Methodological Notes

LECTURE DEMONSTRATION OF EQUAL-INCLINATION INTERFERENCE FRINGES

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THE insufficient number of lecture demonstrations explaining the formation of equal-inclination interference fringes and illustrating the operation of the Fabry-Perot interference spectroscope, gives grounds for exchange of methodological experience on these questions, although a communication was published recently on this subject in this journal[1].

We have constructed a demonstration Fabry-Perot etalon, a section through which is illustrated in Fig. 1; a view of this instrument with the illuminator is shown in Fig. 2. We used in the instrument glass plates whose working surfaces were flat within 0.05 μ. The reflection coefficient of the vacuum-coated metallic mirror surfaces was $\cong 0.8$ at an absorption coefficient less than 0.1. The spacer between the plates was a paper ring 0.15 mm thick. The small thickness of the spacer is important in order to broaden the dispersion region of the instrument and, of course, to facilitate its adjustment[2]. The etalon is adjusted in the light from a mercury lamp monochromatized with a filter. The interference pattern is best observed during the adjustment of the instrument with the aid of a small-magnification telescope (3×) or a magnifying loupe. The adjustment is by rotating three screws which draw together the rings A and B of the instrument (Fig. 1).

For the demonstrations we used the OI-18 illuminator for luminescence analysis, with a mercury lamp SVD-120A. In order to increase the illumination of the picture, the outer objective of the illuminator is screwed out and the illuminator was brought as close as possible to the instrument (Fig. 2). If the latter is properly adjusted, then a satisfactory interference pattern is produced on a screen located 5—10 m away, without using a focusing lens, both with and without use of a filter. A photograph of one such picture, obtained at a distance 6.5 m to the screen and covering a screen area 2 × 3 m and part of the wall of the lecture room, is shown in Fig. 3. By rotating the adjusting screw to the instrument during the course of the demonstration it is possible to show the motion of the interference rings and the change of their quality occurring following slight variations of the thickness of the liner between the glass plates of the instrument.

The repeated use of the described setup for many years makes it possible to conclude that it is simple to use and works without failure.

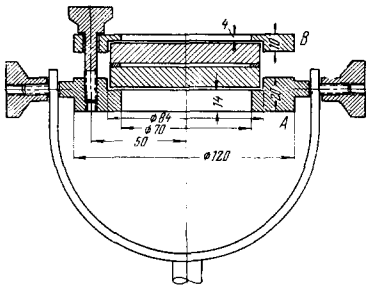

FIG. 1

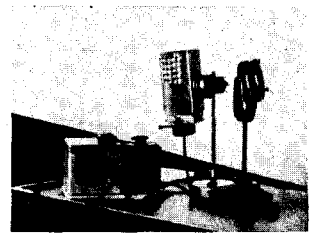

FIG. 2. Photograph of setup.

FIG. 3. Interference pattern ($S \approx 10\ m^2$).

[1] B. Sh. Perkal'skis and V. L. Larin, Usp. Fiz. Nauk 79, 743 (1963) [Sov. Phys.-Usp. 6, 325 (1963)].

[2] S. Tolansky, High Resolution Spectroscopy, N. Y.—Chicago, 1947.