

2.3.04-00 Diffraction intensity of multiple slits and grids



What you can learn about ...

- Huygens principle
- Interference
- Fraunhofer und Fresnel diffraction
- Coherence
- Laser

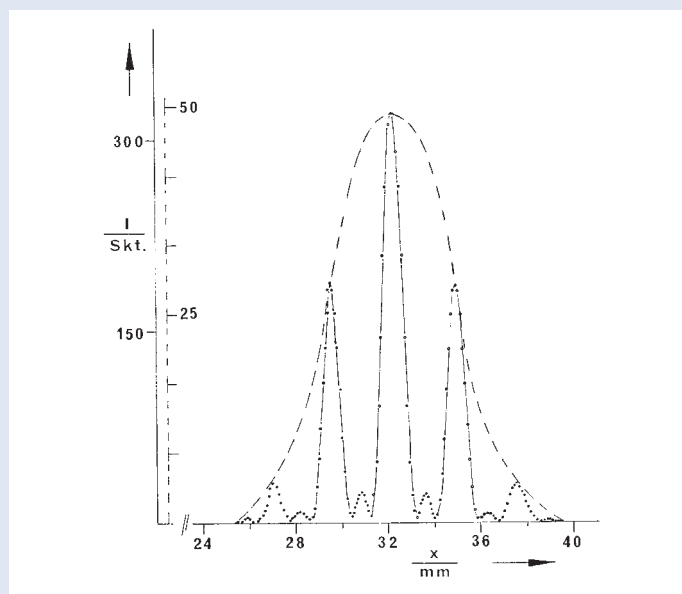
Principle:

Multiple slits which all have the same width and the same distance among each other, as well as transmission grids with different grid constants, are submitted to laser light. The corresponding diffraction patterns are measured according to their position and intensity, by means of a photo diode which can be shifted.

What you need:

Laser, He-Ne 1.0 mW, 230 VAC	08181.93	1
Universal measuring amplifier	13626.93	1
Optical profile bench, $l = 1500$ mm	08281.00	1
Base for optical profile bench, adjustable	08284.00	2
Slide mount for optical profil bench, $h = 30$ mm	08286.01	5
Sliding device, horizontal	08713.00	1
Lens holder	08012.00	2
Object holder 50 mm x 50 mm	08041.00	1
Lens, mounted, $f = +20$ mm	08018.01	1
Lens, mounted, $f = +100$ mm	08021.01	1
Photoelement for optical base plate	08734.00	1
Diaphragm with 3 single slits	08522.00	1
Diaphragm with 4 multiple slits	08526.00	1
Diffraction grating, 4 lines/mm	08532.00	1
Diffraction grating, 8 lines/mm	08534.00	1
Diffraction grating, 10 lines/mm	08540.00	1
Diffraction grating, 50 lines/mm	08543.00	1
Digital multimeter 2010	07128.00	1
Connecting cable, 4 mm plug, 32 A, red, $l = 75$ cm	07362.01	1
Connecting cable, 4 mm plug, 32 A, blue, $l = 75$ cm	07362.04	1

Complete Equipment Set, Manual on CD-ROM included
Diffraction intensity of multiple slits and grids P2230400



Diffraction intensity I as a function of the position x for a threefold slit, $b_1 = 0.1$ mm and $g = 0.25$ mm. Distance between threefold slit and photo-cell: $L = 107$ cm. For comparison, the intensity distribution of a single slit, $b = 0.1$ mm, is entered as a dotted line.

Tasks:

1. The position of the first intensity minimum due to a single slit is determined, and the value is used to calculate the width of the slit.
2. The intensity distribution of the diffraction patterns of a threefold, fourfold and even a fivefold slit, where the slits all have the same widths and the same distance among each other, is to be determined. The intensity relations of the central peaks are to be assessed.
3. For transmission grids with different lattice constants, the position of the peaks of several orders of diffraction is to be determined, and the found value used to calculate the wavelength of the laser light.