its emission is unstable. At this point, T_e increases abruptly until stable emission from neutral hydrogen balances the energy input. (2) Neutral hydrogen emission becomes unstable when hydrogen becomes sufficiently ionized. At this point, T_e again increases abruptly until stable emission from *He* II balances the energy input. (3) *He* II emission also becomes unstable at sufficient ionization, and T_e increases abruptly to a coronal value where emission from multiply ionized metals predominates.

A model of the chromosphere derived from High Altitude Observatory eclipse data[1] shows good agreement with our conclusions based on thermal stability considerations.

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[1] R. G. Athay, paper presented at Princeton meeting of AAS, April 1955.

PECULIAR FEATURES IN THE SPECTRUM OF EPSILON AURIGAE

(*Abstract*)

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Twenty-five high-dispersion spectrograms of ε Aurigae obtained by O. Struve with the 100-inch telescope since 1950 and 14 spectrograms obtained by staff members of the Mount Wilson Observatory between 1932 and 1945 have been measured for radial velocity. These 39 spectra cover the interval from the end of the 1928–30 eclipse to the beginning of the present eclipse. An extensive comparison of the spectrum of ε Aurigae with that of α Persei showed that low-intensity lines of all neutral elements and of most ionized elements are either greatly weakened or absent in the spectrum of ε Aurigae. This fact made it possible to pick 57 lines between 3600 and 4600 that were believed to be free of blends and for which laboratory wave lengths could be used.

About ten of these 39 spectra gave radial velocities that lie within 1 or 2 km/sec of the calculated velocity curve. Radial velocities from the other plates departed from the velocity curve

by —15 to +10 km/sec with about twice as many negative as positive departures. Earlier observers have suspected periodic radial-velocity variations of 100 to 200 days; this series of observations, however, is too scattered to show any such period.

Other spectral features which are well exhibited on these plates are the striking changes (presence or absence) of the red or violet wings of certain strong lines; changes in the sharpness or the extreme width of the weaker lines, particularly those of *Fe* I; and changes in the differential velocity shifts between strong and weak lines. Attempts have been made to correlate these changes with the variations in radial velocity. The narrow absorption cores of *Ca* II, noticed independently by Adams and by Struve, are frequently present and always have a velocity of about —27 km/sec regardless of the phase.

On the last two plates, taken April 5 and 6, 1955, many of the strong lines such as *Sc* II 4246.8 are shown to have sharp red edges or red cores and diffuse violet wings, which are characteristic of the beginning of the eclipse.

EVOLUTION OF SIRIUS

(*Abstract*)

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The evolution of a gaseous configuration of mass 2.291 times the solar mass is followed as a track in the H-R diagram. The initial configuration, which defines the zero of time, has a homogeneous chemical composition of 74 percent *H*, 25 percent *He*, and 1 percent heavy elements by weight, and an effective surface temperature of 4000°.

The star contracts, moving upward and to the left into a region of higher temperature, and increases in luminosity until thermonuclear reactions begin to become important and a convective core appears. The star then decreases in luminosity, the effective tem-