

PROMPT DIAGNOSTICS OF THE CYCLOTRON DEES SHIFT.

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Abstract.

The device for prompt observation of the cyclotron dees shift in vertical and horizontal directions includes gas laser the light of which is reflected from concave spherical mirror fixed on the controlled duant and TV-monitoring system for con-trolling the light reflection shift. The tests on IAE cyclotron showed the sensitivity of the device up to tenth fractions of mm. The transmission of optical information over fibre optics line considerably simplifies the arrangement of construction elements.

I. INTRODUCTION.

Broad-band frequency change of coaxial oscillating lines in cyclotrons with the energy regulated by their heating and other reason can result to displacement of dees at the and this lines up to 2-3 mm. The same displacement of dees takes place and after some profiliation works. Such displacement changes the accelerating conditions and resonance frequency the ion shows work quality and may decrease the cyclotron beam intensity up to ten percents. Due to this reason the prompt monitoring of dees displacement is very useful.

II. OPTICAL MONITORING OF DEES SHIFT.

At Kurchatov IAE cyclotron there was proposed and realized the optical system for prompt and permanent observation dees shift [1]. The device (fig.1) used a gas laser the light of which comes trough collimators and glass window in vacuum chamber to a dee. It is reflected from copper concave spherical mirror fixed at the controlled dee and through the same window goes to a screen. TV-monitoring system is used for observation of the light displacement on the screen. The test of this system on IAE cyclotron showed the sensitivity of the device about 0,1 mm with the distance between the screen and dee about 8m.

The main defects of the present construction are a necessity to work with the straight light beam and along outer optical basis. So to test the medical cyclotron MPC-10 in Kurchatov IAE it was proposed another construction of optic transmitting and receiving tracts (fig.1).

In this construction the gas laser light is transported trough fiber optic line 50 mkm in vacuum chamber. It is focused by focus lens and spherical concave mirror placed at the dee at the

enter surface of fiber optic regular line with dimensions 25x30 mm. This line transports the light from vacuum chamber. Outer ends of two such lines from both dees combined together before TV-camera and operator can see the displacement of two dees ON TV-monitor. Both optic lines - mono and regular - are mounted and have vacuum-tight at flange fixed at vacuum chamber. Such system does not need any additional alignment after its mounting.

The focal length of the lens is 25 mm, curvature radius of mirror is 100 mm, diameter 30mm, the distance between lens and mirror is 140mm.

III. CONCLUSION.

The testing of the model of this monitoring system shows that it is possible to fix dees vertical and horizontal displacement 0,5mm in the range 5mm.

The transmission of optical information through the fiber optic lines considerably simplifies the arrangement of construction elements and increases its reliability.

IV. REFERENCES.

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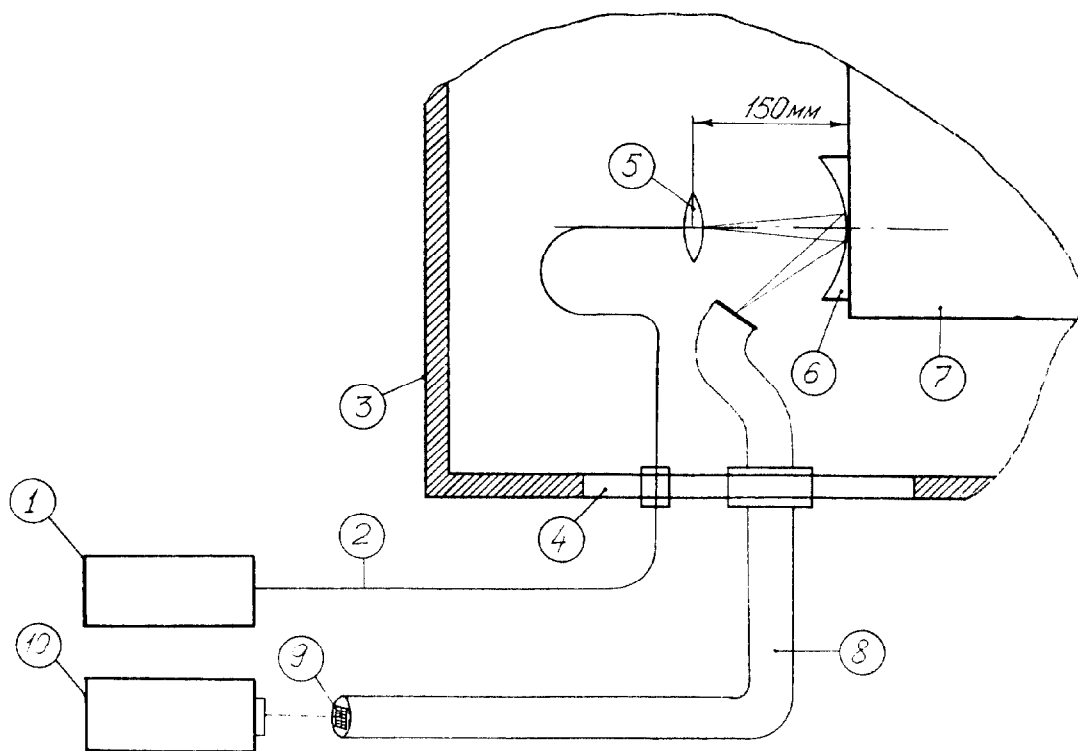


fig. 1. Optical system for prompt and permanent observation dees shift.

1. Gas laser 1-2 mW, 2. Fiber optic line, 3. Cyclotron vacuum chamber, 4. Flange, 5. Lens, 6. Concave copper mirror, 7. Dee, 8. Many-vein regular optic line 25x30 mm, 9. Coordinate netwith image of laser ray, 10. TV-camera, 11. Vacuum tight.