

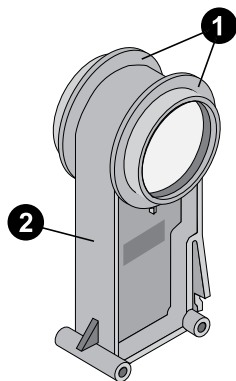
Polarizer Set

OS-8473

Introduction

The Polarizer Set is designed to demonstrate the polarization of light with the Basic Optics System (OS-8515C).

Components



- ❶ 2× polarizing filters
- ❷ Accessory holder

Theory

A polarizer only allows light which is vibrating in a particular plane to pass through it. This plane forms the "axis" of polarization. Unpolarized light vibrates in all planes, so if unpolarized light is incident upon an "ideal" polarizer, only half of the light will be transmitted through the polarizer. (In reality no polarizer is ideal, so less than half the light will be transmitted.) The transmitted light is polarized in one plane. If this polarized light is incident upon a second polarizer with an axis perpendicular to the plane of polarization of the incident light, no light will pass through the second polarizer. (See Figure 1.)

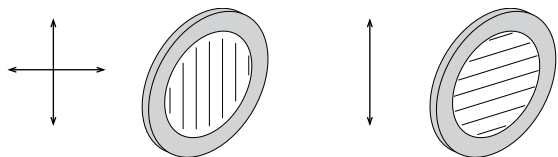


Figure 1: Unpolarized light incident on two polarizers with perpendicular orientation. The light is completely blocked by the second polarizer.

However, if the second polarizer is at an angle not perpendicular to the first polarizer, some component of the electric field of the polarized light will lie in the same direction as the axis of the second polarizer. Therefore, some light will be transmitted through the second polarizer, as shown in Figure 2.

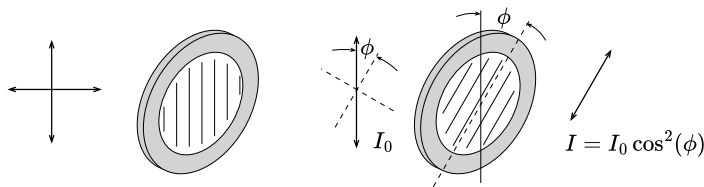


Figure 2: Unpolarized light incident on two polarizers oriented at an angle ϕ with respect to each other.

The component E of the polarized electric field E_0 can be found using trigonometry and is given by $E = E_0 \cos(\phi)$, where ϕ is the angle between the axis of polarization of the incident light and the polarizer. Since the intensity of the light is proportional to the square of the electric field, the intensity of light transmitted through the second polarizer is given by:

$$I = I_0 \cos^2(\phi)$$

where I_0 is the intensity of the incident light upon the second polarizer.

Usage

To use the polarizers, snap a polarizing filter onto each side of the accessory holder. Rotate the polarizers relative to one another to view the effect on light intensity. The polarizer film of each polarizer is aligned to the zero angle printed on the outside rim.

Experiment files

Download one of several student-ready activities from the PASCO Experiment Library. Visit [pasco.com/freelabs/OS-8473](https://www.pasco.com/freelabs/OS-8473).

Technical support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

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Limited warranty

For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

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