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THE HUGE FILAMENTARY GALACTIC H II ZONE

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A very prominent object containing the S7 and S1 nebulae and a system of H II filaments which seem to go out of them has the appearance of a spiral galaxy (Sivan 1974). This region is located in Scorpius-Ophiuchus including the Scorpius OB-2 association, several nebulae and the H II filamentary structures around them. The Local Bubble appears in the same direction. The whole object is embedded into its own neutral hydrogen.

The neutral hydrogen distribution and motion were studied in details with the RATAN-600 radiotelescope situated in Zelenchukskaja, North Caucasus. The angular resolution of the telescope is 2.4 times 130 arcmin. The velocity resolution is 6.3 km s^{-1} and its spacing is 3.15 km s^{-1}. The RMS fluctuation of the antenna temperature is 0.25 K. Many years ago in St. Petersburg (Pulkovo) this object was studied with the Large Pulkovo Radiotelescope (Bystrova 1979). The description of the character of H II and H I coexistence was given in this paper but several problems remained unsolved up to now. The model of the H I behavior is not a simple expanding shell. The RATAN-600 observations added to our "Pulkovo Sky Survey" of the interstellar neutral hydrogen radio line many other details and revealed problems. Some of them are described below.

The following statement was achieved after the analysis of the Pulkovo and RATAN-600 data: the disposition of the neutral hydrogen in the Scorpius-Ophiuchus object is determined by the H II filaments, they play the crucial role in the neutral gas structure. The figure demonstrates this role. Also the general weakening of the H I emission against the S7 nebula with the center near Delta Scorpii and the size 5×5 degrees in RA and Dec is clearly seen.

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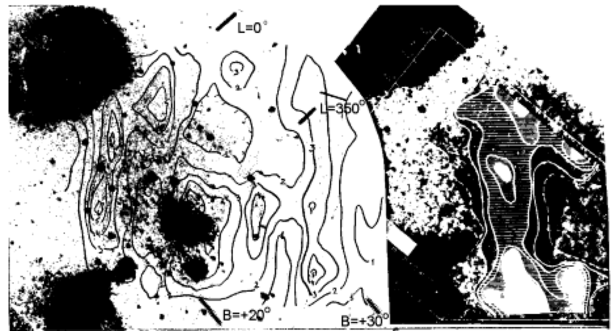

Fig. 1. Contours of H I radio emission overlaid on an optical image of the Scorpius-Ophiuchus object.

The above statement relates to both scales of the filaments—about ten degrees or more for the outer details and less than one degree just in the direction of the S7 nebula. The H II filaments determine not only the disposition of the H II but also the behavior of the neutral gas. Its kinematics on the surfaces dividing both types of gas remains unknown, as does the sequence of events leading to the formation of the Scorpius-Ophiuchus object. The nature of the S7 nebula, which allows the existence of H I signals from between the filaments that comprise the nebula, is also barely known.

Possibly the inclusion of this object into an ESO Key Program (Brown 1996) will help us to understand its nature from optical observations.

This mysterious object was put to the disposal of the astronomers by Dr J.-P. Sivan more than 25 years ago. But more problems than results remain after all. It is quite possible that the combined optical and radio studies will clarify at least some of the problems described above.

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