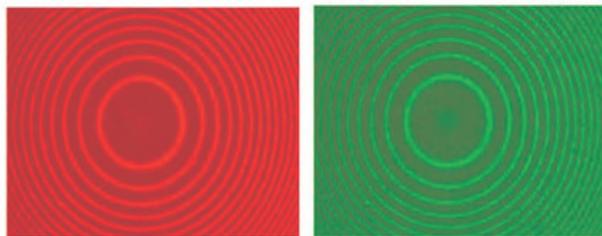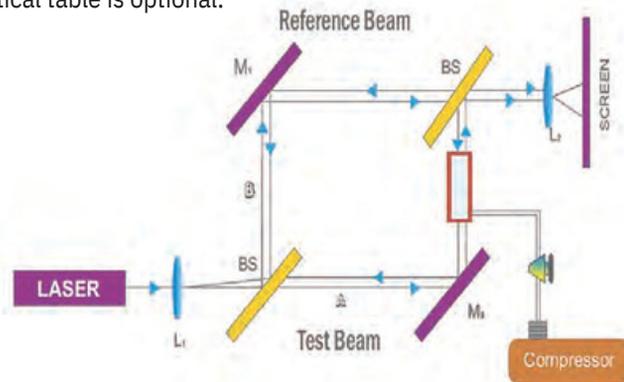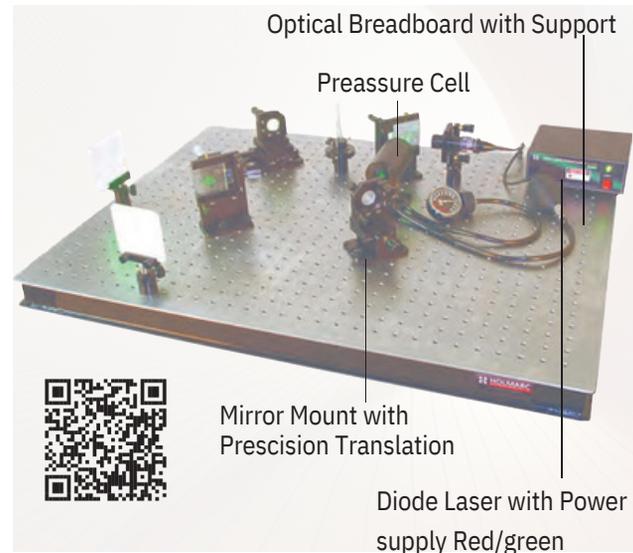# Mach Zehnder Interferometer
Model: FOL - MZM

Interferometer is built by assembling the building blocks on a breadboard as per desired optical layout. Optics and laser head are held using kinematic mounts with two axis fine adjustment facility. Precision alignments for obtaining the interference fringes are done using kinematic mounts.

One of the simplest experiments using the interferometer is measurement of index of refraction of air with an airtight test cell placed in one of the optical arms of the interferometer. No other factor such as convective airflow, should be present, that can generate optical path differences.

The flexibility in fringe localization is one of the important advantages of the mach zehnder interferometer over other interferometers. Although many Mach-Zehnder interferometers use a rectangular arrangement, parallelogram arrangements are also possible. Vibration isolated supports for optical table is optional.

Optical Breadboard with Support
Preassure Cell
Mirror Mount with Prescision Translation
Diode Laser with Power supply Red/green

FRATURES

- **Kinematic mounts are used for fine movement of optical components**
- **Diode laser is used as light source**
- **All materials used in this setup are of laboratory grade with corrosion resistance**
- **The optics used in this device are of research quality**

Experiment Possible

To determine wavelength of laser beam.

The wavelength of laser is calculated by,

$$\lambda = (2d / N) \Delta$$

where 'd' is the change in position that occurs for 'N' fringes to pass and Δ is the calibration constant of the micrometer.

To find refractive index of a transparent material.

The light passes through a greater length of glass as the plate is rotated. The change in the path length of the light beam as the glass plate is rotated and relates the change in path length with the laser beam through air.

The refractive index of glass slide,

$$N = (2t - N\lambda) (1 - \cos\theta) / 2t (1 - \cos\theta) - N\lambda$$

Where t is the thickness of the glass slide, N is the number of fringes counted, λ is the wave length of light used and θ is the angle turned for N fringes.

The Mach-Zehnder interferometer is a particularly simple device for demonstrating interference by division of amplitude. A light beam is first split into two parts by a beam splitter and then recombined by a second beam splitter. Depending on the relative phase acquired by the beam along the two paths the second beam splitter will reflect the beam with efficiency between 0 and 100%.

To study refractive index change in air under different pressures and determine refractive index of air.

When a piece of material of thickness d is placed in one arm of the Michelson Interferometer, the change in optical path length is given by 2dn where n is the difference in refractive index between the sample and the material it replaced (usually air). In other words, 2d (nm - nair) / λ extra wavelengths are introduced if air is replaced by a sample of refractive index nm.

Scope of Supply

Optical Breadboard with Support

Model No.	:ED-INT-12-BBS
Dimensions	:800 mm x 600 mm
Material	:Stainless Steel
Quantity	: 1 No.

Beamsplitter Mount

Model No.	:ED-INT-12-BSM
Degrees of freedom:	2 degrees
Material	:Black anodized
	:Aluminium alloy
Quantity	: 1 No

Mirror Mount with Precision Translation

Model No.	:	ED-IN T-12-MMP T
Adjustment Range	:	+/- 3 degrees
Material	:	Black anodized
		Aluminium alloy
Least count of the micrometer	:	0.01 mm
Q uantity	:	1 No.

Screen with Mount

Model No.	:	ED-IN T-12-SM
D im ension	:	75mm x 75mm
Q uantity	:	1 No.

Mirror with Cell

Model No.	:	ED-IN T-12-MC
Diameter	:	25 mm
Thickness	:	6 mm
Material	:	Borofloat
Coating	:	Aluminium
Q uantity	:	2 Nos.

Glass Slide

Model No.	ED-INT-12-GS
Dimension	75 mm x 25 mm
Thickness	1 mm
Material	Float
Quantity	5 Nos.

Diode Laser with Power supply (Green)

Model No.	:ED-INT-06-DLPG
Wave length	:532 nm
Optical power	:5 mW
Quantity	: 1 No.

Kinematic Laser Mount

Model No.	ED-INT-12-KLM
Material	Black anodized Aluminum alloy
Adjustments	Using 80 tpi lead screws
Adjustment Range:	+/-3 degrees
Quantity	: 1 No.

Mirror Mount with Translation

Model No.	:	ED-INT-12-MMT
Adjustment Range:		+/- 3 degrees
Fine adjustments	:	Using 80 tpi lead screws
Material	:	Black anodized Aluminium alloy
Q uantity	:	1 No.

Rotation Stage

Model No.	:	ED-IN T-12-R S
Resolution	:	2° / division
Material	:	Black anodized Aluminium alloy
Q uantity	:	1 No.

Pressure Cell

Model No.	:	ED-IN T-12-P C
Length	:	10 cm
Pressure Range	:	0 - 300 mm Hg
Q uantity	:	1 No.

Beamsplitter

Model No.	:	ED-IN T-12-B S
D im ension	:	50 mm x 50 mm
Thickness	:	6 mm
R / T ratio	:	50 / 50
Material	:	N-BK7
Coating	:	Aluminium
Q uantity	:	1 No.

Diode Laser with Power supply (Red)

Model No	:	ED-IN T-12-D LPR
Wave length	:	650 nm
Optical power	:	5 mW
Q uantity	:	1 No.

Akademika
at your frequency