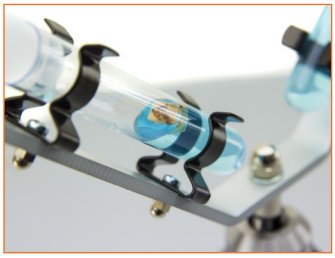
Electrical rotating platform 1443

Optika rotating platform allows students not only to verify the relations between the fundamental quantities which characterize rotational motion, but also to perform experiments on an important topic: inertial and non-inertial systems. What is seen by an observer on an inertial system is different from what is seen by an observer on a non-inertial system. In this way students are allowed to understand which is the origin and which are the results of fictitious forces as the centrifugal force and Coriolis force.

Thanks to this platform, you are able to study a lot of fundamental topics as the effects of Coriolis force on solids and liquids and understand why a mathematical instrument as the cross product was so important. By which magnitudes the centrifugal force depends on? Let's perform some experiences with OPTIKA rotating platform.

Topics

- The relativity of motion
- Galileo equations
- Invariant and non-invariant quantities
- The principle of relativity
- Non-inertial references
- Systems with tangential acceleration only
- Motion in two dimensions
- Uniform circular motion
- Centripetal force
- Systems with only radial acceleration
- Rotating platform
- Centrifugal force
- Effects of centrifugal force
- Conical pendulum
- Coriolis force
- Examples of Coriolis forces
- Properties of Coriolis force
- The Earth: a rotating reference system
- The centrifugal force on the Earth's surface
- Coriolis force on the Earth's surface
- A proof of the Earth's rotation: Foucault pendulum



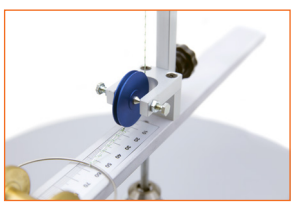
Feasible experiments

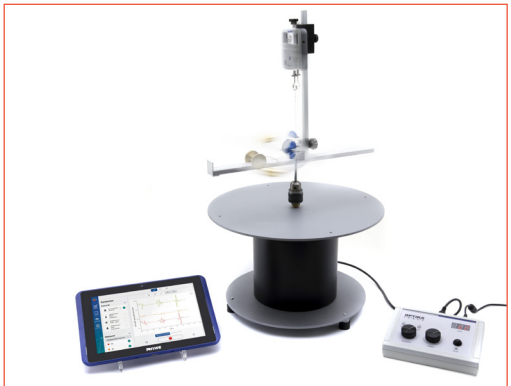
1° Centripetal force
2° A fictitious force: the centrifugal force
3° Lack of centripetal force: what happens?
4° Centrifugal forces in equilibrium
5° How to use centrifugal force to separate a mixture
6° Centrifugal force and Earth shape
7° Watt's regulator
8° White light: Newton's Disk
9° Conical pendulum
10° Properties of conical pendulum
11° How to verify centripetal and centrifugal forces formula
12° Another fictitious force: Coriolis force
13° Coriolis force acting on a water jet
14° Coriolis force acting on a pendulum
15° Observer in a non-inertial system
16° How to verify Coriolis law with an experiment
17° When Coriolis force is zero
18° Foucault's pendulum

1443

Apparatus for measuring centrifugal force for force sensor 1135-SENS

The instrument consists of a rail on which a cylinder can slide.
By putting the # 1443 rotation machine into operation, the device will be able to record the centrifugal force values thanks to the Bluetooth force sensor. For use with sensor # 12943-00.
For data acquisition, the use of the Cobra SMARTlink # 12999-99 data logger is recommended.
By processing the data with the free measureAPP application, you will be able to appreciate the dependence of the centrifugal force on angular speed and arm.





12999-99 + 1443 + 1135-SENS + 12943-00

1135-SENS

Accessories (not included) for Electrical rotating platform

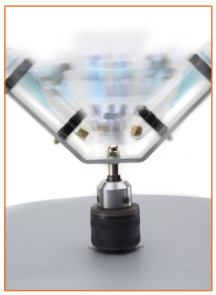
Apparatus for centrifugal force 1445
To performe experiment n° 2


1445

Coaxial cylinders 1447
To performe experiment n° 4


1447

Apparatus with inclined test tubes 1082
To performe experiment n° 5

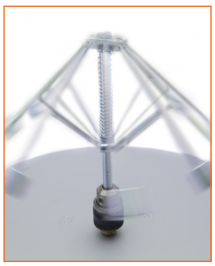



1082

Apparatus with elastic rings 1094
To performe experiment n° 6


1094

Watt's regulator 1093
To performe experiment n° 7




1093

Newton's Disk 1097
To performe experiment n° 8

1097

Bowl with dye 1459
To be used with code 1452 and code 1458.

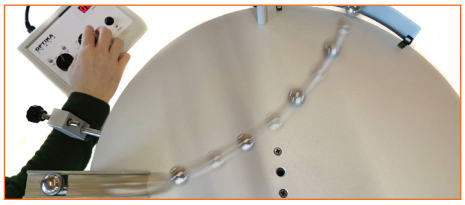
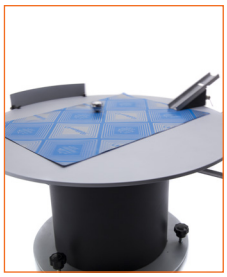
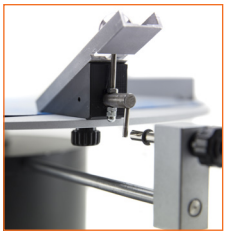
1459

Conical pendulum 1450
To performe experiments n° 9-10-11.



1450

Apparatus for Coriolis force 1451
To performe experiments n° 12-16.

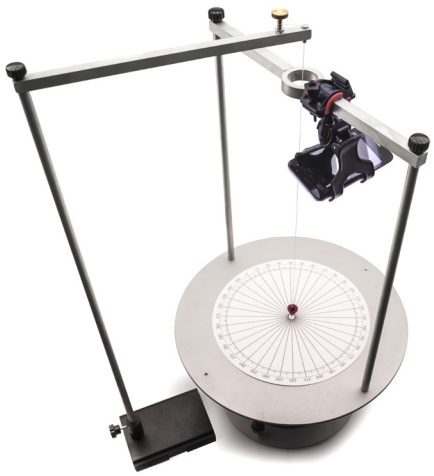




1451

Simple pendulum 1453
To performe experiments n°14-15-18.

Camera kit 1455

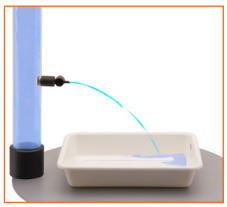
Smartphone 1460



The clamp shown in the photo is a smartphone support. We recommend to use a smartphone provided by our company.

1453 - 1455 - 1460

Apparatus for water jet 1452
To performe experiment n° 13.


Bowl not included

1452

Apparatus for falling water 1458
To performe experiment n° 17.



Bowl not included

1458

Small manual rotating machine 1109

Laminated wood top, 180 x 340 mm. The rotating machine is equipped with a metallic spindle for shafts with 6 mm diameter.

1109

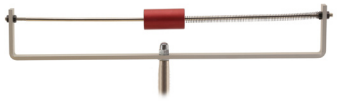
Watt's regulator 1093

It represents a model of centrifugal regulator.
During rotation the two masses move away, compressing the spring.
To be used with a rotating machine.

1093

Centrifugal force device 1081

By mounting the device on a rotating machine, the more the angular velocity increases, the more the cylinder compresses the spring.
To be used with any rotating machine.



1081

Device to measure centrifugal force 1135

It consists of a rail on which a low-friction cylinder can slide. By rotating the device, it is possible to read on the spring scale, the value of the centrifugal force, and it is possible to check the centrifugal force formula.

1135

Elastic rings 1094

They allow to highlight that the centrifugal force grows with the distance from the axis of rotation. During operation they assume an elliptical shape.

1094

Coaxial cylinders 1092

Since one has twice the mass of the other, during rotation there is equilibrium if the distance of the center of gravity of the greater mass from the center of rotation is half the distance of the smaller mass.

1092

Newton's disk 1097

Divided into colored sectors, while rotating, it allows to verify the additive synthesis of spectral colors.

1097

Device to study rotational motion 8109

With this device it is possible to perform experiments on the dynamics of rotational motion and on the moment of inertia of rotating bodies, by using astopwatch (not included).

10 feasible experiments

Topics

- Uniform circular motion and harmonic motion
- Kinematics of rotational motion
- Similarities between translatory and rotational motion
- The dynamics of rotational motion
- The fundamental law of rotational motion
- Inerzia momentum
- The kinetic energy of rotational motion
- Conservation of mechanical energy
- How to use the distance sensor

Equipment supplied

1 Base
1 Rod with chuck
1 Clamping device
1 Rod with sphere
1 Rod for balancer
1 Red mass
1 Green mass
1 Aluminum disk diam. 320mm
1 Mass holder
5 Slotted masses 10 g
5 Slotted masses 20 g
1 Clamp
1 Bosshead
1 Rod with pulley
1 Metallic rod 10x470 mm
2 String
2 Pins
1 Folding ruler
1 Box

Equipment for online use - not supplied

1 Interface	cod. 9001
1 Distance sensor	cod. 9041
or	
1 USB	cod. 9066

Suitable to be used with sensors

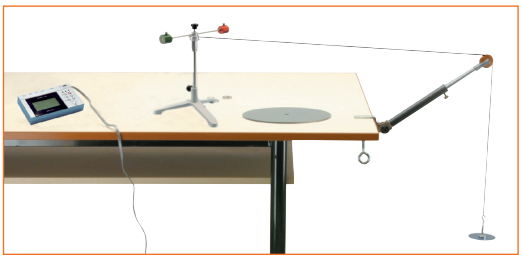
8109

Kit to study translational, rotational and oscillatory motion 8120

This kit has been designed to allow students to perform experiments on translational, rotary and oscillatory motion in real time, using a distance sensor.

Topics

- Rotational motion
- Uniform rectilinear motion
- Uniformly accelerated rectilinear motion
- Measurement of the acceleration due to gravity
- Simple pendulum
- Compound pendulum



Equipment supplied

1 String
1 Base
1 Bosshead
1 Folding ruler
1 Metallic rod 10 x 750 mm
1 Mass-holder 20 g
1 Clamp with telescopic arm
2 Masses 10 g
20 Plumb spheres 0.3 g
1 Aluminum disk
1 Spindle
1 Rod
2 Masses
1 Compound pendulum
1 Simple pendulum
1 Spindle support
1 Atwood machine support
1 Mass-holder
1 Pulley for Atwood machine
1 Box

Equipment for online use - not supplied

1 Distance sensor code 9041 + interface code 9001
or
1 USB distance sensor code 9066

Suitable to be used with sensors

Rotating platform 1177

The rotating platform is characterised by a sturdy metal structure and a couple of conical bearings which allow it to rotate ensuring great resistance to stresses and low friction. Thanks to the didactic guide and the several accessories supplied with this collection, students will be able to carry out experiments on non inertial reference frames which otherwise would be impossible to perform. Our rotating platform is a particular and interactive instrument particularly suited to study angular momentum, moment of inertia and centrifugal force.
Platform diameter: 50 cm

Topics

- Action and reaction principle
- Preservation of the angular momentum
- Non-inertial systems: uniform rotatory motion
- Non-inertial systems: free falling
- Centrifugal force and its effects
- Measurement of centrifugal force
- Centrifugal force depending on the rotation radius
- Centrifugal force depending on the angular velocity
- Coriolis force
- Inertia moment

Equipment supplied

1 String
2 Spring tweezers
1 Rotating platform
1 Aluminum tube 800x35 mm
1 Ring stand for vertical tube
1 Ring stand for falling plane
1 Complete bicycle wheel
1 Plane with cannon
1 Falling plane
1 Device for measuring the centrifugal force
2 Dumbbells 4 Kg
1 Inclination protractor
1 Metal rod 1200 x 18 mm
3 Steel spheres
1 Support for launch system
2 Clamp for round flasks with bosshead

Equipment not supplied (not necessary)

1 Tripod base

Simple pendulum 1272

This Simple Pendulum device can be used to verify the laws of simple oscillations.
More specifically, it can be used to verify that initial potential energy is preserved regardeless of the trajectory (Galileo's pendulum).
The pendulum is supplied with 3 different spheres with strings.
Height: 70 cm.

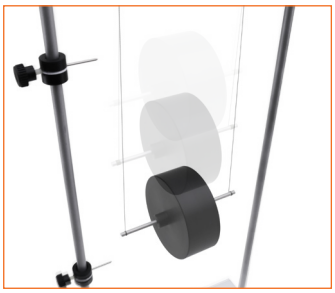
1272

Maxwell's pendulum 1375

Maxwell's pendulum is composed of a wheel suspended by two strings. These strings will be rolled up on an axis passing through the wheel's centre of mass. Releasing the wheel, the two strings are rolled up and down on the axis. If there was no friction, the wheel would reach the initial elevation. This up&down motion will be repeated many times. Its period depends on: the initial height h, from which the wheel was released, the gravity acceleration g and the ratio between the wheel radius and the pivot radius.
Using the distance sensor (not supplied) students are allowed to evaluate the wheel velocity and to make accurate calculations.

Equipment for online use - not supplied

1 Interface	code 9001
1 Distance sensor	code 9041
or	
1 USB distance sensor	code 9066

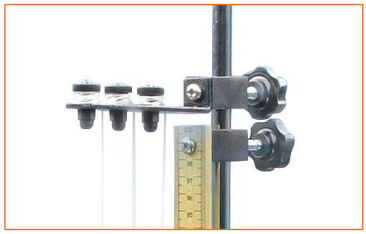


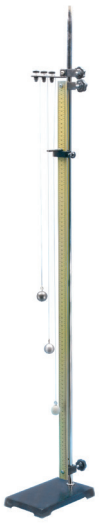
Suitable to be used with sensors

1375

Simple pendulums apparatus 1104

Composed of 3 simple pendulums whose length can be changed through specific handwheel and whose masses are different. Thus, you can demonstrate that the period of a simple pendulum depends on the length, but doesn't depend on the mass. A T-shaped rod able to move along a vertical stand, allow you to release all 3 pendulums at the same time.
Height: 100 cm.





1104

Set of 5 pendulum spheres 1306

Spheres with hook Ø 25 mm.
Material: aluminium, brass, iron, wood, copper.

1306

Forced oscillation apparatus 1302

This device allows the study of the phenomenon of a system's forced oscillations and lets you observe what happens under resonance conditions.

Equipment supplied

1 Base
1 Metallic rod
1 Pulleys system - low friction
5 Springs
1 Slotted masses 20g
1 Slotted masses 10g
1 Bosshead
1 Graduated cylinder
1 Vibrator
1 String
2 Connection cables

We suggest to use our functions generator code 5718, not supplied with this equipment. It has to be use with the vibrator supplied.

1302

Apparatus to study harmonic oscillations 8111

The study of the oscillatory motion of a mass hanging by a spring allows students to be introduced to the motion features of an harmonic oscillator and to get acquainted with one of the most powerful models for the physical interpretation of a wide range of phenomena.

Topics

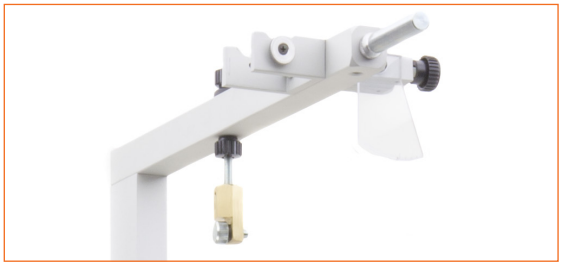
- Hooke law
- Armonic motion
- Mass-spring system
- Simple pendulum
- Physical pendulum
- Torsion pendulum

Equipment supplied

1 Metal support with rod and upper cross-bar for pendulums
1 Kit composed of 4 springs and 1 elastic
1 Wooden sphere for simple pendulum, diam. 50 mm
1 Polystyrene sphere, diam. 50 mm
1 Polystyrene sphere, diam. 160 mm
1 String
1 Compound pendulum
2 Metallic cylinder
1 Lower cross-bar with protractor for torsion pendulum
1 Brass rod 2 x 600 mm
1 Steel rod 2 x 600 mm
1 Steel rod 2 x 300 mm
1 Steel rod 2,5 x 600 mm
1 Torsion pendulum rod
1 Mass holder
1 Reflector disk
4 Masses 10 g
4 Masses 20 g
1 Bosshead
1 Base
1 Allen key

Equipment for online use - not supplied

1 Distance sensor code 9041+ interface code 9001
1 Force sensor code 9032
1 Sensors holders code 4014



Suitable to be used with sensors

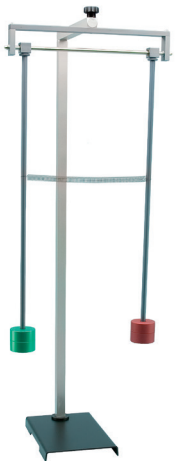
8111

Coupled pendulum 8113

The apparatus of coupled pendulums consists of two pendulums paired through a coil spring slightly stretched out. The spring allows the energy to be transfered between the two pendulums so it is possible to study the phenomena of resonance and beats.
The apparatus of coupled pendulum can be used as optional equipment of the apparatus for the study of harmonic oscillations (code 8111) or with the stand (code 0209), sold separately.

8113

Stand for coupled pendulum 0209



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