This hypothesis still seems very artificial. No emission in the Balmer lines ($H\beta$ to the Balmer limit) has been observed, and the Balmer lines are in fact quite strong and deep. Further, from a theoretical point of view, we must expect to have the hydrogen mixed with the metals; in such an atmosphere, any possible emission lines would disappear at any appreciable optical depth within the atmosphere, and the mean intensity in a hydrogen line would be the black-body value.

Some unknown type of physical process must be invoked to explain the large turbulence and low electron pressure in τ Ursae Majoris. At present, true variations of abundance seem the most probable explanation of its spectrum. It is rather interesting that the supergiant ρ Puppis also seems to have a slight tendency for abnormal weakness of Mg , Sc , V ; however, Zr is of normal abundance, unlike τ Ursae Majoris; Eu II is apparently abnormally strong in both stars.

Quantity	τ U Ma	ρ Pup	θ U Ma	α C Mi
$\log v$	+5.60	+5.70	+5.44	+5.46
Γ/γ_{el}	1.5	1.2	1.7	1.4
Excitation Temp.	5500°	5300°	5100°	5200°
$\log \kappa_p'$	-1.62	-1.36	-1.00	-1.18
Ionization Temp.	5900°	6100°	5800°	5800°
$\log P_e$	0.0	+0.4	+0.6	+0.5
$\log P_0$	+2.7	+3.0	+3.9	+3.6
Adopted M_{sp}	+3	-2	+1.5	+2.5
Type (Yerkes)	F6 II+A3	F6 II	F6 III	F5 IV

Yerkes Observatory,
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Joy, Alfred H. Emission lines in stellar spectra.

Although occurring in the spectra of few stars, emission lines play a leading role in studies of stellar atmospheres and the physical conditions necessary for radiation by highly ionized atoms. They make it possible to observe separately different strata and to learn something of their location and motion.

The principal groups of bright line stars together with the approximate number known are listed below in order of decreasing temperature. On account of their cataclysmic nature the novae were omitted.

Group	No. of Stars
Wolf-Rayet stars	80
Combination spectra	20
P Cygni stars	20
Be and Ae stars	700
Eclipsing stars	20
W Virginis variables	5
SS Cygni variables	40
T Tauri variables	12
RV Tauri variables	30
Stars with bright H and K	150
Stars in dark lanes	40
Faint M dwarfs	40
Long period variables	3000

Emission lines are found in the spectra of both giants and dwarfs, and in all spectral classes. The physical conditions under which the lines are produced must vary widely in different groups. The factors involved are very complex and theories as to the method of radiation, except for the sources which are clearly exterior envelopes, have not received universal support.

Considerable success has, however, been achieved in problems of stratification and in locating the relative levels of different strata. In the long-period variables the source of radiation of the hydrogen bright lines was definitely proved to be below the reversing layer by identifying numerous absorption lines of the reversing layer within the hydrogen emission.

Emission lines of the Be stars, according to Struve, indicate that the stars are in rapid rotation, while for other groups expanding atmospheres or the ejection of gases are observed. For binary and eclipsing stars gaseous shells and equatorial rings were discovered by the study of emission lines. H and K of Ca II without other emission are bright on Mount Wilson spectrograms of 150 stars, both giants and dwarfs. The bright lines of highly ionized atoms, especially of iron and neon, in the spectra of the stars with combination spectra were observed by Merrill and by Swings and Struve. In this respect these stars resemble the novae, but unlike the novae they also show at times the TiO molecular bands.

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Strömgren, Bengt. Problems of stellar atmospheres.

A brief summary was given of the work done in the field of model stellar atmospheres after the discovery by Wildt of the importance of the continuous absorption by the negative hydrogen ion. The approximate methods used to determine theoretically the atmospheric structure, the intensity distribution in the continuous spectrum, and the absorption line spectrum were discussed, and the general agreement between theory and observation illustrated. Work on high-temperature stars by Aller and Rudkjöbing, following that of Unsöld on τ Scorpii, was briefly mentioned.

The recent quantum-mechanical calculations by Chandrasekhar of the continuous absorption coefficient of the negative hydrogen ion as a function of wave length have opened the way for model atmosphere work of increased accuracy. A numerical method was described for the