

INTERSTELLAR LINE SPECTRA OF A DENSE CLOUD: THE VI CYGNI ASSOCIATION

Steven P. Souza*
State University of New York at Stony Brook

Barry L. Lutz*
Lowell Observatory, Flagstaff, Arizona

Spectroscopic observations of the dense interstellar cloud which obscures the VI Cygni association have yielded an optical map of the atomic and molecular constituents in a region which may represent a transition between the diffuse and radio clouds. The velocity of the optical components found is consistent with that of a CO cloud seen in front of No. 12.

INTRODUCTION

The chemistry of interstellar clouds has long been a topic of active astronomical research. Study of the atomic and molecular constituents of such clouds has been primarily limited to extremes of cloud types: diffuse clouds and dark clouds. The midrange clouds, with optical extinctions $\approx 2^m$ or 3^m , may bridge the gap between the two extremes; but they have rarely been probed to any degree of sensitivity, either optically or in the radio regime.

During the past three years we have undertaken to study such mid-range clouds. In particular, we have selected a rather extended cloud which is known as VI Cygni. Two of the prime reasons for choosing the VI Cygni cloud were that it is an association of early-type stars in a large region of moderately dense obscuration with a gradient of extinction ranging up to 10 magnitudes, and it contains one of the most highly obscured early-type stars known. The high cloud density that the extinction implies suggested that this region is amenable to optical searches for new molecules. Indeed, this selection proved fruitful, for the 1μ -spectrum and No. 12 provided the first detection of two rotational lines, Q(2) and R(2), of interstellar C_2 (Souza and Lutz, 1977). Since that time we have undertaken an observational program of other members of the association, including Nos. 4, 5, and 9, both for new molecules and to map the optically observable interstellar species.

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