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Physics Summary

2016 edition





Mechanics

Gyroscopic force

Topics

- Studying of a gyroscope
- Coriolis' force
- Measuring friction torque
- Studying transitory speed
- Sire's experiment



Centrifugal and centripetal forces

Topics

- Angular speed
- Centrifugal force ; centripetal force
- Apparent force



Acoustic standing waves

Topics

- Acoustic standing waves
- Sound propagation in several gases



Ultrasonic waves

Topics

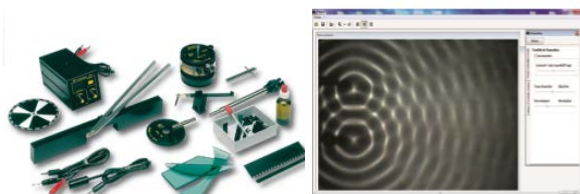
- Ultrasonic standing waves
- Ultrasonic absorption in the air
- Diffraction with a sample slit, a hole, an edge
- Interferences with a double slit
- Interferences with two coherent sources



Flat waves and diffraction principles

Topics

- Huygens' principle
- Standing waves
- Diffraction
- Interferences



Surface tension of a liquid

Topics

- Surface energy
- de Nouy's method



Mechanics



Acceleration and static friction

Topics

- Finding the functioning relation between the height of the fall and the falling time
- Finding the acceleration due to gravity
- Studying static frictions
- Measuring the force of resistance and the static force of a solid on a tilted plane from the slope
- Finding the relation between the weight of an object and the tilt of a slope during a fall



Even motion and collisions

Topics

- Even motion
- Acceleration motion
- Second Newton law
- Accelerometry
- Law of collisions



Hooke's law and dynamics of oscillations

Topics

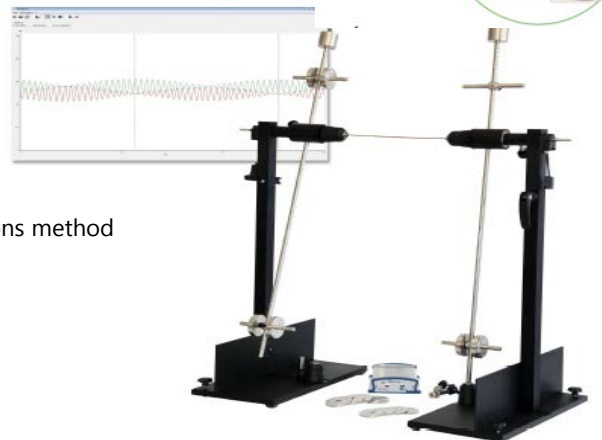
- Statics and Hooke's law
- Dynamics with free or forced oscillations
- Fluid friction



Pendular oscillations, Torsion, Moment of inertia

Topics

- Studying the weighting pendulum
- Studying fluid or solid damping
- Checking Huyghens' theorem
- Measuring the torsion constant of a metallic wire with the oscillations method
- Measuring the moment of inertia of a solid
- Studying resonance
- Studying coupled systems



Mechanical standing waves

Topics

- Standing waves
- Wavelengths.
- Oscillations



Coulomb's law and friction coefficient

Topics

- Coulomb's law
- Effect of the materials and the surface state on the friction coefficient



Optics

Law of lens

Topics

- Bessel method
- Law of lens
- Gauss conditions
- Cornu method



Chemical polarimetry

Topics

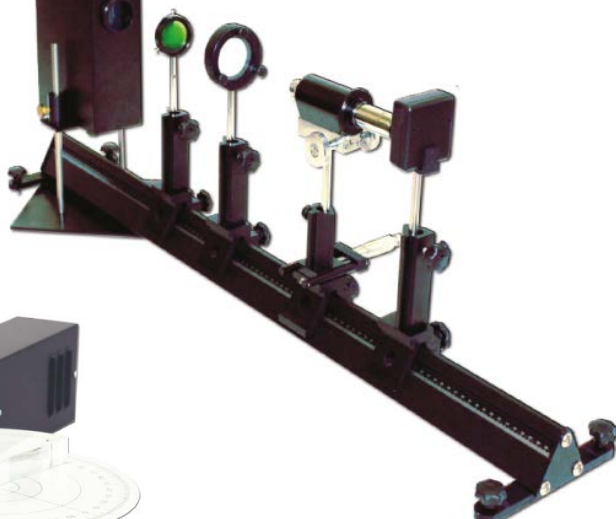
- Optical rotatory power
- Saccharimetry



Newton's rings

Topics

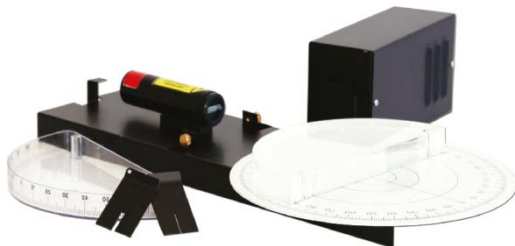
- Curving radii
- Thin air wedge



Reflection - Refraction

Topics

- Snell-Descartes law
- Huygens's principle
- Brewster's angle
- Total or partial reflection
- Refraction



Efeito Faraday

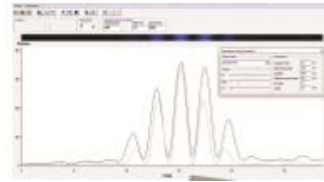
Topics

- Polarização
- Determinação da constante de Verdet
- Oscilações de elétrons





Optics



Diffractions and interferences

Topics

- Diffraction with a slit, a hole
- Interferences with Young's slits, multiples slits, Young's holes
- Showing up the effect of the wavelengths



Dispersion with a prism or a grating

Topics

- Dispersion
- Refraction index
- Dispersion curve
- Goniometer setting
- Finding a grating path



Law of polarization

Topics

- Malus's law
- Birefringence



Michelson's experiments

Topics

- Beat of a spectral lamp
- Idea of thin air wedge
- Optical contact and White Light Fringe
- Thickness of a glass plate
- Measuring the vacuum index
- Fourier's transform of a spectral lamp
- Piezo-electric effect



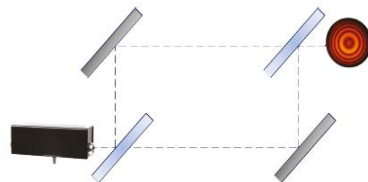


Optics

Study of Mach-Zender's interferometer

Topics

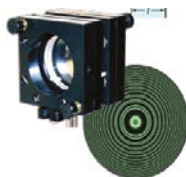
- Study of Mach-Zender's interferometer
- Interferences
- 2 paths interferences



Study of Fabry-Perot's interferometer

Topics

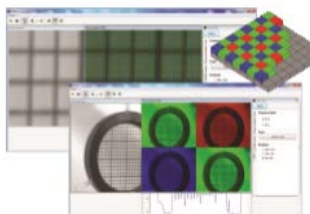
- Study of Fabry-Perot's interferometer
- Interferences



Study of a camera

Topics

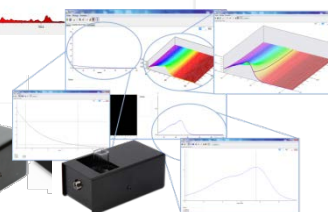
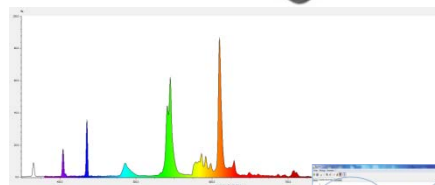
- Focus, aperture, time exposure
- Field depth, magnification
- Sensor, sensitivity, and accuracy



Spectrophotometry – Beer Lambert and kinetics

Topics

- Beer-Lambert's law
- Kinetics of a solution during a given time
- Studying colour spectra of lights and filters



Optical fiber transmission

Topics

- Transmission of information
- Digital aperture

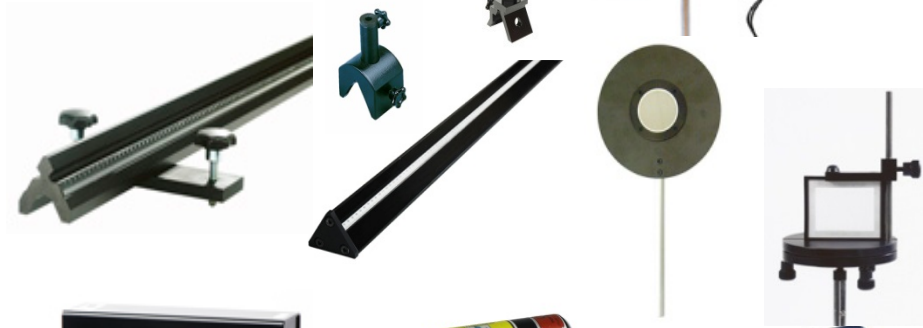


Optics



Optical benches

- Superior optical benches
- didaFirst prismatic benches
- Accessories for optical benches



Lasers – laser diodes

- He-Ne laser, linear polarized, unpolarized
- Red, green, blue laser diodes
- Accessories



Spectral lamps

- Osram lamps (9-pin sockets)
- Eco-27 (E27 screw sockets)
- Simple, dual power supplies
- Accessories (filters, condensors ...)



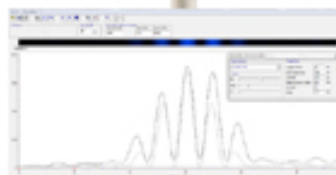
Optical Instruments

- Telescope, collimators
- Laser rangefinders
- Polarizing filters, retardation plates



CCD cameras

- Caliens CCD cameras
- Pedagogical camera (webcam)
- Accessories





Thermodynamics

Heat capacity of gases

Topics

- Finding adiabatic coefficient of air with Rüchardt's method
- Finding heat molecular capacities of air with constant volume and pressure



Heat conduction

Topics

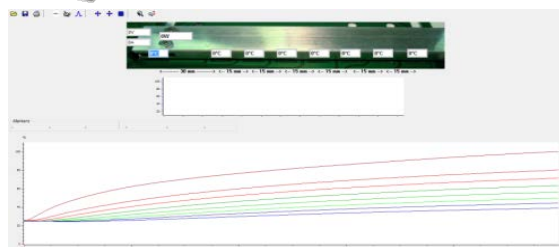
- Thermal transfer
- Heat conduction



Heat capacity

Topics

- Finding the specific heat capacity of water or an other liquid
- Finding the heat capacity of the calorimeter
- Finding the specific heat capacity of aluminium, iron, brass
- Checking the Dulong Petit's law
- Temperature of thermal mixings



Study of critical point

Topics

- Ideal gas
- Real gas
- Verder Waals' equation
- Critical point





Electricity

Study of micro-waves

Topics:

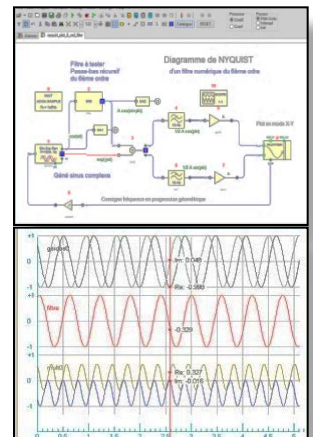
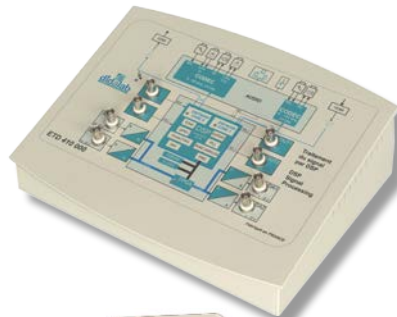
- Rectilinear propagation of micro-waves
- Reflection, absorption and transmission
- Experiments on polarization
- Experiments on refraction
- Experiments on diffraction and interferences
- Transmission of informations
- Studying waves
- Focal plan



Signal processing in real time

Topics:

- Quantification
- ADC - DAC
- Spectrum analysis
- Analogical and digital filters
- Bode & Nyquist
- Modulations and demodulations



Basic laws in Electricity

Topics:

- Kirchoff's law
- Ohm's law
- RLC circuit
- Studying Direct Current
- Studying Alternative Current



Biot Savart's law

Topics:

- Metallic loop
- Biot-Savart's law
- Hall's effect
- Magnetic field
- Induction
- Magnetic flow induction



Study of the transformer

Topics:

- Studying a transformer
- Hysteresis
- Eddy current



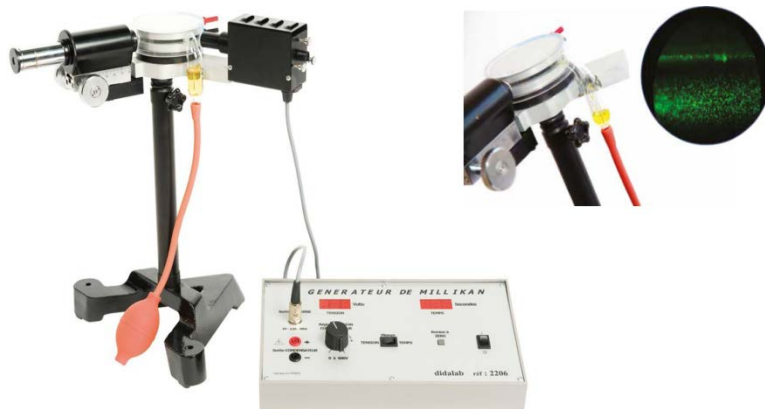


Physics of the matter

Millikan's experiments

Topics

- Measuring the electrical charge of an electron



Balmer-Rydberg's experiments

Topics

- Finding visible rays of Balmer serie for Hydrogen
- Finding Rydberg's constant



Zeeman's effect

Topics

- Bohr's atom model
- Bohr's magneton
- Fabry-Pérot
- Turning electron

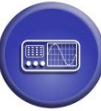


Showing up Planck's constant

Topics

- Finding \hbar





Measuring Instruments

Oscilloscopes, spectrum analyzers

- Digital oscilloscopes
- Spectrum analyzers



Multimeters

- Multimeters
- Hand-held multimeters
- RLC-meters
- Thermometers ...



Functions generators

- Low frequency function generator
- Very low frequency function generator
- Arbitrary function generator



Power supplies

- Fixed power supplies
- Simple adjustable power supplies
- Adjustable dual power supplies
- Adjustable and multiple power supplies



Electrical Engineering - Telecommunications

DIDALAB has a second department: Electrical engineering and Telecommunications



Analogical and Digital Electronics



Computer sciences



Automatic control



Servos systems and Process control



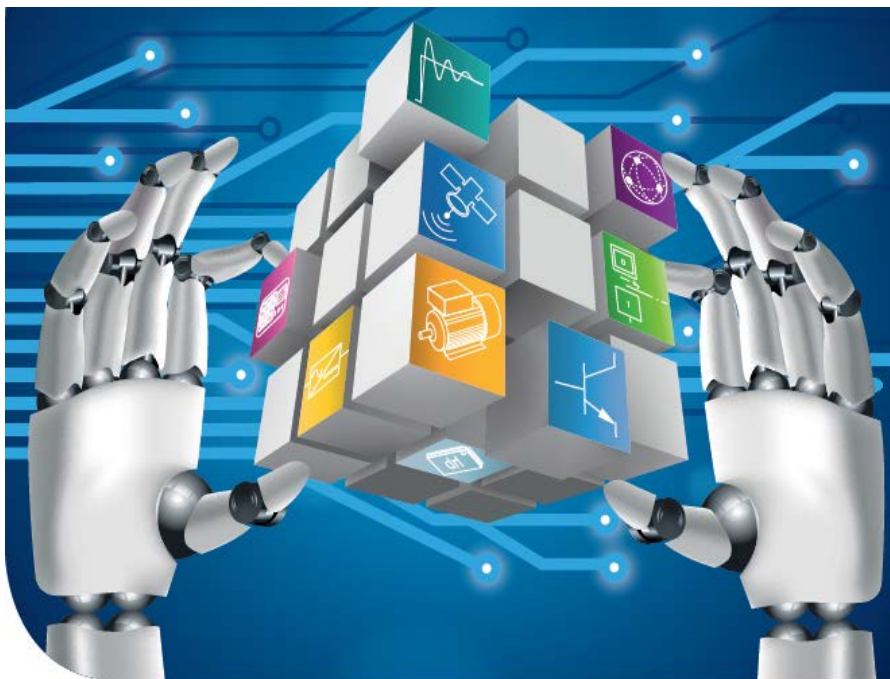
Power Electronics Electrotechnics



Telecommunications



Networks and Voice Data Image convergence



Manufacturing

French design and manufacturing, in our workshops



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