АСТРОФИЗИКА

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FRENCH - ARMENIAN SCIENTIFIC COOPERATION ON STUDY OF SOME HII-REGIONS WITH CIGALE

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The results of the scientific cooperation between astronomers of the Byurakan and Marseille observatories on the study of diffuse matter in the Galaxy are presented. The H_α-emission is discovered in the direction of h and χ Per. The Fabry-Perot observations of three HII-regions: Sh2-152-153 and 106 show the expansion of the diffuse matter relative to the exciting stars. In the Sh2-106 region a probably jet is found. It is shown that in star forming regions the diffuse matter is taking part in expansion motions together with stars.

1. *Introduction*. In autumn 1985 the improved scanning Fabry-Perot interferometer (equipment "CIGALE" [1,2]) has been mounted on prime focus of 2.6-m telescope of the Byurakan Astrophysical Observatory (Armenia) for observations of diffuse matter. This interferometer created in the Marseille Observatory (France) has very perfect construction and gives possibility to measure radial velocities of diffuse matter in numerous points in some HII-regions for study of their velocity field. The search of H_α -emission in the direction of the h and χ Persei (Per OB1 association) was another separate problem, which was significant since up to these observations it was not known the existence of such emission. Thus the spontaneous scientific cooperation began between two mentioned observatories.

However, the strong earthquake in Armenia and very difficult consequences after it forced to forget these observations for long time. And only persistence of Armenian astronomers allowed to obtain the results which seem to be important.

All the work connected with processing of the obtained observational material was done after many years with computer "VAX" in the Marseille Observatory by French

and Armenian astronomers.

In this paper some essential results of this scientific cooperation are presented.

2. *H_α-emission in the direction of h and χ Persei system.* Per OB1 association is the only one which is not connected with any diffuse nebulae. This association of blue and red giant and supergiant stars is in fact a superposition of two OB-associations (designed by us Per OB1 and OB2 [3]) projected on each other. They are on the distances about 1150pc and 2300pc respectively [4,5]. The study of space distribution of absorbing matter in the direction of h and χ Per showed that the absorption is concentrated completely inside of these two associations [4]. The presence of absorbing matter (dust) in this direction gives us some grounds to expect the existence of gaseous matter also in them.

After some attempts the H_α-emission was found in the direction of h and χ Persei (R.A.(1985)=$2^h19^m08^s$ and Dec.(1985)= 57°06'10"). The exposure time of these H_α-observations was 6000 seconds. The observed field was equal to 9'×9' (every pixel was equal to 2".13×2".13). The intensity of the observed H_α-emission is about 2×10^{-6}erg $cm^{-2}s^{-1}sr^{-1}$ [6].

It is possible that this H_α-emission comes mainly from the nearest OB-association (Per OB1), since the emission from farthest one must be too faint [5]. The detection of the H_α-emission in the direction of Per OB1 and Per OB2 associations means that the gas and dust are mixed in them.

3. *Fabry - Perot interferometric observations of HII-regions.* Soon after the discovery of stellar associations in the Galaxy [7] it has been established that they are non-stable stellar systems. The new formed stars are moving off from the volumes of their formation. These motions bring to the expansion and decay of associations. The final result is disintegration and dissipation of matter from the regions of star formation (see, for example, [7]).

From this point of view it was significant to study the motions of diffuse matter, in particular of the hydrogen.

At present the study of velocity fields for three HII-regions is finished and here the obtained results are presented.

Sh2-152 and Sh2-153. In the first H_α -interferometric study Pismis and Hasse [8] have determined the general distribution of the ionized hydrogen in Sh2-152. It is not symmetrical relative to its exciting star. HII-region Sh2-152 consists of two components: the very bright component of the "triangular" form and a fainter curling component which seems to be the continuation of the main component.

The new H_α -interferometric observations of Sh2-152 confirm this general structure. New observations obtained with a higher resolution showed additional conden-

sations around the exciting star. Besides the condensation situated just around the exciting star two other condensations are observed to the west of it. One of them seems to be even denser than the condensation around the exciting star. The Fabry - Perot observations of two HII-regions: Sh2-152 and Sh2-153 connected with each other and representing a part of more extended region containing other HII-regions too (see, for example, [9]) showed an expansion of hydrogen matter in these regions.

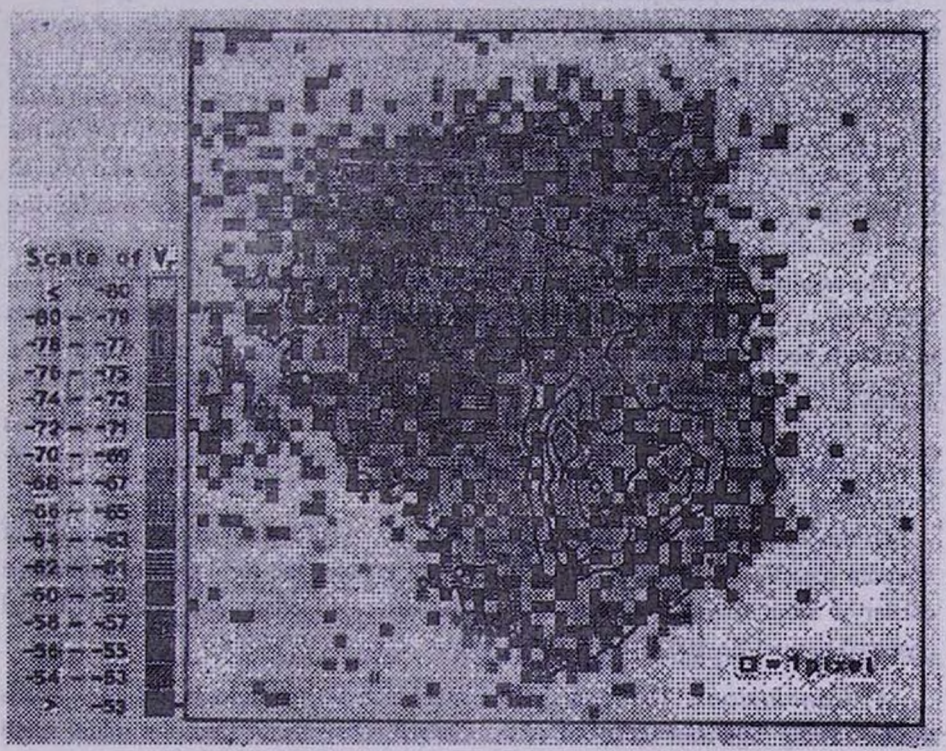

Fig. 1. An example of the distribution of radial velocities in HII Region of Sh2 - 152 [10].

The radial velocities of hydrogen atoms reach considerable magnitudes: about -70km/s near to exciting stars in both HII- regions. Their dispersion is enough large (from about 5-10km/s up to 30-40km/s) especially at large distances from the exciting star.

Namely, the dispersion of individual radial velocities in Sh2-153-region increases almost regularly and reaches to about 20km/s on the distance of 100 arcsec (in projection on the sky) from the exciting star. This dispersion is much larger, in general,

in Sh2-152-region on the distance about 40 arcsec from the exciting star and remains practically unchanged up to distance 100 arcsec.

Sh2-106. One of the most peculiar objects among observed HII-regions is Sh2-106. Owing to its unusual shape this region has been oftenly studied in details in optics, infrared and radio. The main results of the studies of Sh2-106, are presented by Staude and Elsasser [11] recently.

Sh2-106 have bipolar structure and is situated on the distance 500-600pc.The star exciting this region was identified by Eiora et al [12] with a strong infrared source, which is in fact an O-BO star near the main-sequence, supposed intensively (~ 21^m according to [12]) absorbed. The absorbing matter is found between two lobes of Sh2-106. The motions of diffuse matter in Sh2-106 have been revealed by Solf [13] on the base of the longslit spectroscopy and by Maucherat [14] and by Hippelein and Munch [15] using the Fabry - Perot observations. They showed that ionized gas was flowing away from the central region of Sh2-106.

The results of our Fabry - Perot interferometric observations confirm this fact [16]. Moreover, in the southern lobe there is a compact region where the radial velocities in average about two times exceeds the velocities of the remaining part of that lobe. Probably, this fact can be considered as an evidence of jet-like structure in it.

As Evans [17] noted the process of outflow of matter from all peculiar objects is ubiquitous and definitely show the direction of the motions of matter during star formation process.

In this connection it should be noted that the consideration of the formation of separate objects, for example Sh2-106, can not explain the formation of embedded cluster of about 160 stars of moderate masses detected Hodapp and Reiner [18] and observed around Sh-106 (the probable age is about 2×10^6yr [18]).

4. *Conclusions*. The results of the study of stellar motions in OB-associations are the strong argument in favour of the dissipation of matter from the initial small volumes as the paramount feature of cosmic evolution [19]. They always indicate the moving off young stars from the regions where they are formed. It means that the dissipation of the matter is inevitable in the regions of star formation [7].

The presented results concerning the motions of hydrogen matter in the HII-regions obtained on the base of Fabri-Perot interferometric observations are in complete agreement with this idea. They confirm Ambartsumian's [19] fundamental conclusion that "the decay and dissipation... characterize general trend of cosmogonic processes". New Fabry - Perot observations showed that not only stars, but also diffuse matter takes part in this dissipation processes connected with the formation of stars and stellar systems-centres of star formation in stellar associations.

ФРАНКО-АРМЯНСКОЕ НАУЧНОЕ СОТРУДНИЧЕСТВО В ИЗУЧЕНИИ НЕКОТОРЫХ HII-ОБЛАСТЕЙ С CIGALE

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Представлены результаты Фабри-Перо наблюдений 4 полей, полученных в первычном фокусе 2.6 м телескопа в Бюракане (Армения), прибором "CIGALE" Марсельской обсерватории. Обнаружено H_α-излучение в направлении ассоциации Персея. Показано, что межзвездный водород в ассоциациях участвует в расширительных движениях материи приводя к рассеянию и дезинтеграции материи в Галактике.

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