

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.



Free rotation of a rectangular parallelepiped

Video title: Free rotation of a rectangular parallelepiped

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

Abstract: Only the axes of maximum and minimum moment of inertia are free axes of rotation around which a body can rotate stably without mechanical support. Attempts at rotation around other axes lead to wobbling, i.e. unstable rotation. A piece of styrofoam in the form of a parallelepiped (like a cigar box) is thrown into the air while giving it a spin. In order to watch the motion, opposing surfaces have been marked with different colors.

Source: Pohls Einführung in die Physik - Mechanik, Akustik und Wärmelehre. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 19. Aufl., 2005, Springer Berlin Heidelberg NewYork; p. 76

Key words: Mechanics, rotation, free axes

Goal of the experiment: Only the axes of maximum and minimum moment of inertia are free axes of rotation around which a body can rotate stably without mechanical support. Attempts at rotation around other axes lead to wobbling, i.e. unstable rotation.

Experimental setup: A piece of styrofoam in the form of a parallelepiped (like a cigar box) is thrown into the air while giving it a spin. In order to watch the motion, opposing surfaces have been marked with different colors.

Experiment: The box is thrown in such a way that it begins with a rotation around one of its three major axes. For the two axes perpendicular to the largest and the smallest surfaces, the box is seen to rotate stably: an observer watching from the side always sees the same color surface. The attempt to make the box spin around the axis perpendicular to the intermediate size surface, however fails: instead of a stable rotation, the body is wobbling. The observer sees different colors, to be observed best in slow motion.

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