

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.



Astigmatism

Video title: Astigmatism

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

Abstract: The imaging error called astigmatism occurs when light travels not parallel to the axis of the lens, but under an angle. Instead of image points, extended lines or streaks are formed.

Source: Pohls Einführung in die Physik - Elektrizitätslehre und Optik. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 22. Aufl., 2006, Springer Berlin Heidelberg New York; p. 239

Key words: Optics, defects in imaging, astigmatism

Goal of the experiment: The imaging error called astigmatism is demonstrated by imaging the arc of a carbon arc lamp, using a lens of large diameter and focal length. The lens is either rotated, or the distance between arc and lens is varied. The image spots turn into extended structures.

Experimental setup: Using a lens of 200 cm focal length, the arc of the carbon arc lamp is imaged onto the wall of the lecture hall. The lens can be rotated around a vertical axis. The carbon arc can be moved on a cart so as to change its distance from the lens.

Experiment:

- 1) Initially, the arc and its image lie on the axis of the lens. The image is a small disk. Next, the lens is rotated around a vertical axis, so that the light travels under an angle through the lens. The disk becomes an extended structure.
- 2) Keeping the lens rotated, the carbon arc is moved closer to it. Horizontal and vertical structures are observed, depending on the distance. However, if the carbon arc is moved along the axis of the lens, only a circular structure of varying diameter is observed.

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