



LEOI-34

Experimental System for Crystal Electro-Optic Modulation



Description

Electro-optic effect is a change in the refractive index of a crystal as induced by an electric field. By using a laser amplitude modulator employing the transverse electro-optic effect of a typical LiNbO3 crystal, students can

1. understand electro-optic effect and its applications

2. be able to measure the half-wave voltage and electro-optic coefficient of crystals

3. observe a change in optical properties of crystals due to electro-optic effect

4. observe the interference of focused polarized light as caused by electro-optic effect

5. conduct experimental demonstration of laser communication

This experimental system can be used to conduct the following experiments:





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- 1. Display electro-optic modulation waveform
- 2. Observe electro-optic modulation phenomenon
- 3. Measure half-wave voltage of electro-optic crystal
- 4. Calculate electro-optic coefficient

5. Demonstrate optical communication using electro-optic modulation technique

Application

Including He-Ne laser with power supply

Precise optical alignment

Observe and measure electro-optic modulation waveform

High sensitivity photoreceiver for stable waveform output

Detailed instruction manual

Specification

Power Supply for Electro-Optic Modulation	
Output Sine-Wave Modulation	0 ~ 300 V (Continuously Adjustable)
Amplitude	
DC Offset Voltage Output	0 ~ 600 V (Continuously Adjustable)
Output Frequency	1 kHz
Electro-Optic Crystal (LiNbO3)	
Dimension	5×1.7×50 mm
Electrodes	Silver Coating
Flatness	< λ/8 @633 nm
Transparent Wavelength Range	420 ~ 5200 nm
He-Ne Laser	>1.0 mW @ 632.8 nm
Rotary Polarizer	Minimum Reading Scale: 1°
Photoreceiver	PIN Photocell

Part list

Description	Qty
Optical Rail (LEPO-54)	1
Electro-Optic Modulation	1
Controller	
Photoreceiver	1
He-Ne Laser (LLL-2)	1
Laser Holder (LEPO-20)	1
LiNbO3 Crystal	1

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High-Frequency Cable	2
Four-Axis Adjustable Holder	2
(LEPO-25)	Ζ
Rotary Holder (LEPO-52)	3
Polarizer	1
Glan Prism	1
Quarter-Wave Plate	1
Alignment Aperture	1
Active Speaker	1
Ground Glass Screen	1

Examplies:





Schematic of electro-optic modulation

- S: Source laser
- C: LiNbO₃ crystal
- V: Voltage
- P: Polarizer
- A: Analyzer
- D: Photo receiver

Schematic of experimental configuration

- 1. He-Ne laser
- 2. Glan prism
 - m 7. Aperture 8. LiNbO₃ driver
- 3. $\lambda/4$ plate 4. LiNbO₃ crystal
- 5. Analyzer
- 9. Speaker 10. Laser driver

6. Photo receiver

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