

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.



Stabilization using a spinning top

Video title: Stabilization using a spinning top
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Series title: The Physics Experiments of Robert Wichard Pohl (1884-1976)
Abstract: In an impressive demonstration, the precession of a top (see also exp. 07) is used to stabilize a very top-heavy device.
Source: Pohl's Einführung in die Physik - Mechanik, Akustik und Wärmelehre. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 19. Aufl., 2005, Springer Berlin Heidelberg New York; p. 86
Key words: Mechanics, top, precession, monorail

Goal of the experiment: In an impressive demonstration, the precession of a top (see also exp. C 14828) is used to stabilize a very top-heavy device.

Experimental setup: A man tries to balance while sitting on a steel bar which can rotate freely around its horizontal axis. A top consisting of a lead-filled bicycle rim driven by an electric motor is attached to this bar with a joint allowing the top to be tilted away and towards the man, but not sideways. The center of mass of man and top are far above the bar. As long as the top is at rest, the man has to keep his feet on the floor to avoid tipping over.

Experiment: With the top spinning, pushing or pulling its axis will make the top precess, i.e. to move sideways. This motion can be used to balance the top-heavy system. After some practice, the man can lift his feet off the floor and place them on the foot rest without tipping over. In this experiment, two „drivers“ demonstrate their „skills“. It is remarkable how quickly one learns how to push and pull the top intuitively, considering that there is not enough time to think. Nonetheless, it does not take long to feel quite comfortable on this unstable „monorail“.

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