ment. HD33232 and ι Delphini, which have similar metallic-line spectra, show the effect of dilution in the low population of the Si II and Mg II non-metastable levels compared with the population of the metastable levels of Fe II. A dilution factor $W \sim 10^{-2}$ is indicated for radiation longward of the Lyman limit; this is in agreement with the geometrical dilution factor suggested by the line profiles. The ultraviolet radiation beyond the Lyman limit is degraded into long wave-length radiation in its passage through the shell; the absence of shell lines from the metastable helium levels indicates that for 20 volt radiation $W < 10^{-5}$.

The electron density in the shells lies between 10^{10} and $10^{12}/\text{cm}^3$. The total number of hydrogen atoms lying in a cm^2 column of the shell above the photosphere is between 10^{22} and 10^{24} . The shells are estimated to have a mass of about 10^{24} gm.

The shell absorption spectrum of HD195407 consists of lines originating from the 2^1S and 2^3S metastable levels of helium and can be completely explained as originating in a highly ionized shell immersed in the photospheric radiation field geometrically diluted by a factor of 20.

The line profiles obtained for ι Delphini show no differences depending on the excitation potential of the lower level. There is however a striking difference between the profiles of the Fe II lines on the one hand and the Ti II and Cr II lines on the other. The Ti II lines are approximately 20 per cent wider than the Fe II lines and while the Fe II lines are essentially symmetrical the Ti II lines show a pronounced asymmetry; the red wing is considerably stronger than the violet one. The profiles of Cr II lines are similar to those of Ti II.

The colors of all three stars are normal for the spectral types of the underlying stars.

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Stewart, John C. The atmosphere of HD 135485.

Mount Wilson coude plates of the peculiar B star HD 135485, a sharp-line dwarf showing abnormally strong helium lines, have been analyzed by means of simple model atmospheres. Adoption of Michard's "Planck mean" opacity, including the hydrogen and helium continua but neglecting electron scattering, yields a dimensionless form of the atmospheric structure equations. Three observable quantities—Balmer line widths, Si III/ Si II ratio, and helium line

strengths—then serve to determine the surface gravity, boundary temperature and helium abundance. The results, compared with those derived for α Scl by the same method, place HD 135485 about one magnitude below the main sequence at B6 with a helium abundance ten times normal. Curves of growth for C, N, O, Mg, Si, and S yield relatively normal abundances except for a tenfold Mg deficiency.

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Underhill, Anne B. The continuing variations in the spectrum of 48 Librae.

Data is presented showing that the radial velocity of the shell of 48 Librae has become increasingly negative since 1951. In 1955 the radial velocity from the absorption cores of $H\gamma$ and $H\delta$ was -50 km/sec, while that from the Fe II lines was -70 km/sec and that from the lines of Si II, Ti II and Fe I was -85 km/sec. These observations are comparable to those of Merrill in 1936 and 1938, and indicate that a similar disturbance is now occurring. The spread in velocity between lines from different atoms and ions correlates with the strength of the emission wings of the various features in the sense the stronger the emission, the more positive the velocity of the absorption feature. These observations may be interpreted to mean that the outer parts of the shell are moving away from the stellar surface more slowly than the inward parts.

The V/R variation of the emission features at the hydrogen lines has continued since 1950, and it is consistent with the interpretation of an absorption core moving with essentially the velocity of the absorption-shell spectrum across a stationary broad emission feature. The broad wings of the $H\alpha$ emission have not changed appreciably in strength or shape during the last five years although the absorption-line shell has changed in velocity from about $+25$ km/sec to -85 km/sec.

The intensities of 100 absorption lines have been measured each year. Generally speaking, the metallic absorption lines of the shell have weakened somewhat erratically by about 30 per cent from their maximum strength in 1951. The lines Mg II $\lambda 4481$ and Si II $\lambda \lambda 4128-30$ are now about 60 per cent as strong as in 1951.

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