We have obtained absolute fluxes of the Ha and Hβ emission lines in the spectra of selected Be stars. For each star the absolute fluxes were used to determine the absolute luminosity of the circumstellar envelope.

To verify the accuracy of these observations absolute flux measurements of the continuum of standard stars were made. These were compared to standards taken from Berger's Catalogue of Spectrophotometric Scans of Stars. For the Be stars studied we have made independent determinations of distance, apparent V magnitudes, absolute V magnitudes and luminosities. These were then compared to the corresponding values available in the published literature. Any significant differences between our values and the published values have been carefully examined.

From measurements of the absolute Ha and Hβ fluxes we conclude that many, and perhaps all, circumstellar envelopes around Be stars violate the condition of radiative equilibrium. This suggests that an additional source of energy, other than radiation flux from the central star, is required to explain the observed luminosity of the envelope around a Be star. The five current Be star models are examined in view of this discovery.

69.06
High Resolution Ultraviolet Stellar Spectroscopy From Space Observatories - Atomic Physics and Astrophysics
D.S. Leckrone (NASA/GSFC), S. Johansson (Lund Univ.), R.L. Kurucz (SAO), S.J. Adelman (The Citadel)

Sharp-lined photospheric spectra of B and A-type stars, obtained with the IUE, demonstrate the complexity and richness in information of the 1150 - 3300 Å region. UV stellar spectroscopy will reach a new level of resolution and precision with the launch of the HST's Goddard High Resolution Spectrograph (GRS). The atomic data based required for accurate quantitative analyses of IUE and GRS spectra lags well behind our observational capabilities in completeness and quality. We describe a project to assess the currently available atomic data, particularly for the lower ionization states of the iron-group and lighter elements. We have examined in detail the spectral content of the star ω Peg (AI IV, Teff ≈ 9600 K, v sin i < 9 km s⁻¹) in five test intervals between 1720 and 1880 Å, comparing high quality co-added IUE observations (Leckrone and Adelman 1989, Ap. J. Suppl. 71, in press) with LTE synthetic spectra, calculated using a massive new set of iron-group atomic data derived by Kurucz. In general the match is good enough to indicate that we are on the right track, both observationally and computationally. Line-by-line, each discrepancy between observations and calculations is assigned to the state of the experimental classification of predicted energy levels, in terms of wavelengths and line strengths observed in laboratory spectra, and in terms of phenomena of atomic physics, such as level mixing and perturbations, which are difficult to predict theoretically. Continued development of the enormous atomic data base needed for UV space astronomy requires renewed emphasis on "classical" laboratory spectroscopy, experimental term analysis of the iron group, and highly precise measurement of selected level lifetimes and branching ratios.

69.07
The Magnetic Field Geometry of the Helium-Strong Star HD 37776
D.A. Bohlender and J.D. Landstreet (UWO)

A surface magnetic field geometry consisting of collinear dipole, quadrupole, and octupole components, with polar field strengths of approximately 3.5, 5.0, and 45 kG respectively, is presented for the remarkable helium-strong star HD 37776. This magnetic geometry is supported by the pronounced spectral variations of the star, as illustrated with phase-resolved, high S/N, high resolution CFHT coöde Reticon spectra, the observed longitudinal magnetic field curve, and the lack of observed radio emission seen in other members of the helium-strong class. If confirmed, such a field geometry will make HD 37776 unique in several respects: a) it will have the largest surface field of any non-degenerate star, b) it will possess the largest known variation in surface magnetic field over its surface, and c) it will be the first case of a star with a quadrupolar component dominating its magnetic field geometry.*

Visiting astronomers, CFHT.

69.08
N I Abundances from Co-Added IUE Spectra of Late B Stars
S.W. Roby (SUNY Oswego), D.S. Leckrone (NASA/GSFC), S.J. Adelman (The Citadel)

In a previous work by Roby and Lambert, the moderate-to-weak, high excitation lines of N I near 7468 and 8600 Å were undetectable in the majority of HgMn stars studied, leading to upper limits on the N abundance of roughly ten times below that of the solar N abundance. Standard stars with similar temperatures (10000-13000K) were also observed and found to have roughly solar N abundances.

We have determined N abundances in two HgMn stars and four standard stars using the very strong, low excitation lines of N I found in the ultraviolet. The observational data consisted of high quality, high resolution, co-added IUE spectra which had been previously collected and reduced by Leckrone and Adelman.

Synthetic spectra using up-to-date unpublished line lists by Kurucz were matched to the IUE spectra to obtain N I abundances for the N I lines at 1742, 1745 and 1411 Å. We adopted line-blanketed model atmospheres and abundances for other elements based on previous studies by Adelman. LTE was assumed. Transition parameters for the N I lines were adopted after careful consideration of both theoretical and laboratory sources. In the 2 HgMn stars, we again find the N I lines to be undetectable, but the stronger intrinsic strength of the new lines yield more stringent upper limits than those obtained in the previous study.

We find that N is typically depleted by at least factors of 150-500 in the HgMn stars and by roughly 5 times in the standard stars, relative to the sun. The final result agrees with an earlier speculation by Roby and Lambert that upward diffusion may totally deplete the surface N in HgMn stars. The second result is a surprise. If N is indeed 5 times less abundant relative to the sun in the 4 supposedly normal stars studied, then the UV N I lines could provide a very sensitive test of abundance anomalies in the "normal" sharp-lined B and A stars. If non-LTE effects are present, the effect on both sets of stars should be similar and so we can still conclude that the N in the HgMn stars is depleted by at least factors of 30-100 relative to the standard stars.

69.09
Peculiarities among MR Classifications of 51 Early A-Type Stars above the Galactic Plane
C. J. Corbally (Vatican Obs.) and R. O. Gray (Appalachian State U.)

In a search for evolved lambda Bootis stars, reticon spectra were obtained for 51 apparently early A-type stars at high galactic latitudes. These stars were selected from unpublished Strömgren photometry by A.G.D. Phillips, and are characterized by small mi and relatively large c1 chromatic indices. The spectra of all 51 stars were classified on the MK system. Eighteen proved to be normal dwarfs and subgiants, while the rest showed peculiarities characterized of photospheric field blue stragglers, lambda Bootis, silicon Ap, and metal-weak stars. Two are good evolved-lambda-Boo- tis candidates, and will be further investigated with higher S/N spectra. These classifications will be combined with Strömgren photometry to derive the galactic distribution of these stars.