

## Light and colour

## Dispersion of light into colours

## Dispersion of light into colours upon passage through a prism

## Object of the experiment

1. Demonstrating the separation of the colours of white light on the passage through a flint glass prism

## Setup



- Align the filament of the incandescent lamp vertically by turning the lamp insert, and pull the lamp insert out by approx. 3 cm.
- Position the condenser lens ( $f = + 50$  mm) behind the lamp at a distance of approx. 2cm.
- Adjust a slit width of approx. 1.75 mm.
- Stick a sheet of white paper to the translucent screen by means of adhesive tape.
- To adjust the experiment setup, keep the prism out of the ray path and place the translucent screen on the back third of the optical bench.
- Displace the imaging lens ( $f = + 100$  mm) until a sharp image of the slit appears on the translucent screen. Then remove the translucent screen from the optical bench, and set it up at a distance of approx. 30 cm and at an angle of approx.  $60^\circ$  with respect to the optical bench.
- Darken the room completely.

## Apparatus

1 Optical bench, S1 profile, 1 m.....	460 310
4 Clamp riders with fixing column .....	460 313
2 Clamp riders with clamp .....	460 311
1 Lamp housing with cable .....	450 60
1 Bulbs, 6 V/30 W, E14, set of 2 .....	450 511
1 Lens on rod, $f = + 50$ mm.....	459 60
1 Lens on rod, $f = + 100$ mm.....	459 62
1 Adjustable slit on rod .....	471 71
1 Prism, flint glass.....	465 32
1 Candle holders, set of 2.....	459 31ET2
1 Extension pins, set of 2.....	686 60ET2
1 Screen, translucent.....	441 53
1 Transformer 6/12 V.....	521 210

## Carrying out the experiment

- Set up the flint glass prism in the ray path, and turn the candle holder on the clamp rider until a wide spectrum of high light intensity appears on the translucent screen. If necessary, correct the sharpness of the spectrum by displacing the imaging lens.

## Observation

A continuous spectrum is seen on the translucent screen.

## Evaluation

On the passage through a prism, the white light from an incandescent lamp is separated into its colour components by refraction. As a result a colour band arises, which is called a continuous spectrum.

In the continuous spectrum there is a smooth transition between the spectral colours violet, blue, green, yellow, orange, and red.

The reason for the spectral separation of the white light is the dependence of the refractive index  $n$  in the transition from air to glass on the colour of the light (dispersion).

The refractive index  $n$  for red light is smaller than that for violet light.