ABSTRACTS

35.06.05 A Model for the Chromosphere of Arcturus. T. R. Ayres and J. L. Linsky, Joint Institute for Laboratory Astrophysics. We propose a one-component model for the chromosphere and upper photosphere of Arcturus (a Boo, K2 IIIp) consistent with Griffin's profiles of the Ca II H, K, 8498, 8542, and 8662 Å lines, as calibrated by Willstrop's narrow-band photometry. The upper photosphere temperature distribution is constructed from the run of radiation temperature with wavelength in the broad damping wings of the K-line using a semi-empirical method developed by Shine. The chromosphere model is based on the Ca II lines and calibrated profiles of Mg II h and k from Copernicus observations of Arcturus. We adopt a surface gravity of 50 cm/sec² and C, N, O, and metal abundances one-third of Lambert's solar values. We show that the semi-empirical upper photosphere model suggests (1) the effective temperature of Arcturus is probably T_eff = 4000 ± 100K and (2) the photosphere of Arcturus may be in radiative equilibrium (including the effects of line blanketing) up to the temperature minimum region.

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35.07.05 On The Enhancement Of Ultraviolet Opacities In Peculiar A-Type Stellar Atmospheres. Saul J. Aidelman, John W. Fowler, and David E. Leckrone, Goddard Space Flight Center. In the investigation of the flux distributions and photometric variability of Ap stars as observed both with OAO-2 in the ultraviolet and with ground-based instruments, we have calculated heavily line-blanketed model atmospheres with metal line opacities enhanced by factors ranging from 3 to 200X by use of a Goddard code FKGTM (Fowler, J. W., 1972, GSFC Publ. X-670-72-303). The models were calculated for effective temperatures 11000K, 12000K and 13000K at log g = 4.0 and for 12000K at log g = 3.0. The enhanced opacity atmospheres predict flux distributions qualitatively similar to those observed for Ap stars from the vacuum ultraviolet through the visible (Leckrone, D. S. 1973, Ap. J., 185, No. 2). Longward of 3500Å they resemble line-blanketed model atmospheres for normal main-sequence stars with hotter effective temperatures. In the ultraviolet they are flux deficient and possess flux distributions which roughly mimic in shape those of cooler normal atmospheres. Variations of predicted emergent flux as a function of metal line opacity enhancement factor at various wavelengths are similar in nature to the observed photometric variations of Ap stars (e.g., Holmberg, M. R. 1973, Ap. J. 179, 527). The diminution of vacuum ultraviolet flux is accompanied by brightening in the blue-visible while the emergent flux in the vicinity of 3000Å remains constant. We emphasize the importance of line absorption by iron peak and rare earth species as a major ultraviolet opacity source in Ap stars.

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35.08.05 Search for rapid line variability in peculiar A stars. M. Breger, E. Pranz and W. Williams, Univ. of Texas at Austin. Because of various reports in the literature about rapid variations of hydrogen and calcium lines of Ap stars, over 700 photoelectric hydrogen and calcium profiles have been obtained with a high time resolution. The following Ap stars were investigated: ε Uma, 73 Dra, δ Dra, 4 Cyg and HD 221568, ε Ser (Am), ε Cyg (A2Ia) and δ Del were also studied. No line profile variations were found, and the computed equivalent widths of the Hβ line were constant to 2% or better. For ε Uma, a very bright star, the Hα equivalent widths were constant to 0.2% during the time of observation. This study sets strong upper limits on any rapid line variability in the Ap stars observed.

35.09.05 Effects of Departures from an LTE Ionization Equilibrium on Ap Star Spectra. J. C. Evan & D. C. Wenzelbrand, Kansas State U. We have considered the departures from LTE in the ionization equilibrium of the elements Si, Ca, Cr, Fe, and Eu for two A-type model atmospheres (8000K and 10000K; log g = 4.0; solar abundances). Significant departures from LTE are found by using ultraviolet radiation temperatures instead of the local electron kinetic temperature in the Saha equation. Thus radiative ionizations are assumed to dominate over collisional ionizations with the photoionization being dominated by ionization from the ground state. We then showed by detail calculations of the equivalent widths of neutral and singly ionized lines of these elements that abundances determined assuming LTE may be too small, in some cases by as much as a factor of 100. However, for many of the cases considered, the LTE approximation is an adequate assumption for determining the ionization equilibrium. In certain cases, the ultraviolet radiation field is strongly dependent upon the abundances of the opacity sources carbon,