

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.



Wobble oscillations

Video title: Wobble oscillations

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Abstract: A special kind of nonlinear oscillations are the frequently observed wobble oscillations. Their characteristic feature is that they alternate (wobble, stagger) between several (two or more) positions around which they perform oscillatory motion, and that their frequency depends on the amplitude. Two examples will be shown.

Source: Pohls Einführung in die Physik: Mechanik, Akustik und Wärmelehre, K. Lüders und R. O. Pohl (eds.), Springer-Verlag, 19th edn, 2004, § 111, Fig. 304

Key words: Acoustics, nonlinear oscillations, wobble oscillations

Goal of the experiment:

A special kind of nonlinear oscillations are the frequently observed wobble (rocker) oscillations. Their characteristic feature is that they alternate (wobble, stagger) between several (two or more) positions around which they perform oscillatory motion, and that their frequency depends on the amplitude. Two examples will be shown.

Experiment setup and Experiment:

1. A wooden block stands on end on a steel plate, its base cut so that it touches only on two edges. Pushed one way, it rotates like a physical pendulum around one edge, until the other edge touches the plate, whereupon it does pendulum motion around that edge. Thus, the block wobbles between the two edges. This observation can be best observed in shadow projection. The increase of the frequency with decreasing amplitude can also be clearly seen and heard.

2. A metal puck (coated with some plastic for the visual effect) is placed on its edge under an angle on a glass plate which is slightly concave to prevent sideways motion. When the puck is let go, together with a slight twist, it begins to dance, its instantaneous point around which it rolls moving around its circumference. The damping of this oscillation is amazingly small, and the increase in frequency with which the point of contact moves around the puck increases as the puck gradually settles. This demonstration of a wobble oscillation is an advanced version of one which can be readily performed at the dinner table, using a coin on a dinner plate.

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