GALAXIES WITH ULTRAVIOLET CONTINUUM THAT HAVE DOUBLE
AND MULTIPLE NUCLEI. II

A. R. Petrosyan, K. A. Saakyan, and E. E. Khachikyan

Examination of plates obtained with the 0.5-m and 2.6-m telescopes of the Byurakan Observatory and also the 6-m telescope of the Special Astronomical Observatory has shown that objects with double and multiple nuclei occur among the galaxies with ultraviolet excess. The frequency with which such objects are encountered is appreciably higher than among other galaxies. From this point of view, they have the most active nuclei. Such galaxies in the first eight lists of objects with ultraviolet excess are listed and described and photographs of them are reproduced. The observational data show that, on the average, the brightness of the components increases with increasing distance between them and that structural details are then also more apparent.

Introduction

In a first paper [1], two of the authors of the present paper drew attention to the fact that among the Markaryan galaxies four different types are encountered.

In [1], we considered objects of the first type, which are superassociations associated physically with nearby galaxies. The searches for superassociations among the Markaryan galaxies drew attention to the existence of an appreciable number of objects with double nuclei.

In the present paper, we consider these galaxies of the second type, which have double...
and multiple nuclei. The detailed study of the nuclei of such galaxies is of great interest and can significantly advance our ideas about the nature and evolution of active galaxies.

**Observational Material and Results**

The main observational material used in the present investigation was obtained with three telescopes: the 6-m telescope (50 plates) and the 2.6-m (207 plates) and 0.5-m (565 plates) telescopes of the Byurakan Observatory. Kodak IIa0, 103a0, and Zu-2 emulsions were used. The exposures were chosen in such a way as to bring out basically the structure of the central parts. Altogether, we observed 620 galaxies in the first eight lists of galaxies with ultraviolet excess. Among these, double nuclei were found in 59 galaxies. The galaxies were selected on the basis of photographs with the 0.5-m telescope, and also on the basis of the descriptions of Markaryan, who sometimes characterizes galaxies as extended and possibly double.

The data on the galaxies with double and multiple nuclei are collected together in Table 1. Besides the numbers of the galaxies as given in [2-9], Table 1 also gives their radial velocities and the absolute magnitudes of the Markaryan galaxies, together with the apparent photographic magnitudes of the individual components of the nuclei (labeled a, b, etc) estimated visually. In the majority of cases these brightnesses are underestimated, especially for condensations of diffuse form. Further, in Table 1 we give the absolute photographic magnitudes of the components of the nuclei (for Hubble constant H = 75 km. sec⁻¹.Mpc⁻¹), and their sizes and mutual separation in seconds of arc and in kiloparsecs.

The most interesting photographs of galaxies with double and multiple nuclei are given at the end of the paper. In the photographs, the condensations are designated in accordance with Table 1. In reproducing the photographs, our main aim was to bring out as clearly as possible the multiplicity of the nucleus and not the structure of the galaxies as a whole, and in the descriptions we therefore give some further information about the appearance of the galaxies.

Descriptions based on photographs with the 2.6-m telescope carry the identification A, and those with the 6-m telescope the identification B. In individual cases, we also give a description based on the photographs of the 0.5-m telescope and also the Palomar Sky Survey Charts (PC).

Markaryan 20 = MCG 12-9-41: B. Barred galaxy with three condensations on a line. The central one is the brightest and largest.

Markaryan 47: B. Two condensations, of which the western one has very low surface brightness. Both are elongated along the direction of the line joining them and are connected to one another. No details apparent.

Markaryan 60: According to [2] a double system. Is in the Coma cluster of galaxies and a member of the cluster on the basis of the red shift. In the PC both components blue. A: the western component noted in [2] is the more elongated.

Markaryan 66 = MCG 10-19-72: A. The central part of the galaxy consists of two condensations, which cannot be resolved very easily. The satellite noted in [2] may actually be a third condensation in the galaxy. All three condensations are in the equatorial plane of the galaxy.

Markaryan 68: A. The eastern component is a galaxy with two nuclei surrounded by a common envelope. The western component is a star.

Markaryan 96: B. The galaxy consists of two condensations surrounded by a bright envelope. Huchra [10] also notes the presence of a component or a star to the north of the galaxy.

Markaryan 101: B. Barred galaxy in which there are two condensations; in the spiral arms many faint condensations of the type of superassociations can be noted.

Markaryan 110: A. Consists of two starlike condensations; the one to the southwest is brighter and more elongated. Both are very compact. According to the description in [3] this is a close double system whose components overlap one another to 50%. The component to the northeast looks like a star. However, it is noted in [11] that its central part is resolved by means of an electronograph into a double nucleus. In [12] it is noted that this