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LXXII. An experiment on the interference of light

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as 305 (the weight of the first) is to 90 (the weight of the second) as 108 (the atomic weight of the silver) is to 31·8, instead of 31·6 (the atomic weight of the copper). In like manner, 305 : 92·5 :: 108 (the atomic weight of the silver) is to 32·8 (the atomic weight of the zinc,) instead of 32·5, found by Mr. Faraday. It is evident, then, that the apparatus with a constant current, and consisting only of two pairs, together with the electro-magnetic balance, enables us to find the atomic weights of metals, and to determine the quantities of reduced metal that correspond to a given intensity of current.

LXXII. *An Experiment on the Interference of Light.*

By H. F. TALBOT, Esq., F.R.S.*

I BELIEVE the following experiment to be a new one, and it seems to afford a satisfactory illustration of the theory.

Make a circular hole in a piece of card of the size of the pupil of the eye. Cover one half of this opening with an extremely thin film of glass (probably mica would answer the purpose as well, or better). Then view through this aperture a perfect spectrum formed by a prism of moderate dispersive power, and the spectrum will appear covered throughout its length with parallel obscure bands, resembling the absorptions produced by iodine vapour.

The cause of this phenomenon probably is, that one half of the light which passes through the glass film has its undulations thereby retarded by a certain quantity, which may be called *A*.

Let *L* be the length of the undulation of any coloured ray, which I suppose to be a much smaller quantity than *A*.

Then if we consider the colours in succession, *L* increases progressively from the violet to the red. Consequently the quotient $\frac{A}{L}$ becomes by turns a whole number and a fraction, and then again a whole number, and so on alternately a great number of times. Whenever $\frac{A}{L}$ is a whole number, the two halves of the light agree in the phase of their undulation. But when $\frac{A}{L}$ is midway between two whole numbers, the two portions of light are opposed in phase, and therefore the corresponding colour cannot make its appearance in the spectrum at all; and therefore also a dark band appears in the place it would have occupied.

* Communicated by the Author.