26.05
Polarimetry of the Wolf-Rayet Star WR 136 — HD 192163. WNE (SB1)

We present data on the time and wavelength dependence of the linear polarization of WR 136. The variability was monitored in a wide band (5700-1300 A) at the Pine Bluff Observatory 36-inch telescope during 5 nights in 1986/7. The wavelength dependence was observed by C.A. in 10 filters during 6 nights of a spring 1988 run at the 1-m-JKT telescope of the IAC Observatories, La Palma. We obtained the following results:
1.) Our wide-band data points yield a mean percentage polarization of P = 1.31% at a position angle of $\Theta = 177^{\circ}$. The standard deviation of all observations (±0.06%) is comparable to the individual errors (±0.04 to ±0.06%). The polarization did not vary significantly within the errors.
2.) The mean wavelength dependence of P and $\Theta$ is displayed in the Figure below. As this is not a smooth interstellar curve, some of the polarization must be intrinsic to the star. Most noticeable is the dip in P in the 9000FWHM 100 A filter, which coincides with the emission line of He I 5876. The levels of P and $\Theta$ agree well with the wide-band data. We suggest that the stratified, electron-scattering wind of WR 136 has a non-spherically symmetric structure that is stable in time.

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26.06
Long-Term Wind and Envelope Variations in λ Eri
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We present the results of long-term IUE, Hα, and He I λ 6678 monitoring of the bright and active Be star λ Eri during the 1987-1988 emission episode. The C IV λλ1548, 1550 data show strong, high velocity (-800 km s$^{-1}$) discrete absorption components, similar to those initially reported by Bark et al. (1985). These features were present in spectra obtained from 1987 September 22 through 1988 February 14. By 1988 March 20 the discrete absorption components were no longer visible. Hα was in double-peaked emission (I(Hα) 2 L$_{\odot}$) in all spectra obtained from 1987 October 18 through 1987 December 31. Beginning in early January 1988 Hα emission gradually faded from I(Hα) 0.6 L$_{\odot}$ to essentially photospheric absorption. He I λ 6678 showed weak emission I(He I) 1.02 L$_{\odot}$ from 1987 September 27 through 1987 December 12. By 1988 January 7 the He I wing emission had disappeared, and the periodic ripple features characteristic of non-radial pulsation were often visible.

The available data are consistent with a decrease in envelope density beginning near the photosphere in 1988 January. The IUE and Hα data are consistent with both lines being formed in the outer part of the envelope, which gradually dropped in density from late January on. In contrast, the He emission, which can turn on and off rapidly, appears to be formed closer to the stellar surface. We believe that the He emission reflects current discrete mass ejection events which replenish an otherwise slowly dissipating Hα envelope.

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26.07
Color Excesses and Intrinsic Colors of Galactic and LMC Wolf-Rayet Stars
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Using IUE archival data covering the wavelength range of 1200 to 3200 A, we have determined the color excesses and intrinsic colors for 31 Wolf-Rayet (W-R) stars in the Galaxy and 27 W-R stars in the LMC. For this study we have chosen only those Galactic W-R stars located in regions toward which the interstellar reddening law has been determined previously (Meyer and Savage, 1981) to be close to the Galactic average and adopted the reddening law of Seaton (1979). For the LMC, we have included only those W-R stars located outside the 30 Doradus region and assumed a Galactic foreground reddening of 0.05 magnitudes. Assuming that the intrinsic ("de-reddened") stellar spectrum can be well represented by a power law in $\lambda$ over the narrow wavelength range under consideration, we have determined the E(B-V) value and power law index for each star by nulling the 2200 A interstellar absorption feature through the use of a y-$\alpha$ minimization technique. This method has the advantages of being relatively unbiased, more reliable and less subjective than previous "by-eye" estimates of the reddening, and of allowing a quantitative measure of error values. In addition, the effect of choosing various continuum levels for any given stellar spectrum can be easily and directly examined.

We have combined the derived color excesses with the line-free ("monochromatic") optical magnitudes and colors of Massey (1984) and Torres-Dodgen and Massey (1988) to determine the intrinsic colors of the Wolf-Rayet stars and establish a more accurate intrinsic color vs. spectral subtype relationship for Galactic and LMC W-R stars. Although there is a distribution of (b-v) values about the mean for any given subtype, this new calibration of the color-subtype relation will allow absolute magnitudes and distances for Galactic W-R stars to be determined more reliably.

26.08
Absolute Instability as a Cause of Intrinsic Variability in Line-Driven Stellar Winds
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The line-driven stellar winds from hot, luminous stars are known to be strongly unstable. An important distinction is whether this instability is advective, thus causing a perturbation to grow to large amplitude only as it propagates or is advected away, or absolute, thus leading to complete disruption of the flow wherever any perturbation (even thermal noise) is introduced. Previous work has shown that the instability of an absorption-line-driven flow is of the advective type in the supersonic portion of the wind.

In the present study, we use two different methods to show that this instability has an absolute character in the region near and below the sonic point. The implication of this is that steady-state solutions do not describe a physically realizable state for such line-driven winds. Rather, it seems likely that the wind will instead tend to be highly variable, with both the velocity law and mass loss rate fluctuating about the allowed steady values. Using a radiation-hydrodynamics code recently developed to simulate numerically the nonlinear evolution of such line-driven flows instabilities, we illustrate this kind of intrinsic variability in mass loss rate and velocity for parameters appropriate to a typical hot star. We also discuss the implications of these simulations for interpreting observations of spectral line variability in such hot stars.