37.16  
**Interferometric Measurements of Stellar Diameters in T10 Bands and in the Continuum**  
A. Quirrenbach (NRL/USNO Optical Interferometer Project and USRA)

The MI111 stellar interferometer on Mt. Wilson, CA, was used to measure the diameters of a sample of M giants and supergiants. 5 to 10 nm wide filters centered at 623, 670 and 712 nm were used to take data within strong T10 absorption troughs, while filters at 701 and 754 nm measure relatively uncontaminated continuum. Up to now, reliable results have been obtained for six stars. Five of them (Mira Ceti, θ Per, α Her, μ Gep, β Peg) are significantly larger inside T10 bands than in the continuum. For example, fitted uniform disk diameters for β Persei are 16.13 ± 0.11 mas at 754 nm and 17.57 ± 0.13 mas at 712 nm. For α Her, the size difference is even larger, but numerical values are less reliable because of the paucity of short baseline data. β And, which is the least luminous of the six stars and has the earliest spectral type, has the same size at 712 and at 754 nm to within 3σ.

About 30 late giant and supergiant stars in the accessible sky are bright enough to be observed with the MI111 in comparably narrow filters. It should therefore be possible to investigate systematically the dependence of differences between continuum and T10 sizes on spectral type and luminosity class.

To enhance the signal-to-noise ratio of narrow-band or low-visibility data, a scheme has been investigated that uses the phases in the broad-band tracking channel to extend the coherent integration time in the data channels beyond the atmospheric coherence limit. The coherence losses due to photon noise in the tracking channel and co-errors in the adopted wavelengths are small, but differential refraction limits this method to zenith angles < 45°. Estimates of this effect based on a model atmosphere are compared to MI111 data.

37.17  
**Models for Supergiants' Chromospheres Derived from Zeta Aur Binaries**  
Joel A. Eaton (Tennessee State U.)

I have used archival IUE spectra (for ζ Aur, 32 Cyg, and 31 Cyg) and new optical observations to form a representative mean chromosphere for these K supergiants. Excitation temperatures, mean densities, and turbulent velocities have been measured in these stars for radial mass column densities between 10^3 and ~ 0.5 gm/cm². Departure coefficients for the upper levels of Lyα and MgII h & k have been estimated, and crude determinations of the electron density at various depths have also been obtained. To test this model, I have begun comparing spectra calculated for it (by using the computer program PANDORA) with observations of emission lines in Zeta Aur binaries and single stars. I shall report the results for three models now in hand, as well as others to be calculated in late 1991.

37.18  
**The Dust Shell around α Orionis**  
G.C. Sloan (WJRO), G.L. Grasdalen (G-Star Ent.), P.D. LeVan (Phillips Lab.)

We have obtained long-slit spectra from 7 to 14μm of α Ori and its associated dust shell, using the Geophysics Laboratory Array Detector Spectrometer (GLADYS) on the 2.5 meter telescope at the Wyoming Infrared Observatory (WIBO). Integrated along the slit, our spectra show the silicate feature with only half the contrast against the stellar continuum observed by the Low Resolution Spectrometer on IRAS. Our 2x9 arcsecond slit excludes much of the silicate dust shell around α Ori. The intensity of the shell increases dramatically from 9 to 10 μm in the reduced images. We have successfully used maximum entropy techniques to spatially separate the spectrum of the star from that due to the dust shell. At an effective resolution of 0.25 arcseconds the central spectrum is nearly a blackbody with little or no contribution from the silicate dust component. Away from the central source the processed data show only the silicate emission feature.

The lack of silicate emission overlying the central star constrains the geometry of the circumstellar dust to a thin shell several arcseconds in diameter. Such a shell would result from a brief episode of mass loss from α Ori.

37.19  
**Molecular Absorption in the Ultraviolet Spectrum of Alpha Ori**  
G. M. Whigham, R. D. Robinson (CSC/GHRS) and K. G. Carpenter (NASA/GSFC)

Observations of the cool supergiant Alpha Ori, made with the Goddard High Resolution Spectrograph aboard the Hubble Space Telescope, show the UV spectrum shortward of 1600 Å to be dominated by molecular absorption from the CO (A-X) 4th positive system. Also present in low and medium resolution spectra are emission lines of both atomic and molecular origin and a far-UV continuum level that is stronger than that expected from simply photospheric radiation. The velocity of the outward expanding CO absorbing material is approximately 20 km/sec.

The region of CO absorption likely originates in a circumstellar shell and is modeled here by a slab of cool gas overlying the far-UV continuum. A best fit to the spectrum of the (1-0) band system, which is seen in the region 1510 - 1530 Å, is obtained for a temperature of 500K, column density N(CO) of 1.6×10^18 and turbulent velocity of 5 km/sec.

The low resolution of the data does not allow for distinguishing between the carbon isotope ratios of CI2/C13 = 10 and 20. The latter value has been used in all calculations. The UV spectrum of SiO is also being investigated.

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**Session 38: Solar Corona and SERTS Results**

**Display Session**

**Imperial Ballroom**

38.01  
**Large Scale Variation of the Solar Corona, 1966-1991**  
R. R. Fisher (NASA/GSFC)

Daily observations of the inner solar corona, b=1.3 Rd or 1.5Rg, span the period 1966-1991. These data have been used to form a set of about 300 estimates of the global distribution of coronal polarised brightness over latitude and longitude as a function of time, p(B, φ, t).

The assignment of longitude was made assuming a single synodic angular velocity of 2.67 x 10^{-6} radian sec^{-1}, a value obtained from a previous study of white light structure over the period 1966-1982. The synoptic data set was then decomposed into a time series of spherical harmonic coefficients which were interpolated and resampled for equal spacing in time. The approximate limits of spatial and temporal resolution are a smallest characteristic equatorial scale of ~ 0.4Rg and a highest temporal frequency of 43Hz.