THE ASYMMETRIC PROFILE OF THE H76α LINE EMISSION FROM MWC349

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MWC349 is an emission-line star found by Merrill, Humason and Burwell (1932). Braes, Habing and Schoenmaker (1972) discovered that it is a strong radio source. The radio emission originates in a massive ionized wind that is expanding with a velocity of about 50 km s^{-1} (Hartmann, Jaffe and Huchra 1980). Its continuum spectrum fits well a $\nu^{0.6}$ power law from the cm wavelenghts to the far-IR (Dreher and Welch 1983). Radio recombination line emission from the envelope of MWC349 was first detected by Altenhoff, Strittmatter and Wendker (1981).

We have obtained good signal-to-noise ratio, Very Large Array observations of the H76α radio recombination line from the ionized wind of MWC349. Our data reveal that the profile is markedly asymmetric, with a steep rise on the "blue" side (see bottom of Figure). This asymmetry could be due to non-LTE effects in the formation and transfer of the line or to intrinsic asymmetries in the envelope. Our analysis suggests that most probably the peculiar profile is caused by a non-LTE enhancement of the line emission from the side of the envelope nearer to the observer. This asymmetry, reported for the first time here, has the opposite sense than that observed in optical and IR recombination lines, where a different effect (absorption of the stellar continuum by the gas in the wind between the star and the observer) is known to be dominant, leading to the classic P Cygni profile (see Figure).

We propose that the profiles of the radio recombination lines from ionized stellar winds will have this characteristic shape, while optical and IR recombination lines are characterized by P Cygni-like profiles. Unfortunately, at present the detection of radio recombination lines from ionized stellar winds is only feasible for MWC349 and a few other objects.

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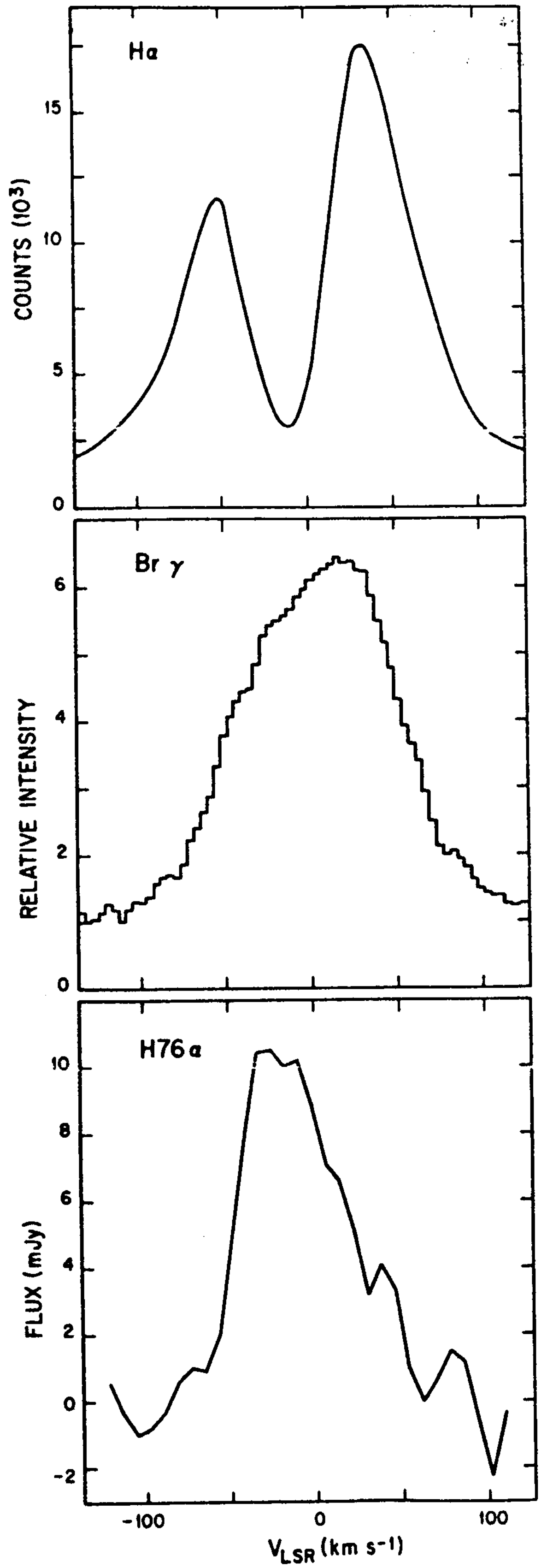

Figure. Spectra of Hα (top: Hartmann, et al. 1980), Br γ (middle: Tanaka et al. 1985), and H76α (bottom: this abstract). Note that the sense of the asymmetry in the Br γ line reverses in the H76α line.