A NEW GALAXY OF SEYFERT TYPE

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The results are given of a spectrophotometric investigation of a galaxy with ultraviolet excess; it has the serial number 163 in the list of [1]. Spectra of this galaxy were obtained using the 6-m telescope of the Special Astrophysical Observatory, and a direct photograph was obtained using the 2.6-m telescope of the Byurakan Observatory. Galaxy No. 163 consists basically of two parts, S and N. In the spectrum of S there are broad and strong emission lines Hα, [O III] λλ 5007, 4959, Hβ, Hγ, and Hδ, which are characteristic of Sy 1 galaxies. In the broad wings of the lines Hα, Hβ, Hγ, and Hδ two components are observed (denoted in Fig. 3 by I and II). Component I is also observed in the broad wings of the lines [O III] λλ 5007 and 4959. In the spectrum of part N there are in all probability weak lines [N II] λ 6584 and Hα in emission and Hδ and Hγ in absorption. It is concluded that the parts S and N of galaxy No. 163 differ strongly in their activity. The former is extremely active, the latter hardly so. The equivalent widths and the relative intensities of the emission lines of part S are given.

1. Introduction

In the periods from October 29 through 31, 1981 and May 27 through 29, 1982 the 6-m telescope of the Special Astrophysical Observatory of the USSR Academy of Sciences was used in conjunction with the UAGS spectrograph to obtain 137 spectra for 31 galaxies with ultraviolet excess in the lists of [1, 2]. The spectra of 26 of these galaxies were obtained for the first time.

For the detecting apparatus a multichannel spectrophotometer of the 6-m telescope was used. A detailed description is given in [3]. One of the galaxies, whose serial number in [1] is 163 (α1950 = 17h47m3s, δ1950 = +68°38′), was found to be a type 1 Seyfert. The present paper is devoted to an investigation of it.

For this galaxy, 14 spectra were obtained, these covering the region of approximately λλ 7400-3300 Å. Six of the spectra were obtained for the red part of the spectrum, six for the blue, and two for the violet. Eight spectra were obtained on October 31, 1981 and six on May 28, 1982. The exposures of all the spectra were 10 min. The spectra were obtained with reciprocal dispersion 100 Å/mm. The spectrograph slit width was 0′.9.

The direct photograph of galaxy No. 163 was obtained on August 11, 1977 at the primary focus of the 2.6-m telescope of the Byurakan Observatory on ORWO (ZU-2) plates in photographic light (original scale 1 mm ≈ 20″). The exposure was 10 min.

2. Morphological Structure and Description of the Spectral Lines

Examination of the images of galaxy No. 163 in the charts of both the Palomar Sky Survey and the 2.6-m photograph reveals that the galaxy mainly consists of two parts, an extended in the north and a compact in the south. In the charts, the first of them has a red color and the second a blue; from the second two features extend to the south and southwest. In the red chart, the northern part has an elliptic shape...
Fig. 1. Reproduction of photograph of galaxy No. 163 (scale 1 mm \(\approx 1\,\text{''}.51\)).

Fig. 2. Trace of spectrum of part S of galaxy No. 163.

measuring 12 x 20'' and almost merges with the southern compact part. It can be seen in the blue chart and also the 2.6-m photograph that the northern part has a central bright region of circular shape with diameter 7''. The image of the southern compact part does not differ from a star's and has diameter 4''. The distance between the centers of these parts is 8''.

Figure 1 is a reproduction of the 2.6-m photograph of galaxy No. 163. The extended northern part and the compact southern part are designated by N and S, respectively. In the text we shall refer to these parts simply by the letters N and S. For S, 10 spectra were obtained; for N, four.

In the S spectra we identified the emission lines \(\text{H}_\alpha\), \([\text{O III}]\) \(\lambda\lambda\) 5007, 4959, \(\text{H}_\beta\), \(\text{H}_\gamma\), and \(\text{H}_\delta\), which are the strongest and broadest. In addition, we also observed weak emission lines \([\text{S II}]\) \(\lambda\lambda\) 6731/17, \(\text{Fe II}\) \(\lambda\lambda\) 5220, 4570, and \([\text{Ne III}]\) \(\lambda\) 3869.

The red shift of S determined using the above lines is 0.0627 \(\pm\) 0.0005, and its absolute magnitude is \(m_{pg} = -21.5\). In the determination of the absolute magnitude of S the Hubble constant \(H\) was taken to be 75 km sec\(^{-1}\) Mpc\(^{-1}\), and \(m_{pg}\) was taken from [1].

Figure 2 is a trace of the spectrum of S in the lines \([\text{S II}]\) \(\lambda\lambda\) 6731/17, \(\text{H}_\alpha\), \([\text{O III}]\) \(\lambda\lambda\) 5007, 4959, \(\text{H}_\beta\), \(\text{H}_\gamma\), and \(\text{H}_\delta\) in the intensity scale. Below each line we also give a narrow spectral interval of the sky background observed at the wavelength of the given line.

Figure 3 gives the profiles of the lines \(\text{H}_\alpha\), \([\text{O III}]\) \(\lambda\lambda\) 5007, 4959, \(\text{H}_\beta\), \(\text{H}_\gamma\), and \(\text{H}_\delta\). Each of them was constructed by means of one spectrum.

It can be seen from these figures that in the S spectrum each line can be roughly divided into two parts -- a narrow upper part and a broad lower part. The boundary dividing these parts in the figures are indicated by the broken line. The total widths of the lower parts of the lines \(\text{H}_\alpha\), \([\text{O III}]\) \(\lambda\lambda\) 5007, 4959, \(\text{H}_\beta\), \(\text{H}_\gamma\), and \(\text{H}_\delta\) are approximately 320, 100, 38, 160, 130, and 90 Å, respectively. If we assume that the

Fig. 3. Profiles of emission lines of the spectrum of part S of galaxy No. 163.