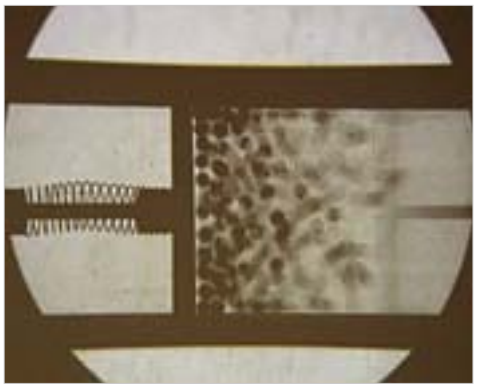
The Physics Experiments of Robert Wichard Pohl (1884–1976)

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.



Model of a gas: its barometric density distribution

Video title: Model of a gas: its barometric density distribution

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

Abstract: Random (thermal) motion of gas molecules is simulated using small steel spheres in a container with moving walls. The density distribution in the gravitational field is shown for this model gas. In the experiments small steel spheres in a flat container with large glass windows can be viewed by projection. Thermal motion is simulated by a vibrating piston which terminates the volume on one side.

Source: Pohls Einführung in die Physik - Mechanik, Akustik und Wärmelehre. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 19. Aufl., 2005, Springer Berlin Heidelberg New York; p. 137, 144

Key words: Mechanics, ideal gases, thermal motion, density distribution, barometric formula

Goal of the experiment: The simulation of random (thermal) motion of gas molecules using steel spheres in a container with moving walls. Demonstration of their density distribution in the gravitational field.

Experimental setup: Small steel spheres in a flat container with large glass windows can be viewed by projection onto the wall of the lecture hall. Thermal motion is simulated by a vibrating piston which terminates the volume on one side. A mobile, spring-loaded piston terminates the volume on the opposite side and can be used to demonstrate the pressure resulting from the spheres colliding with it. A similar vessel in a vertical arrangement, with a vibrating piston at the bottom, and no mobile piston above can be used to demonstrate the density distribution in the earth gravitational field, the analog of the barometric formula for gases.

Experiment: In the horizontal container, the principle of thermal motion and the pressure caused by it is demonstrated (note that the vibrating piston moves so rapidly that it tends to be blurred in the movie). With the vertical container, the density profile is shown that results from the gravitational forces acting on the moving spheres.

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