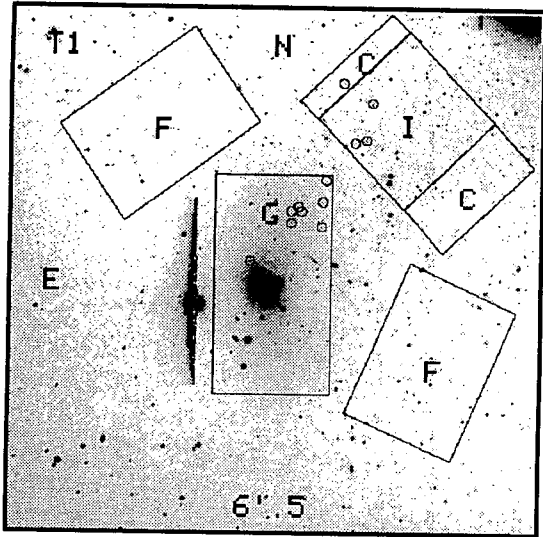


Fig. 1.—  $T_1$  image of UGC 7636 ( $6'.5 \times 6'.5$ ). There is an under-subtracted region toward north-west direction (to the center of NGC 4472). For further analyses we have selected four regions: galaxy region(G), interacting region(I), comparison region(C), and field(F), as shown by solid lines. The ratio of the areas is 2.36 : 1.45 : 1.00 : 3.51. The point sources in circles represent blue objects.

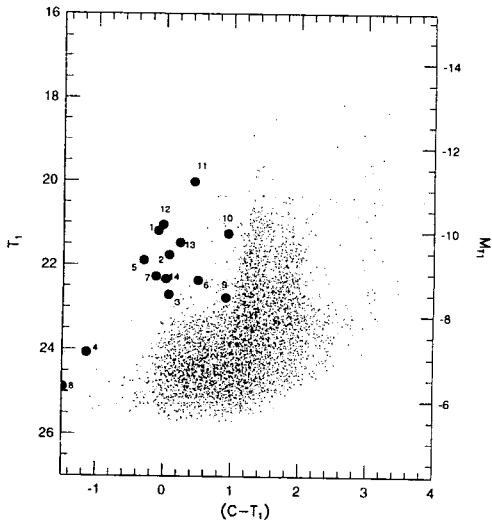


Fig. 2.—  $(C - T_1)$  vs.  $T_1$  diagram of the measured objects in the CCD image of NGC 4472 and UGC 7636 (dots). The filled circles represent the blue objects in the G and I regions.

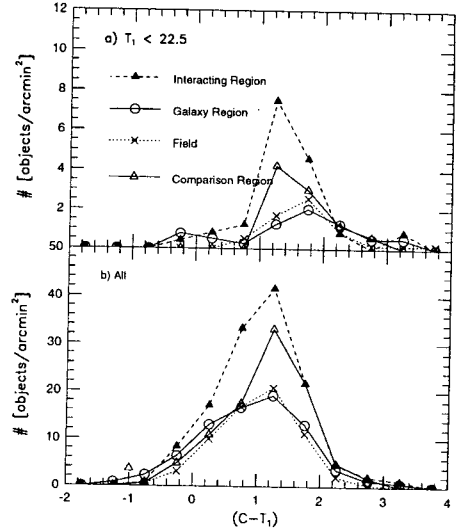


Fig. 3.—  $(C - T_1)$  color distribution functions of the measured objects. Note the excess of blue population with  $(C - T_1) \sim -0.25$  in the galaxy region for the sample of  $T_1 < 22.5$ , and the excess of the objects with the colors of metal-poor globular clusters,  $(C - T_1) \approx 1.25$  ( $[Fe/H] \approx -1.4$ ).

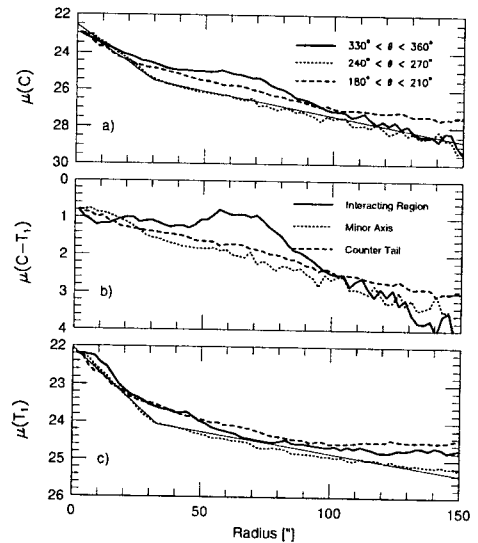


Fig. 4.— Surface brightness and color profiles of UGC 7636. We have divided the image into 12 sectors according to their position angle ( $\theta$ ). Note that there is significant excess of blue light along the direction of the interacting region at  $40'' \leq r \leq 95''$ . The solid lines represent results of fitting to exponential disks with two components.