Holographic Diffraction Grating 5 Pack

33-0990

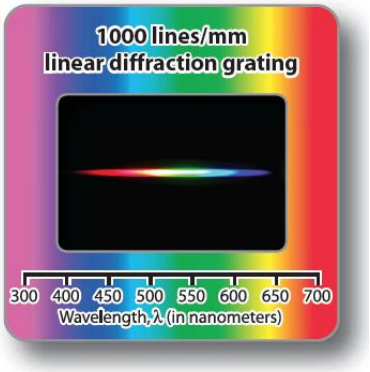
INSTRUCTIONAL GUIDE

Contents

- (5x) Holographic Diffraction Gratings
- Instructional Guide

Recommended for activities:

- Multiple Light sources
- Spectrum tubes



Background

This holographic diffraction grating produces the brightest low-cost diffraction pattern ever. Its quality results from improvements in the grating replication process. **The gratings have approximately 1000 lines per millimeter (~25,000 lines/inch).**

Conventional diffraction grating is formed by cutting microscopic grooves in a piece of glass. This process produces an excellent, but expensive, piece of grating. Most low-cost diffraction gratings are photographically reproduced replicas of real diffraction grating.

Arbor Scientific diffraction gratings are replicas of a *holographically* fabricated master grating. The unique replication process is able to reproduce very deep grove structures, resulting in very efficient replica gratings. To produce the original, a microscopic interference pattern of light and dark stripes is made by recombining the light split from a single laser beam. This pattern in projected onto a glass substrate which is coated with an unexposed photo-sensitive material called “photo-resist.” Development of the photo-resist reveals an alternating series of microscopic “hills” and “valleys.” These are very similar to the grooves produced by a special electrochemical plating process. This nickel master is, in turn, used in a precision micro-embossing process to produce our diffraction gratings.

Note: Any blemishes on the grating are cosmetic only. They in no way affect the efficiency of the grating.

Activities

1. Observe ordinary sources of white light through the grating. Notice the difference in the spectrum formed by different types and shapes of lights.
2. Qualitatively observe bright-line spectra from spectral tubes or other sources (mercury lights, neon lights.
3. Project a bright spectrum for group observation. Attach the grating to a flashlight, along with a cardboard mask that allows only a narrow slit of light to pass through.

4. Perform quantitative experiments on the diffraction of monochromatic laser light. Use the diffraction formula to calculate the wavelength of the light.

$$d \cdot sin(\theta_m) = m \cdot \lambda$$

where *d* is the distance between lines on the grating and *m* is the number of the maximum being evaluated (m=0 is the center of the pattern).

Related Products

Project STAR Spectrometer (P2-7055) Explore flame spectra, streetlights and solar spectra with this dependable device. Since it is labeled in electron volts and nanometers, you can use it in both your physics and chemistry labs.

RSpec Explorer (P2-9505) Digitally capture an individual spectrum, and then compare it to a series of known spectra! The included camera and software make this an easy and inexpensive solution to studying quantitative spectral data in the classroom.

NexGen Spectrum Tube Classroom Bundle (P2-9902) A classic atomic theory demonstration! Energize the gas and view the characteristic atomic spectral lines with any spectroscope. This complete set comes with 8 different gas Spectrum tubes. Spectroscopy Tube length is approx. 26 cm.