which are significantly cooler than those found in the winds of O-stars, of about 1 million degrees K or less, approaching the minimal temperature detectable by ROSAT. We also find that there is a decrease in the ratio of X-ray luminosity to bolometric luminosity as one goes to later spectral types. At spectral type B3 this ratio is two orders of magnitude lower than that found for O-stars. Additionally, two of our observed stars are Be stars and they show a higher X-ray luminosity than B-stars of the same spectral type. Properties associated with shocks and other heating mechanisms operating in the stellar winds of B stars are described.

19.05

WUPPE/Astro-1 Observations of HD 45677

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The first ultraviolet spectropolarimetry of HD 45677, a B2 IV [e]p star with infrared excess, was carried out during the December 1990 Astro-1 space shuttle mission with the Wisconsin Ultraviolet Photo- Polarimeter Experiment (WUPPE). These data from 1400 to 3300Å, combined with optical spectropolarimetry obtained at the Pine Bluff Observatory (PBO) and the Anglo-Australian Telescope (AAT), show systematic variations of polarization and position angle from the UV through the optical which are indicative of dust scattering in a bipolar scattering geometry. We find that after removal of the interstellar polarization, the position angle flips by 90° in the near-UV, as expected from a bipolar reflection nebula. This work was supported by NASA contract NAS5-26777.

19.06

Detection of Silicates in the 51 Ophiuchi Disk

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We have detected a prominent 10 μm silicate emission feature in 51 Oph, a B9.5 Ve star with circumstellar emission. 51 Oph appears to show the "Vega phenomenon," probable disk emission from a main sequence star. Observations were conducted with the NASA MSFC bolometer array camera, BIG MAC, at the NASA IRTF. We obtained narrowband spectrophotometry (FWHM $\approx$ 1 μm) of the inner 4" region with filters in the 10 and 20 μm spectral regions. The emission feature is more than 30 times stronger than the photospheric flux at 12 μm (Waters, Cote, & Geballe, 1988, A. & A., **203**, 348). The widths of the silicate features in 51 Oph and β Pictoris (Telesco & Knacke 1991, Ap. J. **372**, L29) are comparable, but at 10.3 μm the feature (observed flux minus photospheric and dust continua) is 9 times stronger in 51 Oph. From observed fluxes at 7.9 and 12.5 μm we estimate the temperature of the hottest grains within 140 A.U. to be 385 K with a lower bound of 295 K. This makes the grains around 51 Oph warmer than those around β Pic. Modeling the emissivity with Draine & Lee (1984, Ap. J., **285**, 89) "astronomical silicates" shows that submicron-sized particles must be present in the 51 Oph disk, with an upper limit of 1.5 μm to the size of the grains emitting the silicate feature.
This research was sponsored by NASA under grants NAGW-2334 and RTOP 188-44-24-05.

19.07

A Potential Similarity and Difference of Be Stars and Shell Stars Based Upon the Continuous Energy Distribution

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Recently the continuous energy distribution from the infrared to the radio region has been obtained for six Be stars, three of which are Be stars and three of which are shell stars. Analysis of these continuous energy distributions by Waters et al. (1991) in terms of a disk model has yielded the density distribution and the radial component of velocity in the circumstellar material. In this paper we determine the additional force, $F_x(r)$, exclusive of those arising from gravity, rotation, and the gas pressure gradient, which is required in this disk model to produce the radial component of velocity for each of the stars studied. We find that $F_x(r)$ for the three Be stars and the three shell stars has the same behavior. Between the surface of the star and the turning point $F_x(r)$ decreases with increasing r but a little less rapidly than does gravity. Beyond the turning point $F_x(r)$ increases dramatically with r. We show that the normalized $F_x(r)$ has several characteristic properties: a) between 2-3 stellar radii and the turning point the normalized $F_x(r)$ is essentially identical for the six stars, b) beyond the turning point $F_x(r)$ increases with increasing distance, but the rate of increase depends on the star considered, and c) Be stars as a group may have the turning point closer to the surface of the star than do shell stars. The first property suggests the same mechanism is responsible for driving the wind inside the turning point for Be stars and shell stars. The second property suggests that either a second driving mechanism takes over from the first or a change in physical conditions leading to an increase in $F_x(r)$ takes place which is different from one star to another. The third characteristic, if real, suggests that the increase in $F_x(r)$ occurs at smaller r for Be stars than for shell stars. This latter result, if real, suggests that some shell stars have envelopes which are more extended than those of Be stars.

19.08

FOS Spectra of OB-type Stars in the LMC

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As part of continuing project to determine the intrinsic stellar parameters (temperature, gravity, luminosity, chemical composition, radius, mass-loss rate) of early OB-type stars, we are observing several stars in the Large and Small Magellanic Clouds using the HST/FOS high resolution gratings (G130H, G190H) in the UV (1200 to 2200 Å). This part of the UV spectrum contains several line profiles of C, N, O, and Si which when combined with ground based observations in the optical and NLTE stellar atmosphere models allow us to accurately determine the intrinsic stellar parameters of the star.

In this poster, we will present the FOS spectra and preliminary model fits for AV-232 (Sk-80) and AV-488 (Sk-159) which are to be obtained Fall 1992. We will also present our latest work on the three stars (Sk-70D69, Sk-66D100, and Sk-68D137) obtained last summer.