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Determination of Wave Length of Heliy-Neon Laser Light Using Michacelson Interferometer

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Abstract: *We can use a Michelson interferometer to observe interference and determine the wavelength of helium-neon laser light in the experimental classes of optics.*

Key words: *Interference, Michelson interferometer, incident and reflected light*

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Interference is a wave-specific phenomena. It's used to demonstrate that light has wave qualities, among other things. Interference is a phenomena that is employed in the construction of precise measurement tools known as interferometers. Interferometers are sensitive measuring instruments that are extremely accurate. They are used for a variety of purposes. Changes in length, density, wavelength, and so on, for example.

The Michelson interferometer is part of the two-beam interferometer family. These rays of light move in different directions, rotate, and are directed into a new optical component.They are overlapping and merging here. As a result, an interference pattern emerges. When one of these rays' route lengths, that is, the refractive index and geometric path, change, a phase shift occurs in comparison to the unmodified light. As a result, the interference pattern changes, allowing conclusions to be drawn about any change in the refractive index or optical path assuming all other variables remain constant. So, if the refractive index remains constant, we may calculate the difference in the geometric path, such as the change in material size due to heat or electric or magnetic fields. On the other hand, if the geometric path remains constant, we can determine the refractive index, as well as the amount and effect of changes in pressure, temperature, or density that affect the absorption index.

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1 Lazer optik tayanch plita	47340
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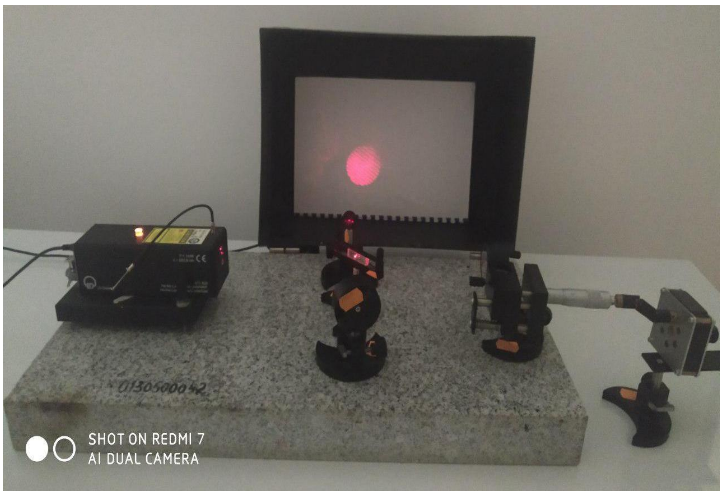
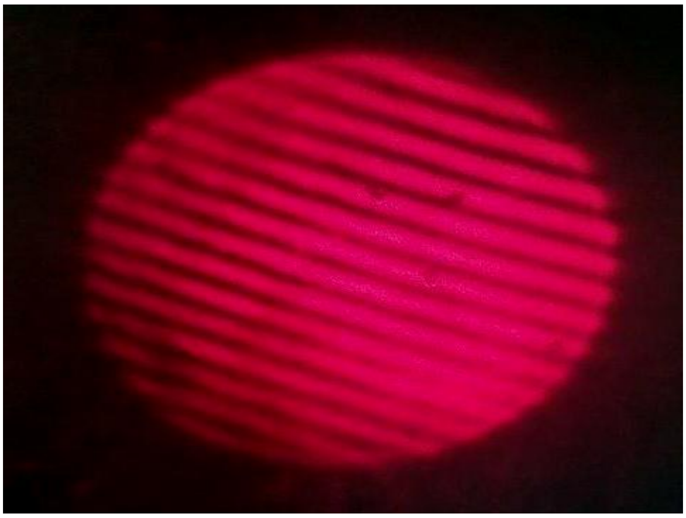
Using the tools and equipment illustrated in the illustration, assemble the experimental set. The He-Ne laser is activated. To generate a picture, we modify the light separator, flat blues, spherical lens, and screen.



The following is how the image is created: It is known that the maximum number of intensities Z is 16 ± 1 for the resulting image. The value for this image is when the number of gears N = 1. If the number of revolutions of the reducer is N = 2, the number of these maxima is Z = 32 ± 1.



The relationship between the number of revolutions of the reducer ds ,the total displacement of the flat mirror, the wavelength λ and intensity of the laser beam, and the enumerated maxima is as follows:

$$ds = 5 \cdot N \cdot \mu m;$$
$$Z \cdot \lambda = 2 \cdot ds; \quad (1)$$

Equation (1) above shows that the smoothness of $2\,ds$flat mirrors is also valid for incoming and outgoing light. From Equation (1) we find the laser wavelength λ:

$$\lambda = \frac{2 \cdot ds}{z}; \quad (2)$$

We take the above results to equations (1) - and (2) - and calculate the wavelength of the He-Ne laser.

Based on measurements and calculations, the He-Ne laser wavelength is N = 1. When N = 2, λ =.

$\frac{N}{ta}$	$\frac{Z}{ta}$	$\frac{ds}{\mu m}$	$\frac{\lambda}{nm}$
1	16±1	5	625 ± 39
2	32±1	10	620 ± 20

In conclusion,The Michelson interfrometer and interfromometer are widely employed in a variety of sectors, according to our research. First and foremost, we attempted to obtain findings by meticulously assembling the interfrometer during the experiment. According to some sources, the wavelength of the He-Ne laser is equal to λ=632.8 nm. In comparison to the result we obtained, it is a pretty close value. The biggest disadvantage of the laboratory is that the finished room does not entirely match the optical laboratory's criteria. Any external mechanical, acoustic, or light waves used in the process of obtaining the result reduce the value of the result and increase laboratory work errors. To optimize earnings, you should have all four of these components in place for launch whenever possible. We accomplished our goal of assembling a Michelson interferometer and observing the interference pattern during the laboratory work.

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