Physics. — "*The red lithium line*". By Prof. P. ZEEMAN.

Only those spectrum lines, which belong to pair series or to threefold series, are resolved by magnetic fields into complicated types, i. e. not into triplets. The cause of the complicated resolution is intimately connected with the presence in the spectrum of natural groups of two or three lines (series-doublet or series-triplet). It has nothing to do with the distribution of lines in series, for there exist connected series of lines, which are resolved into triplets by magnetic fields [1]).

Recently [2]) PASCHEN and BACK discovered that lines belonging to a very close series-triplet or series-doublet, influence each other in a very peculiar manner. Under the action of a sufficiently strong magnetic field we might expect to observe a superposition of the types of separation of the compounds, but contrary to expectation a normal triplet is seen.

Among the lines investigated by PASCHEN and BACK are also the lithium lines. Many physicists by analogy with the other alkali metals and their series expect that the lithium lines are very close pairs.

Sometimes the opinion has been expressed that the laws for the other alkali metals do not apply to lithium. This then might explain the result obtained by VOIGT [3]) that the red lithium line (6708) contrary to PRESTON's rule is resolved by a magnetic field into a triplet, which is at least nearly normal. The measurements of BACK [4]) for four lithium lines prove that within the limits of the errors of observation the separation has the normal value.

It is therefore very interesting to know whether the lithium lines are really very narrow pairs or not. In the first case PASCHEN and BACK are right placing the lithium lines in parallel with the other doublets they investigate, but they also indicate 6708 Li as a "theoretische Doppellinie", because it has never been resolved.

I have been able to do this, using the method given in the foregoing communication.

As glass is strongly attacked by heated lithium it is necessary to place a small iron or copper vessel inside the glass tube; the life of the tube is then at least increased.

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[1]) LOHMANN, Physik. Zeitschr. **9** p. 145, 1908; PASCHEN, Ann. d. Phys. **30**, 746, 1909, **35**, 860, 1911, ROYDS **30**, 1024, 1909.

[2]) PASCHEN u. BACK, Normale u. anomale ZEEMAN-effekte, Ann. d. Phys **39**, 897, 1912.

[3]) VOIGT, Physik. Zeitschr. **6**, 217, 1912.

[4]) Anhang BACK. l. c.

The observations were made in the second order spectrum of a large ROWLAND grating.

The red of the second order is superposed on the blue of the third order so that the line 6708 is seen in the absorption spectrum as a blue line. With small vapour density the line resolved into two components; this proves that the conclusion drawn from the analogy of the spectrum series of the alkali metals is true. That component of the double line which has the smaller wavelength seemed to be the most intense. The distance between the components could only be measured in a roundabout manner by means of a divided scale in the eye piece of the spectroscope. This measurement gave for the distance between the components about one fourth of an Ångström unit. From the empirical rule that in the case of the elements of the same family the frequency differences of the pairs are nearly proportional to the square of the atomic weights, it would follow that for lithium this distance ought to be $6 \times \frac{7^2}{23^2} = 0{,}6$ Ångström units. The observed distance is much smaller.

Physics. — "*Some remarks on the course of the variability of the quantity b of the equation of state.*" By Prof. J. D. VAN DER WAALS.

(Communicated in the meeting of January 25, 1913).

In my preceding communications I came to the conclusion that the differences which occur in the normal, not really associating, substances are to be ascribed to the different value of the quantity $\frac{b_g}{b_{lim}}$. As this quantity is greater, both f and s are greater, viz. $\frac{f-1}{3} = \frac{b_g}{b_{lim}}$ and $s = \frac{8}{3}\sqrt{\frac{b_g}{b_{lim}}}$. The deviation exhibited by the law of corresponding states, is also a consequence of the different course of the quantity b. Thus it becomes more and more clear that everything that can contribute to elucidate the cause of the difference in this course must be considered of the highest importance.

If the course of b is traced as function of v, a line is obtained which runs almost parallel to the v-axis with great value of v, and approaches asymptotically to a line parallel to the v-axis at a distance b_g from the latter. Not before $v = 2b_g$ does an appreciable difference begin to appear, and has the value of b descended to e.g. about