ratios can be derived from the DDO photometry. Based on this index, the CN strengths of stars in M67 were found to be comparable to typical field K-giants and weaker than the Hyades giants. Additional calibrations of DDO photometry combined with UBV photometry make it possible to derive the reddening and distance modulus of an individual giant star. Using this procedure, the mean values obtained for the giants in M67 are \( E(B-V) = 0.05 \pm 0.01 \) and \( M - 9.33 \pm 0.14 \). These values are in good agreement with the results of Eggen and Sandage (1964, Astrophys. J., 140, 130), thereby giving indirect support to their conclusion that the stars of M67 have an ultraviolet excess relative to the Hyades. Thus, the results of broad-band and intermediate-band photometry do not support the hypothesis that M67 is supermetal-rich (Spinrad and Taylor, 1969, Astrophys. J., 157, 1279).

02.03.05 A Q-method for Color Excesses of Classical Cepheids. S. B. Parsons, Warner & Swasey Obs., Case Western Reserve Univ. (now at Univ. of Texas), and R. A. Bell, Univ. of Maryland - We have computed synthetic spectra between 3000 and 6800 \( \AA \) from Parsons' (1969 Astrophys. J., Suppl. 18, 127) model atmospheres in order to study the effects of several parameters on photometric indices for F and G supergiants. In the Stebbins & Kron 1964 six-color system (Astrophys. J., 159, 424), one particular combination

\[
Q_1 = \frac{(V-G) - (E(V-G)/(G-I))}{(V-G)}
\]

is found to have a coefficient \( E(V-G)/(G-I) = 0.86 \) which is almost independent of the intrinsic energy distribution and of the amount of reddening. The model atmospheres predict that a plot of \( (V-G) \) vs. \( Q_1 \) should give a nearly linear relation affected little by changes in gravity and in microturbulence or composition. Six-color observations of classical Cepheids confirm this: Each Cepheid (except \( \epsilon \) Car) goes back and forth along a single curve, with no looping. Vertical shifts in this plot yield very accurate relative color excess values, and the shift to the model atmosphere results, plus a reliable transformation, gives absolute values of \( E(B-V) \) in the UBV system. These values confirm the earlier work by Parsons (1971 Mon.Not. Roy.Astron.Soc. 152, 121) and average smaller than those obtained by most other workers. The method is also applicable to non-variable stars.

02.04.05 The H and K Absorption Features as Luminosity Indicators For MK Classification. T. E. Lust, Washington State University, I. Furenlid, Kitt Peak National Observatory, J. H. Lust, Washington State University - The H and K absorption lines of Ca II are found to be good indicators of luminosity on classification dispersion spectograms for the spectral range F0 to K2. The cores of these lines appear narrower in dwarf stars than in more luminous stars of the same spectral type. The wings appear widest in supergiants. Line profiles of H and K computed from LTE model atmospheres are in qualitative agreement with the observations. On classification dispersion spectograms which are well-exposed at H and K, the use of this effect as a luminosity indicator greatly facilitates luminosity classification.

02.05.05 Ca II K Line Reversals in Stellar Spectra. Dennis R. Bollans and Herbert A. Beers, N.M. State Univ. - Flux profiles of the core of Ca II K are calculated from kinetic equilibrium theory, assuming complete redistribution of photons in the line. Several simulated stellar chromospheric-photospheric models are used in order to examine their effect on the character of the central reversals. We find that certain combinations of line parameters, turbulent velocity models and the outward rising temperature gradients produce flux reversals that are moderately sharp at the K2 - K1 transition. We evaluate these reversals with respect to photographic interpretation and find that photographic effects can create the visual illusion of increased sharpness and that the character of the reversals as they appear on photographic spectra can be consistent with theoretical predictions.

02.06.05 Discovery of Chromospheres in Early A Stars. J. L. Linsky, R. A. Shine, T. R. Ayres and F. Praderie, Joint Institute for Laboratory Astrophysics - High spectral resolution photoelectric profiles of the Ca II H and K lines have been obtained for Vega (A0 V), Sirius (A0 V), and Deneb (A2 Ia) using the Kitt Peak Solar Telescope. The K line in Deneb appears to exhibit a double reversal in its core similar to the solar profile, whereas the other stars do not. The Vega H line profile clearly exhibits an emission peak in its core. The H lines in Sirius and Deneb show weak central emission above the noise. We interpret the K line emissions in Deneb and H line emission in Vega as manifestations of chromospheres in these stars, indicating that chromospheres exist in stars as early as A0. These chromospheres may or may not be qualitatively similar to the solar example. We interpret the existence of core emission in the Vega H line as due to the thermalizing effects of collisional excitation and interactions with the H\(_\beta\) line wing which appears in the Ca II line source function as continuous opacity. In the chromosphere of Vega collisional excitation alone of the Ca II K line is insufficient to produce any emission. Deneb may show emission in K but not H because the star is cooler and H\(_\beta\) narrow. Since Vega and Sirius are very similar in \( T_{\text{eff}} \) and \( g \), the apparent