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HIGH-VELOCITY GAS IN THE MONOCEROS LOOP

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The interstellar Na I lines arising from high-velocity gas in the Monoceros loop supernova remnant have been observed. When combined with previously published interstellar Ca measurements, the interstellar lines in the high-velocity component of HD 47359 show an abnormally low ratio Na I/Ca II.

Key words: interstellar matter—supernova remnants—high-velocity gas

Wallerstein and Jacobsen (1976; hereafter WJ) recently studied interstellar absorption lines in a search for high-velocity gas in the Monoceros Loop supernova remnant. Out of 25 stars, for which they obtained coudé spectrograms, two showed high-velocity gas. Unfortunately, they were not able to observe the Na I interstellar line in one of these two stars. Since the ratio of Na I/Ca II is of great interest for high-velocity gas in supernova remnants, we have observed the Na I lines in HD 47359 from a 5.1 Å mm^{-1} 4-m echelle spectrogram 0.3-mm wide taken with the baked IIIa-J emulsion behind a Carnegie image tube. We summarize in Table I the observations of the interstellar lines for this star, where the Ca II data are from WJ.

The radial velocity separation of the two components determined from the echelle spectrogram is 38 km sec^{-1}, which agrees very well with that given in WJ, but the absolute value of the radial velocity cannot be easily obtained from the echelle spectrum. The mean motion of +15 km sec^{-1}, found in WJ, implies that the two components are moving at velocities of +7 and −30 km sec^{-1} with respect to ambient gas at the distance of the Monoceros Loop.

TABLE I

INTERSTELLAR LINE STRENGTHS IN HD 47359

Velocity (km sec^{-1})	Equivalent Width (mÅ) 3968	3933	5895	5889
+22	124	206	360	425
−15	43	92	45	81

The high-velocity component of the interstellar gas in HD 47359 shows the expected anomolously low ratio Na I/Ca II. The deduced column densities are log N (Ca II) = 12.1 and log N (Na I) = 11.7 for this component. This low Na I/Ca II is characteristic of the high-velocity clouds only (see Fig. 1 of Siluk and Silk 1974), and also of clouds above the galactic plane (Cohen 1974). Whether this is an ionization effect or results from vaporization of the grains onto which Ca is extensively depleted in low-velocity clouds is not yet clear.

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