taken. The advantage over magnetic lenses is clear, chromatic aberration of this type being

$$\frac{\Delta A}{A} \; = \; C . \frac{\Delta \Phi_0}{\Phi_0},$$

where C is about 0·8.

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Absorption Band Spectrum of S_2 in the Schumann Region

While the main band-systems of the molecules O_2, S_2, Se_2 and Te_2 of the sixth periodic group have been the subject of numerous publications, there is little known about the systems of these molecules lying in the far ultra-violet. In all cases such systems have been found in absorption, but they have been analysed only partially for their complex structure. The absorption bands of Te_2 and Se_2 between 2500 and 1950 A. and 1950 and 1750 A. respectively have been photographed by Choong Shin-Piaw[1]. His analysis is incomplete and violates the empirical rule of Mecke–Birge. Choong Shin-Piaw believed all the molecules Te_2, Se_2 and S_2 to show the same peculiarity, and referred to the results published by Wieland, Wehrli and Miescher[2] on S_2. Yet these authors emphasized the provisional character of their interpretation.

We have therefore reinvestigated the S_2-bands between 1600 and 1900 A. by means of a 1-metre vacuum grating spectrograph (dispersion 8 A. per mm.). The continuum was furnished by a Lyman explosive discharge through a quartz capillary. Within the accuracy of measurement, which for most of the sharp bands is better than ± 1 cm.$^{-1}$, all the recorded bands can be arranged in two systems which we will call C and D.

The bands of system C are degraded towards shorter wave-lengths and appear to have several heads up to six, the intensity of which depends strongly from the vibrational quantum number v'. By arranging the strongest head of each band in a scheme, one gets for the wave-numbers of the heads the expression :

$$\nu = 55598 \cdot 2 + 830 \cdot 2 \; (v' + \tfrac{1}{2}) - 3 \cdot 75 \; (v' + \tfrac{1}{2})^2 - 725 \cdot 1 \; (v'' + \tfrac{1}{2}) + 2 \cdot 85 \; (v'' + \tfrac{1}{2})^2.$$

The system thus consists chiefly of the two vibrational progressions $v' = 0$ and $v'' = 0$. The vibrational constants of the lower level are in good agree-

ment with the data of the ground-state of S_2 given by Olsson[3] ($\omega_e'' = 725 \cdot 8$, $\omega_e'' x_e'' = 2 \cdot 85$). The high intensity of the bands points to a transition between states of like multiplicity. The ground-state being $^3\Sigma_g^-$, the upper state might then be of the $^3\Sigma_u^-$ or $^3\Pi_u$ type. Considering the number of heads and the multiplet separation, which is larger than in the ground-state, $^3\Pi_u$ is perhaps more probable.

System D, situated at shorter wave-lengths, is about of equal intensity, but its aspect is more complex. There are apparently three groups of bands (a, b, c in the accompanying reproduction) which are observed several times. Each group is formed by three strong heads. The groups being arranged in a scheme, the vibrational constants turn out to be nearly the same for all the heads. From the strongest heads on the more refrangible side of each group, the following constants are derived :

Group a		Group b		Group c	
ν_e =	58515·1	ν_e =	58707·2	ν_e =	58976·8
ω_e' =	794·2	ω_e' =	793·8	ω_e' =	793·7
$\omega_e' x_e'$ =	4·00	$\omega_e' x_e'$ =	4·00	$\omega_e' x_e'$ =	4·00
ω_e'' =	724·4	ω_e'' =	724·6	ω_e'' =	725·1
$\omega_e'' x_e''$ =	2·85	$\omega_e'' x_e''$ =	2·85	$\omega_e'' x_e''$ =	2·85

Here again the lower level is identical with the ground-state of S_2. As an arrangement of the groups or systems in series of electronic states does not seem possible, no traces of higher series members being recorded, the three groups must be regarded as belonging to one and the same system showing atom-like separations. This analysis of system D departs from the one given earlier. The bands being shaded towards the violet, the vibrational frequency of the lower level is expected to be smaller than that of the upper one. This is actually the case.

The details of this investigation and a fuller discussion of the results will be given in a later paper to appear in the Helv. Phys. Acta.

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Nov. 21.

[1] Choong Shin-Piaw, Thèse, Paris (1937).
[2] Wieland, K., Wehrli, M., and Miescher, E., Helv. Phys. Acta, 7, 843 (1934).
[3] Olsson, E., Thesis, Stockholm (1938).

Energy of the Ground-State of Helium-like Atoms

The purpose of the present note is to suggest that the discrepancy between the measurements of helium-like spectra made by F. Tyrén and by H. Flemberg[1], on one hand, and the theoretical calculations made by E. Hylleraas (non-relativistic) and by me[2] (relativistic corrections) on the other hand, may possibly be due to the same reason which causes the discrepancy between theory (Dirac's fine-structure formula) and experiment (Lamb and Retherford[3]) in the hydrogenium spectrum.

The possibility of removing this latter discrepancy by taking into account the interaction of the electron with the radiation field has been the subject of discussions at a conference on Shelter Island
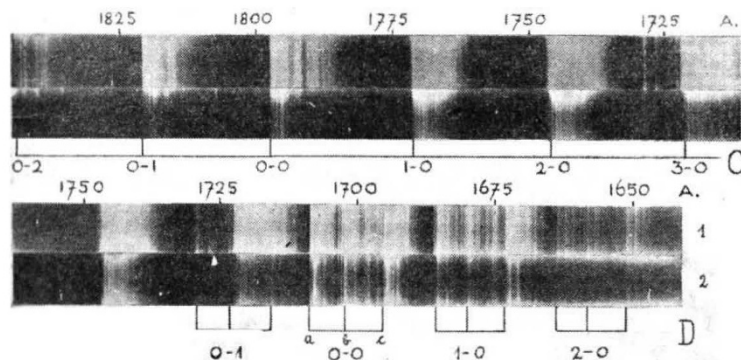
ABSORPTION BANDS OF OVERHEATED SULPHUR VAPOUR BETWEEN 1650 AND 1850 A.
1. Saturation pressure = 0·5 mm. (t_s = 165° C.), temp. of oven = 630° C.
2. ,, ,, = 10 mm. (t_s = 245° C.), ,, ,, ,, = 630° C.