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THE STARLIKE NUCLEUS OF NGC 6207

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ABSTRACT

Photometric and spectroscopic observations confirm that the apparent stellar nucleus of the spiral galaxy NGC 6207 is in fact a foreground star.
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As part of a continuing study of luminous galactic nuclei, we have recently been examining various galaxies whose nuclei show evidence of unusual structure or activity. An especially useful search list for galaxies with bright but compact nuclei is the list of classifications obtained photographically at the Byurakan Observatory (see references in Tovmassian 1972) in which the degree of concentration of a galactic nucleus is defined by the change in its appearance in adjacent images of different exposure times. Those nuclei which have prominent starlike cores are defined as class 5 objects in this system. A total of 192 bright Sb and Sc galaxies were recently classified by Saakian (1968) and Iskudarian (1968), of which 16 were class 5. All of the Seyfert galaxies included in these particular lists (NGC 1068, 3227 and 4051) were listed as class 5, leaving 13 other spirals not known to be Seyferts but having prominent starlike nuclei. A number of the 13 have been noted in the literature as having nuclei with early-type spectra, moderately blue colors, or other peculiarities, but one object in particular aroused our curiosity. This is NGC 6207, a bright Sc spiral whose nucleus is listed in the *Reference Catalogue* (de Vaucouleurs and de Vaucouleurs 1964) as being a foreground star—one of the very few cases where a star is actually superposed very near the center of a galaxy. This star is not visible on *Sky Survey* prints because the galaxy image is overexposed; but in visual observations with the 50-inch (1.3-m) reflector at Kitt Peak, the galaxy with its starlike nucleus markedly resembles a Seyfert galaxy. The classification of the nucleus as an actual star was based on a spectrum classified as F2 by Humason (1936) which was considered to arise from a foreground star because its radial velocity was -250 km s^{-1}. The velocity of $+869$ km s^{-1} given subsequently by Humason, Mayall, and Sandage (1956) was based on [O II] λ3727 emission. A very similar situation occurred for NGC 4569; Humason (1936) found it to have an F0 spectrum with a radial velocity of -200 km s^{-1}, but Humason, Mayall, and Sandage stated that this spectrum referred to a foreground star and that the actual galactic radial velocity was $+960$ km s^{-1}. However, it was subsequently found that the latter result was erroneous and that NGC 4569 actually is blueshifted (Burbidge and Hodge 1971), so the original Humason velocity was correct after all and referred to the actual galactic nucleus rather than a foreground star.

Another curiosity of NGC 6207 is its published color. According to de Vaucouleurs (1961) the integrated colors of the entire galaxy in the *UBV* system are $B - V = 0.55$ and $U - B = -0.21$, which place NGC 6207 in that part of the color-color diagram containing galaxies in which the ultraviolet excess is often caused by an unusually blue nucleus (Weedman 1973). Were this the case for NGC 6207, it is conceivable that the colors of the nucleus itself could be comparable with those for a Seyfert galaxy. In any case, the $U - B$ color is too blue if dominated by a nucleus with an F2 spectrum. We therefore decided to reexamine NGC 6207 spectroscopically and photometrically to confirm the nature of its starlike nucleus. *UBV* observations were obtained with 8″ and 15″ apertures centered on the nucleus using the 50-inch reflector at Kitt Peak in 1973 March. The resulting colors are $B - V = 0.43$, $U - B = -0.05$ for the smaller aperture and $B - V = 0.50$, $U - B = -0.09$ for the larger. Thus the nucleus itself is not unusually blue and does indeed have colors close to those expected for an F star (an F5 V star would have $B - V \simeq 0.45$, $U - B \simeq 0.00$), so the ultraviolet excess noted by de Vaucouleurs must arise in the outer part of the galaxy. A trailed spectrum of the nucleus was obtained in 1973 May with the image-tube spectrograph at the Cassegrain focus of the 90-inch (2.3-m) reflector of the Steward Observatory. This spectrum included the region λ3500–λ6700 at a dispersion of 240 Å mm^{-1} and shows that the spectrum is indeed like that of an early F star. Allowing for the wavelength uncertainties arising in such image-tube

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spectra, the measured radial velocity is 0 ± 100 km s^{-1}. Considering that Humason's measured velocity of -250 km s^{-1} also had an estimated error of ± 100 km s^{-1}, our result is compatible with his but is even more consistent with the interpretation of the spectrum as arising from a foreground star. Our spectrum was obtained with a $2'' \times 2''.5$ entrance aperture in order to avoid contamination by the surrounding galaxy. There is no $\lambda 3727$ emission visible in this spectrum, so the $\lambda 3727$ emission used by Humason *et al.* (1956) to measure the radial velocity of $+869$ km s^{-1} presumably arises in the outer parts of the galaxy.

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