XIII. Note on the focometry of a concave lens

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To cite this article: J.A. Tomkins A.R.C.Sc. (1908) XIII. Note on the focometry of a concave lens , Philosophical Magazine Series 6, 15:85, 198-200, DOI: [10.1080/14786440809463755](https://doi.org/10.1080/14786440809463755)

To link to this article: <http://dx.doi.org/10.1080/14786440809463755>

Published online: 16 Apr 2009.

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even if there were no other objections. Hence it becomes necessary to examine systems with more than one ring.

§ 29. The effect of the presence of other rings besides the one considered is twofold :—(1) Each ring contributes a term to the resultant specific moment of the system, so that the second terms in (36) and (38) must be replaced by sums of terms, one for each ring. (2) Each ring modifies the controlling field of every other ring, partly on account of its own steady motion, partly on account of its disturbance ; the result is that the quantities $T - \frac{P}{\rho}$, S and R in equations (24) and (25) are altered. In particular $T - \frac{P}{\rho}$, which is zero in our models, becomes negative, and the rings become linked together. In consequence the total moment due to all the rings is by no means the sum of the moments they would contribute if independent of each other. When the linking is very loose the total moment is paramagnetic, but less than the sum of the separate moments, possibly less than that of a single ring ; so that it may very well happen that the resulting moment of the system of sphere and rings is negative for certain arrangements of rings. The problem is, however, too complicated to be pursued further here, but it does suggest that magnetic properties are functions of the structure of the atom, depending on the number and arrangement of its electrons, just as directly as do the atomic weight and atomic volume.

XIII. *Note on the Focometry of a Concave Lens.*

By J. A. TOMKINS, A.R.C.Sc. (Lond.).*

IN a recent number of the *Philosophical Magazine* † Prof. Anderson described a simple method for the determination of the focal length of a concave lens in which f is calculated from observed values of u and v .

The following methods, in which the focal length of a concave lens is measured directly, occurred to the writer after reading Prof. Anderson's article. They correspond to two well-known methods which are employed in the case of a convex lens. They do not appear, however, to have been previously described.

I. Light from the cross-wires C (fig. 1) of an optical bench is brought to a focus at F by means of a convex lens L_1 . The concave lens L is then placed in the position* shown and

* Communicated by the Author.

† *Phil. Mag.* June 1906.

adjusted until the rays reflected by the plane mirror M , passing through the lenses again, form an image of the cross-wires on the screen carrying them.

Fig. 1.

F is then at the principal focus of L and the distance between L and F is the focal length.

II. As in the first method, light from the cross-wires C (fig. 2) is brought to a focus at F . The concave lens L is

Fig. 2.

then inserted and adjusted until an image of the cross-wires is formed in the focal plane of the telescope T , which has been previously focussed for parallel rays. The distance between L and F is the focal length as before.

III. In this method a distant object is viewed through the concave lens L by means of the telescope T (fig. 3). The

Fig. 3.

latter will therefore be focussed as for an object at F , the principal focus of L .

To find the position of F , the lens L is removed and a screen S is adjusted until an image of it is formed in the focal plane of the telescope T . As in the previous methods, the focal length required is the distance between L and F .

In this experiment an auxiliary convex lens L_2 may be employed, if necessary, so that F may be brought to within a short distance of the telescope.

Of these methods II. and III. appear to be more accurate than I.

Technical College, Bradford.
Oct. 1907.

XIV. *Notices respecting New Books.*

Recherches sur les Propriétés Optiques des Solutions et des Corps Dissous. Par M. C. CHÉNEVEAU. Paris: Gauthier-Villars. 1907. Pp. 190.

THIS memoir forms the thesis presented by the author for his Doctorate to the University of Paris. It contains the results of numerous determinations of the refractive index and dispersive power of various solutions (aqueous and others), and the conclusions deduced by the author from the results of his experiments. The apparatus employed by him consisted of a modified form of Féry refractometer. It is interesting to note that according to the author's researches there is little to choose between the law of Gladstone and that of Lorentz, although the latter appears to give rather more accurate results when dispersion is taken into account. Students of physical optics will find a great deal to interest them in this valuable contribution to our knowledge of the optical properties of solutions.

Rivista di Scienza. Anno I (1907), No. 1. Bologna: Nicola Zanichelli. 1907. Pp. 192.

THE first issue of this new periodical, which is described as an "International Review of Scientific Synthesis," contains the following articles:—"La mécanique classique et ses approximations successives," by E. Picard; "Zur modernen Energetik," by W. Ostwald; "Problemi di chimica organica," by G. Ciamician; "Il concetto di specie in biologia," by F. Raffaele; "Die natürliche Zuchtwahl," by H. E. Ziegler; "Il carattere delle leggi economiche," by C. Supino; "Impartiality in History," by W. Cunningham; "Questions pédagogiques," by J. Tannery. In addition to these, there are reviews (in Italian) of various scientific works, and of recent progress in various departments of science. The scope of the new periodical, it will be seen, is