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The Case Low-Dispersion Northern Sky Survey (Peisch and Sanduleak 1986, Ap. J. Suppl. 60, 543 and references therein). Spectroscopic observations were carried out with the 2.3m Steward telescope and Cassegrain spectrophotograph with the blue intensified PC relcion system as detector. SpT and spectral type class is obtained from the list of 3140–6200. The case survey has proven to be an exceedingly rich source of new degenerate stars. The break down is as follows: 27 DA white dwarfs, 6 DB white dwarfs, 1 DBZ white dwarf (CBS7B: Song et al. 1986, Ap. J. (Lett.). 308, 617) 14 sdB stars, 5 sdO stars, 6 HBB stars, 6 sdG stars, 2 cataclysmic variables including a doubled emission line CV, 8 quasi-stellar objects, 2 active galactic nuclei and 1 composite stellar object.

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Pre-discovery Imaging and High-resolution Spectroscopy at Maximum Light of the Unique Supernova 1984 in NGC 3169

C. M. Gaskell (SUNY/Stony Brook), W.C. Keel (Leiden)

The 1984 supernova in NGC 3169 was unique in showing extremely sharp strong Balmer lines at maximum light superimposed on an otherwise normal type II spectrum (Gaskell 1984, IAU Circular 3936). CDS spectroscopy at maximum light shows the full width at half maximum of the narrow Balmer lines to be about 300 km/sec. This is much slower than the classical waves are the driving mechanism for winds from the supergiant component of zeta Aur type binaries. We attempt to match the observed velocity function reported by Ahmad and Stencel (1986, submitted to Nature) using models based on the theory of Hartmann, Edwards, and Avrett (1982, Ap. J. 261, 279). We adopt published mass loss rates and estimate the magnetic field strength in the wind. We find that models with a constant damping length do not fit the observations (the terminal velocity is too high). Since the wave flux below the critical point fixes the mass loss rate while the dissipation of flux above the critical point determines the terminal velocity, we suggest that the winds may leak out by reflation as Davila (1986, Cool Stars, Stellar Systems, and the Sun, M. Zeilik and D. M. Gibson, eds., New York: Springer-Verlag, p. 463) has previously proposed for the solar wind.

*Data was analyzed at the Regional Data Analysis Facility at Goddard Space Flight Center, Greenbelt, MD.

Time-Dependent Line-Driven Wind Model Not Based on the Sobolev Approximation

S.P. Woocki (UCSD/CASS), J.J. Castor (LLNL), and G.B. Rybicki (CFA)

We have recently developed a radiation hydrodynamics code to compute numerically the evolution of instabilities in line-driven stellar winds. Our calculation of the line force does not assume the Sobolev approximation, although it does still neglect any dynamical effect of scattered radiation by assuming all lines can be treated as pure absorption lines. In the supersonic portion of a smooth wind, this pure absorption line force recovers the Sobolev theory expression used by Castor, Abbott and Klein (CAK), but in the subsonic part of the wind it can differ from the CAK force by an order of magnitude or more. Hence the CAK wind model is not a steady-state solution for such an absorption line-driven wind, and, if used as an initial condition in a time-dependent calculation, its subsonic region forms a wave structure that is soon strongly amplified by the line force.

We have found a steady-state solution for this absorption line-driven wind; its mass loss rate is nearly equal to that of CAK, but its velocity law differs markedly. This solution is unchangeable in a further time integration, indicating global stability. We are now comparing the numerically computed evolution of small perturbations in this steady wind with predictions of analytic, linear perturbation analyses.

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31.10

Alfven Wave Damping in Supergiant Stellar Winds

I. A. Ahmad (Imad-ad-Dean, Inc.) and N. P. Kuin (Goddard Space Flight Center)

We present arguments that Alfven waves (not acoustic waves) are the driving mechanism for winds from the supergiant component of zeta Aur type binaries. We attempt to match the observed velocity function reported by Ahmad and Stencel (1986, submitted to Nature) using models based on the theory of Hartmann, Edwards, and Avrett (1982, Ap. J. 261, 279). We adopt published mass loss rates and estimate the magnetic field strength in the wind. We find that models with a constant damping length do not fit the observations (the terminal velocity is too high). Since the wave flux below the critical point fixes the mass loss rate while the dissipation of flux above the critical point determines the terminal velocity, we suggest that the winds may leak out by refraction as Davila (1986, Cool Stars, Stellar Systems, and the Sun, M. Zeilik and D. M. Gibson, eds., New York: Springer-Verlag, p. 463) has previously proposed for the solar wind.

Luminosity Effects of Wind Blanketed Models for Late O-Type Stars

S.A. Voels, B. Bohannan, D.C. Abbott, D.G. Hummer (JILA / Univ. of Colorado)

Four late O-type stars (ξ Ori B0a, ζ Ori O9.5B, λ Ori A0III(f)), ξ Ori A0V), have been observed as part of our program to determine temperatures, gravities, and helium abundances of a variety of O and early B stars. This set of stars permits us to test our models over a range of stellar luminosities. Line profiles of hydrogen and helium (SNR 200) are compared with model atmospheres that include the effect of radiation scattered back onto the photosphere, a process referred to as wind blanketing. Compared to non-wind blanketed models, these models are able to produce equally strong helium lines at a lower effective temperature. In addition, we have analyzed ξ Gru (O4V) for comparison with our previous study of ζ Peg (O4V) which we found to be significantly evolved with an enhanced helium abundance (\(\text{[\text{He}]/\text{[H]}=0.17}\)).

31.12

A Two-Dimensional Wind Model for Rotating Hot Stars

C. H. Poe (U. Wisconsin)

We have solved the equations for an axially symmetric, radiation-driven wind from a rotationally distorted 0 star in the plane containing the pole and the equator. The line force is treated as in Friend and Abbott (1986, Ap. J. 311, in press) which includes the treatment of the star as a finite disk. The correct solution, which is found by a shooting method, must pass through a critical curve. We find that the line force dominates the radial flow, and angular momentum conservation dominates the azimuthal flow. We are mainly interested in studying the effects of meridional flow on the wind.

We have found that the centrifugal force pushes the wind material from the polar regions toward the equatorial regions. Very near the star, the mass flux is largest at angles near 30 degrees from the pole which then moves toward the equatorial regions. At large radii, the flow is purely radial with a larger mass flux near the equatorial plane. The terminal velocity along the polar regions is faster than along the equatorial regions. We will compare this model with the one-dimensional wind model of Friend and Abbott.

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