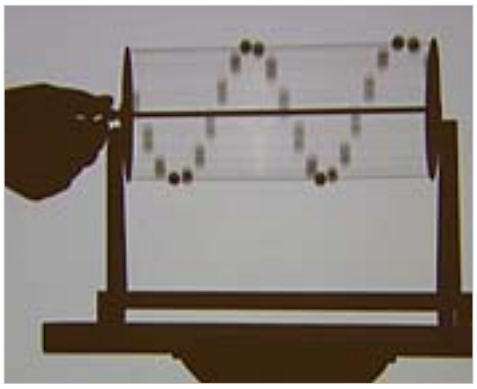
The Physics Experiments of Robert Wichard Pohl (1884–1976)

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 travelling wave

Video title: Model of a travelling wave

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

Abstract: The connection between circular motion, phase difference and wave propagation is shown with the help of a series of beads arranged to form a right-handed helix. This helix can be rotated manually either clockwise or counterclockwise. The motion of the individual beads and also their collective excitation is shown in shadow projection. While the former is a sinusoidal motion, the latter is a wave which is seen to travel either to the left or to the right.

Source: Pohls Einführung in die Physik: Mechanik, Akustik und Wärmelehre, K. Lüders und R. O. Pohl (eds.), Springer-Verlag, 19th edn, 2004, § 113, Fig. 310

Key words: Acoustics, sinusoidal motion, phase difference, harmonic waves

Goal of the experiment: The demonstration of the connection between circular motion, phase difference and wave propagation.

Experimental setup: A series of beads is arranged to form a right-handed helix. This helix can be rotated manually either clockwise or counterclockwise. The motion of the individual beads and also their collective excitation is shown in shadow projection.

Experiment: With the helix at rest, the beads form a sine curve along the axis of the helix. With the helix rotating, this curve appears as a travelling wave: Clockwise rotation creates a left-travelling wave, while counterclockwise rotation creates a right-travelling one. Finally, a single bead is watched through a slit in order to demonstrate that it does indeed not move along the axis of the helix! This is the model of a travelling wave: Its individual elements, in this case the beads, move up and down, but remain in place. Their collective excitation, however, creates the travelling wave through the phase difference between the motion of the individual beads.

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