

Intensity of diffractions due to pin hole diaphragms and circular obstacles 2.3.03-00



- What you can learn about ...
- Huygens principle
 - Interference
 - Fraunhofer and Fresnel diffraction
 - Fresnel's zone construction
 - Coherence
 - Laser
 - Airy disk
 - Airy ring
 - Poisson's spot
 - Babinet's theorem
 - Bessel function
 - Resolution of optical instruments

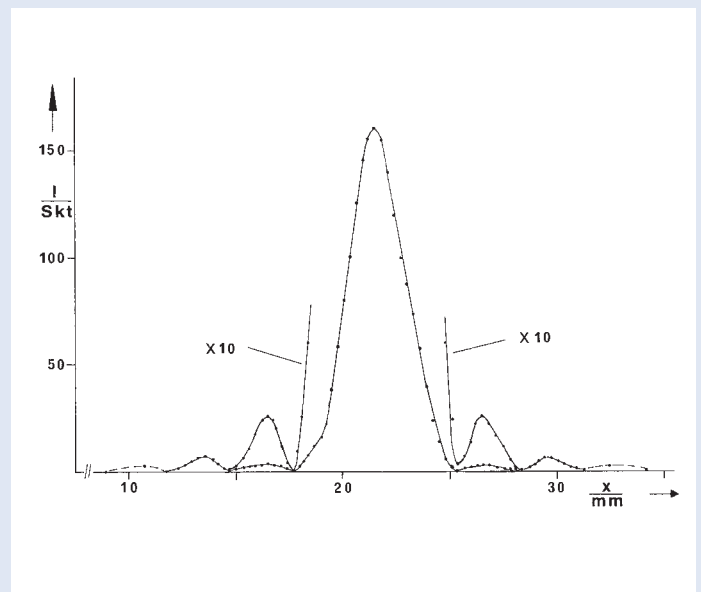
Principle:

Pin hole diaphragms and circular obstacles are illuminated with laser light. The resulting intensity distributions due to diffraction are measured by means of a photo diode.

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, $h = 80$ mm	08286.02	4
Sliding device, horizontal	08713.00	1
Object holder 50 mm x 50 mm	08041.00	1
Screen, metal, 300 mm x 300 mm	08062.00	1
Screen with diffracting elements	08577.02	1
Photoelement for optical base plate	08734.00	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
Intensity of diffractions due to pin hole diaphragms and circular obstacles P2230300



Diffracted intensity I vs position x of the photodiode, using a diaphragm with $D_1 = 0.25$ mm.

Tasks:

1. The complete intensity distribution of the diffraction pattern of a pin hole diaphragm ($D_1 = 0.25$ mm) is determined by means of a sliding photo diode. The diffraction peak intensities are compared with the theoretical values. The diameter of the pin hole diaphragm is determined.
2. The positions and intensities of minima and peaks of a second pin hole diaphragm ($D_2 = 0.5$ mm) are determined. The diffraction peak intensities are compared with the theoretical values. The diameter of the pin hole diaphragm is determined.
3. The positions of minima and peaks of the diffraction patterns of two complementary circular obstacles ($D^*_1 = 0.25$ mm and $D^*_2 = 0.5$ mm) are determined. Results are discussed in terms of Babinet's Theorem.