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Position of neutral and ionized hydrogen in a filamentary nebulae

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POSITION OF NEUTRAL AND IONIZED HYDROGEN IN A FILAMENTARY NEBULAE

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Earlier the HI distribution was found to be related to the external HII filaments around the S7 nebulae. Now the RATAN-600 data present the HI radiation between the HII filaments embedded into the S7 nebulae. The observed HI distribution consist of the filaments of various size.

KEY WORDS HI region, 21 cm line, HII filaments, Galactic nebulae S7

1 INTRODUCTION

Analysing the data of the Pulkovo Sky Survey in the interstellar neutral hydrogen radioline (Bystrova & Rachimov, 1977), we showed (Bystrova, 1979) how complicated is the HI distribution in the direction of the object detected by the Sivan (1974). At the HI velocities which are inside the main profile of the radioline in this direction, the gas shows the following peculiarities. It does not obey the distribution typical of the expanding shell model (Sancisi, 1974). Besides the general weakening of the emission against the S7 nebulae with the center near Delta Scorpii and the size 5×5 degrees in RA and Dec, all other gas positions are connected with HII filaments which seem to go out from the central nebulae and make it look like a spiral galaxy. The size of these outer filaments, which stretch themselves in the Dec-direction, is more than ten degrees. On the places of the sky where the telescope's beam crosses these outer HII filaments the HI signals are approximately a half of those shown by the structural component of the HI emission in this direction. The weakening of the HI emission at the position of the S7 nebulae is about 90% in 4 spectral channels or in about 16 km/sec.

2 THE RATAN-600 OBSERVATIONS

Before the recent reconstruction of the telescope RATAN-600, its beam was $2' \times 120'$, fourty spectral 30 kHz-channels were installed through 30 kHz, the sensitiv-

Table 1.

<i>Dec(50)</i>	<i>RA(50)</i>	<i>Ampl(K)</i>	<i>Half width (sec)</i>	<i>LII</i>	<i>BII</i>
-22 deg	15 ^h 59.0 ^m	2.6	120	350.8	22.5
(double)	16 00.9	2.3	145	351.1	22.2
-23	15 56.7	4.5	90	349.6	22.2
-24	15 54.5	8.0	120	348.4	21.9
-25	15 52.5	8.0	130	347.3	21.5

ity was 0.3 K. Among the results which give these observations is the following one.

After the installation of additional panels on every element of the main mirror of the telescope, the records showed rather strong signals already described by Bystrova (1992). Here, in Table 1, are given parameters of these signals after gaussian approximation of the original records without smoothing, i.e. for every 3 seconds in time.

3 COMPARISON WITH OPTICAL OBSERVATIONS

It is important to compare positions of the HI details with filaments of the S7 nebula.

The details project themselves just on the nebula S7. But on the existing prints of it the filaments, of which the nebula consists, are either not seen (POSS prints) or they are overexposed (Sivan, 1974). Possibly the best print for our purpose is that which Dr. J.-P. Sivan obtained at ESO and sent to Pulkovo. The description of this unpublished print S67 is the following: $f/1$, Kodak 103 aE, H-alpha filter with halfwidth about 10 Å, exposure time 95 min, the star omega-two Scorpii is at the center of the field, its size being 20 degrees and magnification is 18 times.

The HI-signals to be compared are seen only in one spectral channel at the LSR-velocity +2.4 km/s. Just in this channel is the weakening of HI-emission against the S7 nebula (on its place) most clearly seen. Therefore the HI gas responsible for the above at signals must be at the distance of the nebula. The sizes of the filaments is approximately the same as that of the empty areas between the filaments of the ionized hydrogen in the nebula S7.

4 CONCLUSIONS

It was shown by Bystrova (1979) that the outer HII-filaments, being outside the S7 nebula and having the sizes of about ten degrees, determine the distribution of neutral hydrogen which is connected with a peculiar object found by Sivan. The RATAN-600 data confirm this conclusion. But the HI-gas found between the

filaments which form the nebula S7 extends over only about one degree. This means that on all scales in the peculiar object neutral hydrogen is distributed in the manner controlled by HII-filaments. But the kinematic behaviour of neutral hydrogen on the borders of HII-filaments still remains unknown. Possibly other RATAN data will give some conclusions in this respect.

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