Determination of the gravitational constant / computerised Cavendish balance

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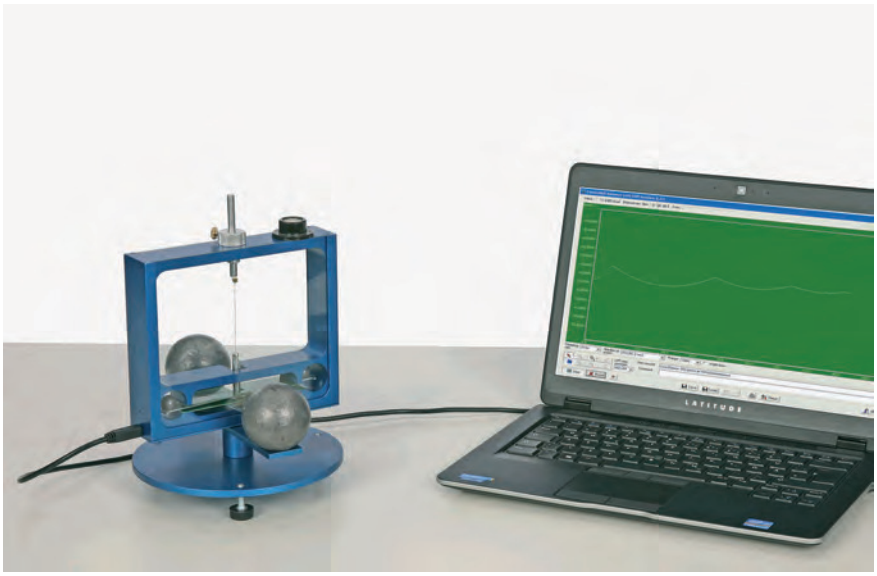

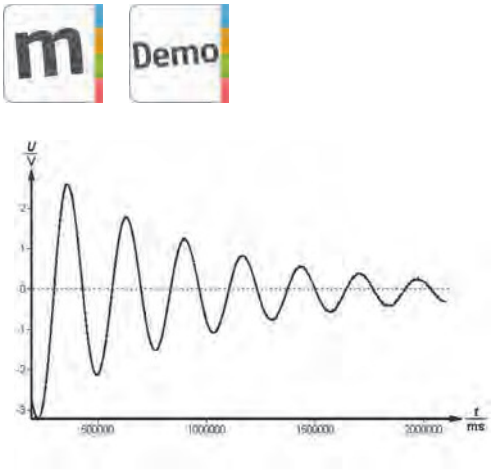

Output voltage of the free and damped oscillating Cavendish balance.

Principle

Two small lead spheres are positioned on a beam, which is freely suspended on a thin metal wire. At the beginning the large lead spheres are positioned symmetrically opposite to the small spheres in that way that the attractive forces are eliminated. There after, the large spheres are swung so that they are close to the small spheres. As a consequence of the gravitational attracting force the beam with the small spheres now moves in a new equilibrium position, where the attractive forces are equivalent to the force of the torsion of the wire. The gravitational constant can be determined from the new equilibrium position.

Tasks

1. Calibration of an angular detector.
2. Determination of the oscillation time of a free and damped oscillating torsion pendulum.
3. Determination of the gravitational constant.

What you can learn about

- Law of gravitation
- Free, damped, forced and torsional oscillations
- Moment of inertia of spheres and rods
- Steiner's theorem
- Shear modulus

Main articles		
Cavendish balance/computerized	02540-00	1
Circular level, d = 36 mm	02123-00	1

Cavendish balance/computerized

Function and Applications

For the demonstration of the mass attraction of two bodies and for the determination of the gravitational constant.

Benefits

- Complete and compact system with control unit, only a recording system (e.g. aninterface-system) or a multimeter is to be used to get 2%
- Accurate results in a single lab period
- Short oscillation periods of 2-4 minutes using a 25 µm diameter adjustable length tungsten wire
- No more optical lever jitters due to SDC-(Symmetric Differential CapacitiveControl) sensor technology

02540-00