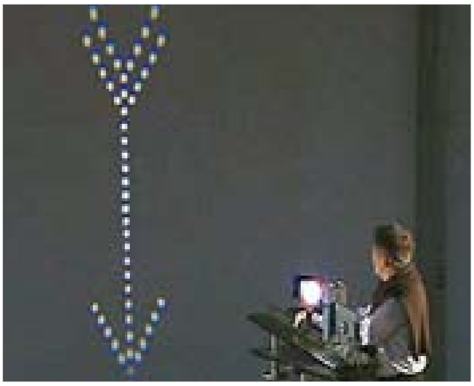
# The Physics Experiments of Robert Wichard Pohl (1884–1976)

For decades, Robert Wichard Pohl taught his famous lectures of introductory physics in the old lecture hall of the Physics Institute at Goettingen University. These lectures became the foundation for three volumes entitled „Introduction into Physics". Now, using Professor Pohl's original instruments in the same lecture hall in which he taught, this set of videos captures his extraordinary ingenuity and once more brings to life Pohl's great experimental skills.



## Chromatic aberration

**Video title:** Chromatic aberration

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**Series title:** The Physics Experiments of Robert Wichard Pohl (1884-1976)


**Abstract:** Chromatic aberration occurs in imaging as result of the wavelength dependence of the index of refraction. It will be demonstrated on a special example.


**Source:** Pohls Einführung in die Physik - Elektrizitätslehre und Optik. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 22. Aufl., 2006, Springer Berlin Heidelberg New York; p. 243


**Key words:** Optics, errors in imaging, chromatic aberration


**Goal of the experiment:** The imaging error resulting from the wavelength dependence of the index of refraction (dispersion) of the glass lens used will be shown on a special example.

**Experimental setup:** An arrow made of holes drilled into a screen is imaged onto the wall of the lecture hall with a glass lens of large dispersion. The focal length of the lens is: f = 8 cm and the diameter = 6 cm. For the illumination of the arrow, light from a carbon arc is being shone weakly diverging onto the screen so that the narrow light beams travelling through the holes forming the tips and the tail of the arrow travel only through the outer regions of the lens, while the beams travelling through the middle of the arrow travel through its central regions.

**Experiment:** With the carbon arc turned on, an inverted image of the arrow is seen. A close-up view shows the colored edges of the light spots in tail and tip. They are missing on the spots in the middle of the arrow. This demonstrates that the dispersion-induced difference of the refraction of red and blue increases towards the rim of the lens. It is also seen that red light (longer wavelength) is refracted less than blue light (shorter wavelength).

By moving a red filter into the light path, a comparison between monochromatic and polychromatic imaging can be made. It is shown here by moving the filter in and out of the path. As can be seen, the positions of the red edges coincide with parts of the full red spots.


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