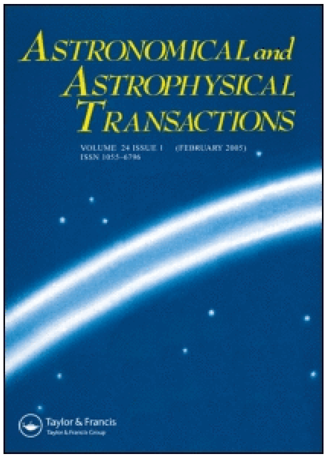

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Short note: Large circumstellar envelopes against background of nebulae

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SHORT NOTE

LARGE CIRCUMSTELLAR ENVELOPES AGAINST BACKGROUND OF NEBULAE

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Circumstellar gas-and-dust envelope is the relict of the birth of any star, accompanies the star during the most part of the star's lifetime. The Oort's comet cloud probably is the remnant of such an envelope around the Sun. Under favorable circumstances this envelope may be seen against the bright nebulae background as a dark halo around the star. The bulk of the matter of any compact HII region is believed to consist of partly ionized envelopes of stars of a very young cluster.

KEY WORDS Large circumstellar envelopes, compact HII regions.

In 1951, when analysing the structure of nebulae, Fesenkov (1951) paid attention to a phenomenon of a dark halo around some stars, seen against the bright nebulae background. He supposed that a star could blow away by its light pressure on the surrounding dust, and form a void (Fesenkov and Rozhkovsky, 1952). It is interesting to note that, 38 years later, Feibelman (1989) came to the same conclusion.

In 1968, after a close inspection of POSS maps, it was found that dark halos were gas-and-dust envelopes, not empty spaces; however, there was a lack of evidence (Glushkov, 1968). Only in 1986, by indirect methods, evidence was provided for the existence of large circumstellar envelopes (Glushkov, 1986).

Finally, Castelaz (1990), after an analysis of infrared observations, obtained direct proof of the existence of these envelopes: "Socket stars may be a new type of astronomical object."

Our analysis shows that the envelopes, observed around some 10–20th-magnitude stars, covered all spectral types, against any luminous background. Angular sizes of the envelopes are 5–40″ (depending on the distance to objects), the corresponding linear radii are between 1000 and 5000 a.u. The degree of polarization of the stars investigated in our work is ≃2–5%. A crude estimate of light extinction in the envelopes is $A_v \simeq 2^m$. Besides that, such envelopes occur, not only around stars associated with nebulae, but also around main-sequence field stars (for example, β Pic). This is a very important point because an analysis of the envelope's IR radiation can allow us to solve the problem of the star's lifetime on the main sequence. Most probably, the envelopes are shaped like ellipsoids of revolution or discs. Sometimes two or more stars are embedded in one envelope.

In our opinion, these envelopes are remainders of matter conserved since the time of the star's formation. The dust seen in IR could be constantly replenished by comet-like bodies gravitationally bound to the star. If a star with an envelope is located inside a nebula, especially in the radiation field of an O-type star, the external part of the envelope becomes ionized, and this object will be observed as a dense HII knot, as, for example, in the Orion Nebula (Churchwell *et al.*, 1987).

It is natural to assume that, the younger is the star, the thicker is the envelope. Therefore, in very young clusters associated with compact HII regions, all the stars should have such envelopes. The A- and later-type stars, surrounded by envelopes ionized from outside by O-stars radiation, could be the main body of a compact HII region. This suggestion, formulated by us (Glushkov *et al.*, 1975), now finds some confirmation: compact IR stellar cluster of $\simeq$100 stars was recently found by, Hodapp and Rayner (1990), in Mil-19 $\equiv$ S106, which was identified by us as a compact HII region (Glushkov and Karyagina, 1971).

The aim of the present note is to once more draw attention to these interesting objects, and particularly, to stimulate their theoretical studies.

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