

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.



Perspective

Video title: Perspective

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

Abstract: Two-dimensional images of three-dimensional structures have a perspective, that is a certain ratio of size and distance for things which lie behind each other. The perspective depends on the position of the centers of the projection, which in imaging lie in the centers of the entrance- and exit-pupils. Using the images of two objects positioned at different distances from the imaging lens, the perspective and its changes will be shown.

Source: Pohls Einführung in die Physik - Elektrizitätslehre und Optik. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 22. Aufl., 2006, Springer Berlin Heidelberg New York; p. 255

Key words: Optics, imaging, pupils, perspective

Goal of the experiment: The perspective, which is the ratio of size and distance during the two-dimensional imaging of three-dimensional structures, is demonstrated by the imaging of two objects held at different positions from the lens. The perspective can be altered by changing the position of the exit-pupil.

Experimental setup: Two illuminated mat-glass windows are placed at different distances from a lens. The one in back is shaped like the letter H (for „hinten“, meaning „in back“), the one closer to the lens is shaped like the letter V (for „vorne“, meaning „in front“). Through a lens they are projected onto the wall of the lecture hall, so that both of them are about equally in focus (that is a compromise, since a simultaneous sharp focus is obviously not possible). A movable screen with a hole in its center serves as the exit-pupil.

Experiment:

- 1) The screen is positioned initially next to the lens, so that entrance- and exit-pupil coincide with the center of the lens, thus forming the center of the projection. The image of the more distant letter H is smaller than that of the letter V, which is closer to center of the projection.
- 2) Now, the screen is moved, as the exit-pupil, into the focal spot on the image-side. Consequently, the entrance pupil on the object side is moved as projection center to infinity. Both images now appear with the same size.
- 3) By moving the screen beyond the focal spot, the entrance pupil and therefore the projection center on the object-side move closer to the letter H than to the letter V. The image of H now appears even larger than that of the V.

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