

## Laser Ray Boxes



### 21-0301 Laser Ray Box without Power Supply

### 21-0302 Laser Ray Box with Power Supply

The Laser Ray Box consists of five independent laser modules with a wavelength of 635 nm. Five clearly visible parallel line light traces can be seen when they are collimated by cylindrical lenses. It effectively demonstrates the transmission of rays through a combination of optical elements. The laser has magnetic back which enables it to be easily used with Ray Optics Demo Sets (21-0401 or 21-0402). Battery box and mechanical shade is included.



### 21-0311 Laser Ray Box ELECTRONIC without Power Supply

### 21-0312 Laser Ray Box ELECTRONIC with Power Supply

One of our best products ever! 5 - Beams Laser Ray Box - electronic (21-0311) - increases comfort of geometric optics education. It uses all the advantages of Laser Ray Box and extra - for shading the beams it doesn't need the mechanical shade. The electronic switching enables it. With the help of ON/mode/OFF key on the Laser Ray Box - electronic - you can switch the modes in this order: A. sleep mode, B. all 5 beams emitted, C. beams 1, 3, 5 emitted, D. beams 2, 3, 4, emitted -, E. only beam 3 emitted. After 60 minutes it automatically switches into sleep mode. Battery box is included.



### 21-0321 Green Laser Ray Box - Electronic without Power Supply

### 21-0322 Green Laser Ray Box - Electronic with Power Supply

Green Laser Ray Box includes 5 modules emitting green light (wavelength 532 nm). Human eye is most sensitive for this wavelength - 3 times more sensitive than for 635 nm (red light). It is the best what exists! With this Ray Box you can prepare all the geometrical optics experiments w/o limiting. With the help of ON/mode/OFF key on the Green Ray Box - you can switch the modes in this order: A. sleep mode, B. all 5 beams emitted, C. beams 1, 3, 5 emitted, D. beams 2, 3, 4, emitted -, E. only beam 3 emitted.



### 21-0331 3- beam Laser Ray Box Electronic

Economic version of Laser Ray Box with 3 rays. It is possible to switch the beams electronically. Ray distance is 24 mm. Suitable for student sets. Battery box is included.

### Optional: 21-2006 Power Supply 100-240VAC / 3VDC

Suitable for Laser Ray Boxes, Laser Line Boxes, Didactic Lasers DL1 and Green DL1, MLDD, Fresnel Mirrors.

## Ray Optics Sets without Laser Ray Box



**21-0401 Ray Optics Demo Set without Magnet Board**

**21-0402 Ray Optics Demo Set with Magnet Board**

This set has been designed for simple and clear demonstration of the principles of geometrical optics - transmission, reflection and refraction. It demonstrates the functioning of the eye and eyeglasses (shortsighted and longsighted eyes and the correction), of Galileian and Keplerian telescopes, as well as the camera etc. The set contains 8 different lenses, 3 types of mirrors, plan parallel plate, right-angle prism, fiber, and 6 pcs example sheets, users Manual and CD-rom with Video tutorials of experiments. Delivered in a carton plastic case.

Recommended accessories:  
 Laser Ray Box (21-0302) or Laser Ray Box Electronics (21-0312) - sold separately.



**21-0411 Ray Optics Demo PLUS Set without Magnet Board**

**21-0412 Ray Optics Demo PLUS Set with Magnet Board**

Additional set to extend the use of the Ray Optics Demo Set. Using this set enables you to clearly observe negative refraction effect on both - converging and diverging lenses. Many different experiments show use of optical elements in technical optics, such as telescope, periscope, right angle prisms etc. The set contains 15 pcs optical models - biconcave 'air lens', biconcave lens, biconvex 'air lens', biconvex lens, equilateral 'air prism', equilateral prism, rectangular prism, parallel plates, plane mirrors, users Manual and CD-rom with Video tutorials of experiments.

Recommended accessories:  
 Laser Ray Box (21-0302) or Laser Ray Box Electronics (21-0312) - sold separately.

**Optional: 21-0116 Magnet Board 59x45 with Support Stand**

Suitable for Ray Optics Demo set and Ray Optics Demo PLUS set. Dimensions including frame.



**21-0421 Ray Optics for students including laser light source**

Excellent and essential set for practical exercises. Contains 11 pcs of optical models, 3-beams light source including external battery box and 5 worksheets. This set enables students to understand basic ray optics principles - transmission, reflection, refraction. Students can construct simple optical devices using worksheets - e.g. worksheet "human eye" helps to understand why some of them have to wear glasses. The set has been designed to be table-used. All elements are non-magnetic. Includes manual with experiments. Set will be delivered in carton plastic case.



**21-3005 Hartl Optical Disc set**

Very popular and schematic aid for the explanation of the principles of reflection and refraction of light in the optic environment. The set contains metal base with rotatable circle and angular scale, semicircle optical module, Laser Line Box with Power Supply

## Wave Optics and Fiber Optics Sets



**21-0601 Laser Optical Set LOS1 without Magnet Table**

**21-0602 Laser Optical Set LOS1 with Magnet Table**

This set has been designed to facilitate the education of wave optics. The following principles can be clearly demonstrated: basic optical principles of light diffraction, the phenomena of coherent light interference, reconstruction of holographic images, the behavior of linearly polarized light, etc. The set contains: diode laser, power supply, 2 mirrors, 2 adjustable mirror holders, semitransparent mirror, polarizing filter, ground screen, set of diffraction and interference structures, hologram, plastic suitcase, battery box, users Manual and CD-rom with Video tutorials of experiments.

**Optional: 21-0624 Magnet Table for LOS1 59x45 (Dimensions including frame)**



**21-0623 Laser LOS Including lens**

Small but effective adjustable laser from LOS1 with 1mW output. Controllable holder enables you to point the ray demanded direction. Magnetic bottom side. Delivered with collimating lens, which can be used by hologram reconstruction.



**21-0621 Hologram from LOS1 (85x70mm)**

By means of a divergent beam you can reconstruct the hologram. Demonstrates three-dimensional record of an object. Highly effective device for demonstration of holography and wave properties of light. Hologram is framed, delivered with stand. Dimensions with frame - 110x100mm



**21-1001 Laser Communication Kit without Colour Camera**

**21-1002 Laser Communication Kit with Colour Camera CC9621B**

Using this set you can easily perform the sound and picture transmittance. For the picture transmittance it is necessary to buy a camera - you can use any PAL/NTSC camera.

The Kit contains: Laser Transmitter MLDD 3.0, Laser Receiver, microphone, loudspeaker, adjustable transmitter holder, receiver holder, Power Supply (100-240VAC/12VDC), plastic suitcase.



**21-1201 Fresnel Mirrors without Power Supply**

**21-1202 Fresnel Mirrors with Power Supply**

Mirrors clearly demonstrating light interference.  
 Laser source 635 nm-1mW – laser class II, Battery box, ground screen, white screen are included.



**21-1101 Optical Fiber Demonstration set**

This set demonstrates behavior of light in fiber optics, information transmission, examples of fiber optic sensors etc.

The set contains: basic transmitter and receiver board with possibility to connect following modules: analogue transmitter, receiver, digital transmitter, receiver, transmitter set with microphone, receiver set with amplifier and speaker, a frequency generator, RS232 signal converter receiver and transmitter.

The set also contains special connector for fiber optics, universal AOV meter device, equipment for Tyndall's light guiding experiment, force plates, bending cylinders, special emeries for fiber preparation, jacketed and unjacketed fibers, power supplies, users Manual and CD-rom with Video tutorials of experiments and software for one way PC-to-PC communication on CD.



**21-1103 Optical fibers and polishing ( lapping ) films kit**

The practical set consists of three unjacketed polymer optical fibers ( 2 m, 3 m, 5 m long) with 1 mm diameter, one 3m long jacketed optical fiber with 2 mm outside-diameter (diameter of core is 1 mm). The fibers have a step profile of refractive index of various lengths. Set contains 3 types (2 pc of each) polishing (lapping) films with various grade of abrasiveness (0,3 micro, 3 micro and 12 micro). Can be used as a spare kit for experiments of Optical Fibers set or for your own experiments.

**Laser Line Boxes**



**21-0501 Laser Line Box without Power Supply**

One clearly visible red (635 nm) line light trace can be seen when it is collimated by cylindrical lenses. It effectively demonstrates the transmission of ray through a combination of optical elements. The laser has magnetic back. Battery box is included.



**21-0502 Laser Line Box with Power Supply**

Laser Line Box (the same as 21-0501) supplied with Power Supply (100-240VAC/3VDC).



**21-0511 Green Laser Line Box without Power Supply**

**21-0512 Green Laser Line Box with Power Supply**

One clearly visible green (532 nm) line light trace can be seen when it is collimated by cylindrical lenses. It effectively demonstrates the transmission of ray through a combination of optical elements. The laser has magnetic back. Battery box is included. Human eye is most sensitive for this wavelength - 3 times more than for 635 nm (red light). It is the best what exist!

**Lasers**



**21-0701 Laser Quant without Power Supply**

**21-0702 Laser Quant with Power Supply**

High end regulated semiconductor laser with modulation for universal use. It has a regular output from 0,2mW to 1 mW. After switching on the laser starts to emitted at the minimal output value. The optical power is adjustable by a potentiometer and is shown on a LCD display. The laser will reach the adjusted power after pressing the switch button connected by means of cable in order to avoid vibration caused by touching the laser main body. The laser can be used for a sound transmission. A possibility to order: steel stand – holder with M8.

**21-0801 Diode Laser MLDD 3.0 - 1mW**



MLDD (Modulated Laser Diode Device) is with adjustable output in the range of 0,2 – 1,0 mW. It displays the emitting output immediately on the LCD display. The interconnection of the control unit with the laser head by means of a cable avoids the vibration of the laser by setting the experiment. The laser can also be used for a video and sound transmission. Power Supply is included.

**21-0803 Diode Laser MLDD 3.0 - 3mW**

Like Diode Laser MLDD3.0 (the same as 21-0801) but adjustable output in the range of 0,2 – 3,0 mW



**21-0901 Didactic Laser without Power Supply**

**21-0902 Didactic Laser with Power Supply**

Low end didactic laser light source 635nm-1mW, laser class II, Battery box and laser holder are included.



**21-0911 Green Didactic Laser GDL1 without Power Supply**

**21-0912 Green Didactic Laser GDL1 with Power Supply**

Didactic laser emitting green light (wavelength 532 nm), Pmax= 1mW, Laser class II. With keylock and LED indicator



**21-2101 Small Diode Laser SDL1 without power supply**

**21-2102 Small Diode Laser SDL1 with power supply**

Simple laser - 635 nm, Pmax= 1 mW delivered with holding rod with diameter 10 mm. Suitable for simple experiments on optical bench.



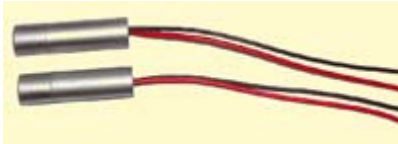
**21-1501 Green Laser 532 nm - 5mW**

Lasers 532 nm, 5 mW with, high stability. Power Source included, Laser class 3R

**21-1502 Green Laser 532 nm - 10 mW**

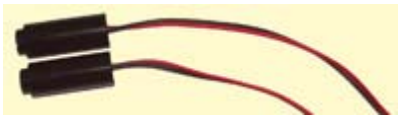
Lasers 532 nm, 10 mW, high stability. Power Source included, Laser class

## Diode Modules



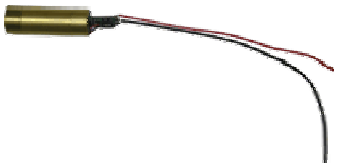
**21-1301 Laser diode module LM 8-635- 1mW**

Especially suitable for use in education, medicine, industry... The focus is not adjustable. LM X-Y(Z): X- diameter, Y - wavelength, Z- output power



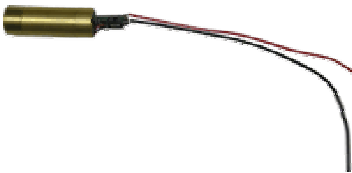
**21-1302 Laser diode module LM 12-635- 3mW**

Especially suitable for use in education, medicine, industry... The focus is adjustable. LM X-Y(Z): X- diameter, Y - wavelength, Z- output power



**21-1311 Laser Diode modules LM12-532-1mW, 532 nm**

Especially suitable for use in education, medicine, industry... The focus is not adjustable. LM X-Y(Z): X- diameter, Y - wavelength, Z- output power



**21-1312 Laser Diode Module LM12-532-5 mW, 532 nm**

Especially suitable for use in education, medicine, industry... The focus is not adjustable. LM X-Y(Z): X- diameter, Y - wavelength, Z- output power

## Laser Pointers

### Laser Pointers

**Wave Length: 630 - 680 nm**  
**Laser Class: II**  
**Operation Time: 6 hours (min.)**

**Maximum output: Pmax= 1mW**  
**Beam Dimensions: 3 x 2mm**  
**Dimension: 133mm (W), diameter 14mm**



**21-1401**  
Laser Pointer LP-1  
without ball pen



**21-1402**  
Laser pointer LPBP-1  
with ball pen

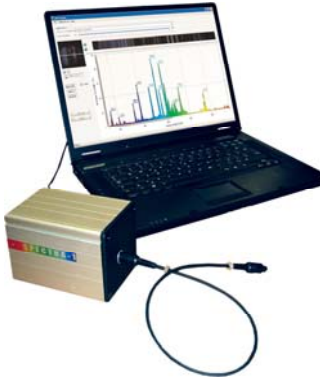


**21-1403**  
Laser Key LK-1 (Red)



**21-1404**  
Green laser pointer GLP-1  
without ball pen

## Light - Spectra and Color Mixing



### Spectral-1 High Resolution CCD Spectrometer for Education

Easy to use laboratory Spectrometer. Ideal as general purpose instrument for School and Research Labs.

#### Specifications:

Dimensions: 60 x 60 x 120 mm Weight: 600 g  
Spectral range: 360 - 940 nm Spectrometer resolution: <2.0 nm FWHM  
Pixel resolution: <0.5 nm Software: Win XP and Vista based, USB 2.0

Contains: Every spectrometer comes ready-to-use, tested and calibrated.  
Package includes: Spectrometer with USB Cable, Optical Fiber, CD with software and instruction manual.



### 21-2200 Spectral Plus

Demonstration set for color mixing and spectra.

This set allows to explain the light, spectra, color mixing, light diffusion and absorption.

Contains different types of light sources (light emitting diodes, incandescent bulb, fluorescent tube), color filters, holographic grating and a spectroscope to observe different types of emission spectra.

Helps to explain optics and some parts of atom physics in a more attractive and meditative way.

## CCD Camera and Accessories



### 21-1603 Hi-Res Color CCD Camera CC 8706S

1/3" Panasonic CCD Chip  
BLC: ON-OFF; autoiris Video D/C Drive;  
AGC: ON-OFF; ALC Low-High;  
Video output: 1.0Vp-p, 75ohm  
Minimum Illumination: 0.5 LUX (F/1.4)  
DC12V; C/CS  
NTSC 1/60-1/100,000 sec.  
PAL 752(H)x582(V);  
Automatic Electronic Shutter: ON-OFF;  
550 TV lines;  
Gamma char. 0.45;  
Operating temperature: -10 °C to +60 °C  
PAL 1/50-1/100,000 sec.  
Dimensions: 117(L)x57(W)x57(H)mm



### 21-1602 Color CCD Camera CC-9621B

1/4" Color Bullet Camera Panasonic D5 CCD  
NTSC 510(H)x492(V) ; PAL 512(H)x582(V)  
BLC: ON; Auto White Balance: ON;  
Automatic Electronic Shutter: ON; AGC: ON; ATW: ON; 420 TV Lines  
Video output: 1.0Vp-p, 75ohm  
Gamma char. 0.45;  
Minimum Illumination: 0.92 LUX (F/1.4)  
Operating temperature: -10 °C to +60 °C  
DC 12V  
PAL 1/50~1/100,000 sec.  
NTSC 1/60~1/100,000 sec.  
Dimensions: 25 (R) x87(L)mm