Note on Constant-Deciation Prisms

This content has been downloaded from IOPscience. Please scroll down to see the full text.

1906 Proc. Phys. Soc. London 20 105

(<http://iopscience.iop.org/1478-7814/20/1/306>)

View [the table of contents for this issue](#), or go to the [journal homepage](#) for more

Download details:

IP Address: 139.184.14.159

This content was downloaded on 05/09/2015 at 13:31

Please note that [terms and conditions apply](#).

Then if

d = distance apart of plates,

N = frequency,

V = voltage between plates,

we have

$$V = kd \times N. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (III)$$

An instance of this application has been given already
Another may be added :—

The difference of potential yielded by a Wimshurst machine was measured by charging a Leyden jar, the outer coating being connected to one pole, the inner to the other pole, the poles being kept well apart. The jar was connected with the pair of parallel plates, which were at a distance of 10.5 cms. apart. The frequency of the needle in the field between them was 2.04 per sec. The needle used had a constant (reduced to $d=1$ cm.) of 1300 volts. Applying formula III, we have

$$V = 1300 \times 10.5 \times 2.04$$
$$= 27800 \text{ volts.}$$

The machine, it may be added, was working badly, giving a spark between balls of 2 cms. and 5 cms. diameter respectively, Leyden jars being in, of something less than 1 cm. length.

These experiments were made in the laboratories of the Birkbeck College. I would record my thanks to the Principal for facilities for carrying them out.

V. Note on Constant-Deviation Prisms.

By T. H. BLAKESLEY.*

It appears that any prism of three faces can be made to give a spectrum in which the light, that occupies the centre of the field of view of the telescope at any moment, has undergone passage through the two refracting surfaces of the prism in such a way that its original angle of incidence is equal to its final angle of emergence. This condition, which in the ordinary employment of the prism is associated with minimum deviation, must be described as isogonal passage, the property which has the minimum value being not the

* Read November 10, 1905.

deviation, but the rate of passage across the field of view for a given motion of the prism, to which alone in these instruments motion has to be given to bring different parts of the spectrum into the field, the telescope and collimator both remaining fixed. If any triangle having the angles α , β , γ is adopted as the shape of a prism, the telescope must be set to make one of these angles, say γ , with the line of the collimator. Then the prism being placed in the region between them, a position can be found so that any ray selected will be refracted through one of the sides containing the angle γ , reflected at the side opposite γ , and finally refracted through the remaining side containing γ . On emergence it will be parallel to the telescope, and its passage through the refracting faces will be isogonal. The prism will affect the light to the same degree as one used in the ordinary way, of refracting angle $\beta - \alpha$, would do. The sine of the angle of original incidence is equal to $\mu \cdot \sin(\beta - \alpha)/2$ for every ray occupying the centre of the field of view.

If the prism is turned over but the same angle γ employed, the telescope will remain unaltered but the spectrum will run in an opposite direction to the first. If n similar prisms are piled one upon another, the diameter of the telescope and collimator being large enough to embrace them all, n different parts of the spectrum may be brought into coincidence at the centre of the field of view. Thus such prisms afford an excellent mode of mixing colours. Mr. Blakesley showed the case of two prisms in which the spectra ran in different directions. The top prism was slightly tilted by the insertion of a small piece of silver paper between the prisms. By this means one of the spectra was shifted upward by a small amount, and one could see in the telescope a band, at top and bottom, of the component colours, and in the centre a band of the resulting colours. It was suggested that spectroscopes on this plan could be advantageously employed in measuring the motion on the line of sight of heavenly bodies, as a line brought into coincidence with itself for a terrestrial source in the two spectra would, in the case of such motion, split up into two moving *different* ways in the field of view. It was also explained how such prisms could be placed in trains for increased dispersion.