

P 1.4.3.
Centrifugal force



P1.4.3.3 Centrifugal force on a revolving body - measuring with the central force apparatus and CASSY

Centrifugal force on a revolving body – measuring with the central force apparatus and CASSY (P1.4.3.3)

Cat. No.	Description	P 1.4.3.3
524 068	Central force apparatus S	1
521 49	AC/DC Power supply 0-12 V	1
524 010USB	Sensor-CASSY	1
524 200	CASSY Lab	1
524 074	Timer S	1
501 16	Multicore cable, 6-pole, 1.5 m long	1
301 06	Bench clamp	1
501 46	Pair of cables, 1 m, red and blue	1
337 46	Forked light barrier, infra-red	1
300 02	Stand base, V-shape, 20 cm	1
300 40	Stand rod, 10 cm	1
	additionally required: PC with Windows 98 or higher	1

The centrifugal force apparatus enables experimental investigation of the centrifugal force F as a function of the rotating mass m , the distance r of the mass from the centre of rotation and the angular velocity, thus making it possible to confirm the relation

$$F = m \cdot \omega^2 \cdot r$$

r : radius of orbit, ω : angular velocity

for the centrifugal force.

In the centrifugal force apparatus, the force F acting on a rotating mass m is transmitted via a lever with ball-and-socket joint and a push pin in the axis of rotation to a leaf spring, whose deflection is measured electrically by means of a bridge-connected strain gauge. In the measuring range relevant for the experiment, the deformation of the leaf spring is elastic and thus proportional to the force F .

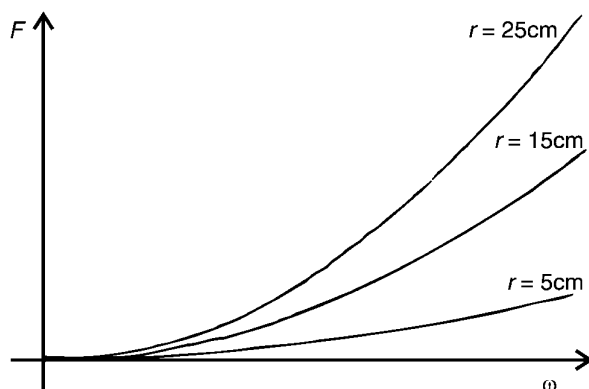
In this experiment, the relationship

$$F \propto \omega^2$$

is derived directly from the parabolic shape of the recorder curve. To verify the proportionalities

$$F \propto r \text{ and } F \propto m$$

the curves are recorded for different orbit radii r and various masses m .



Centrifugal force F as a function of the angular velocity ω