3d-p, 3d-f, has been made using Hartree's¹ wave functions for the bound electron and wave functions found by numerical integration using Hartree's field but omitting exchange for the unbound. The 4p-d and 3d-f continua are so large that following the arguments of Bates and Massey² one may have confidence that the inclusion of exchange would not appreciably affect either the magnitude or the variation with ϵ . On the other hand, the three remaining continua are so small that the present work can only be considered as establishing their smallness but neither their magnitude nor their variation. Considerable deviations from hydrogenic character are noted in the total f -values for the continua. A single $df/d\epsilon$ value calculated using wave functions derived from a Kramers field has again been found to lie between the values obtained with the self-consistent field with and without exchange.

1. *Proc. Roy. Soc.* **164** A, p. 167, 1938.

2. *Proc. Roy. Soc.* **177** A, p. 329, 1941.

*Haverford College,
Haverford, Pa.*

Greenstein, Jesse L. Spectra of diffuse nebulae.

A program of observation of the spectra of various galactic nebulae has been started at the McDonald Observatory. This paper reports on spectrophotometric observations of the continuous emission in the Orion nebula. The color temperature of this continuum is found to be near 12,000° on both sides of the Balmer limit. The emission discontinuity is 1.6 mag. If the energy distribution in the Balmer continuum is interpreted as re-combination emission, its electron temperature is about 60,000°. This excessively high value is in contradiction to electron temperatures derived from the forbidden line spectrum, and from the hydrogen emission line intensities near the series limit. If we assume that the nebula is optically thick at wave lengths less than 3646 Å however, an electron temperature near 12,000° can be derived. Suggested observational tests of this hypothesis include the absence of filamentary structure in direct photographs taken in the ultraviolet.

Another very interesting observation is the apparent existence of a "double Balmer jump" in emission. The resolving power of the spectrograph is such that the hydrogen lines blend at about the twentieth series member. The mean intensity of the lines near this point is about one-half the intensity in the continuum at the series limit. This observation can be explained as arising from the departure of the populations of the

various energy levels of hydrogen from the expected values in thermodynamic equilibrium, in accordance with theories developed by Baker and Menzel.

The opacity of the nebula is ascribed to the nearly complete metastability of the 2²S level of hydrogen. The computation of the amount of hydrogen required gives a mass of about 10☉ for the nebula.

*Yerkes Observatory,
Williams Bay, Wis.*

Herget, Paul. The orbits of comet 1925 II (Schwassmann-Wachmann) and comet 1943a (Oterma).

The orbit of Comet 1925 II (Schwassmann-Wachmann) has been determined from 54 observations extending from 1934 to 1944 (p.e. = $\pm 0''.85$ from 12 normal places) and reliable ephemerides can be prepared for years to come.

Approximate perturbations of Comet 1943a (Oterma), based on the elements of *Harvard Announcement Card* 698, were carried backward to see what the effect of the close passage to Jupiter in 1937-38 had been. These indicated that the comet had approached to within less than 0.1 astr. units of Jupiter, and that very accurate starting elements would first be needed to make the computations reliable. Unfortunately, the comet was 1° to the north of the region around Jupiter surveyed by Nicholson in 1938. It is urged that observations be made at opposition and at both quadratures so as to provide the most accurate elements. Another close approach to Jupiter will occur in 1961.

*Cincinnati Observatory,
Cincinnati, Ohio.*

Huffer, C. M. A photoelectric study of AR Aurigae and RZ Cassiopeiae.

Solutions for these two eclipsing stars have been made from photoelectric observations made at the Washburn Observatory from 1935 to 1942.

The most important results follow:

AR Aurigae. The two components of the system are equal in size ($k = 1$) but are not quite equal in brightness, the difference being 0.15 magnitude, in close agreement with the spectroscopic results. Since the spectral classes are B9, a darkening coefficient, $u = 0.4$, was used for each star. The eclipses are partial. The average residual of a single normal is ± 0.004 magnitude.

RZ Cassiopeiae. The period is variable and the