

Physics Lab Apparatus Specifications on PC-I

List of Apparatus for Physics Lab

Sr.	Name of Equipment	Quantity	Specifications
1.	<p>Determining Plank's constant - Measuring in a compact Assembly (Set)</p> <p>Lamp Length of Guide: 395mm Dark current $\leq 0.003\mu\text{A}$ Precision of accelerated voltage $\leq 2\%$ Set of 5 different color filters Complete set with all other necessary Accessories</p>	1	<p>Features:</p> <ul style="list-style-type: none"> - Instrument can carry on the experiment about the rule of photoelectric effect- Calculate Planck's constant according to Einstein's equation of photoelectric effect Instrument has features such as compact structure, fastness, Convenient operating, steady performance, cheap and Convenient service. <p>Technical Specification:</p> <ul style="list-style-type: none"> - Color filter: 635nm, 570nm, 500nm, 460nm- Sensitive component: Vacuum phototube.- Dark-current: $\leq 0.003\mu\text{A}$ - Light source: 12V/30W halogen tungsten lamp - Length of guide: 395mm- Precision of accelerate voltage: $\leq 2\%$- Measuring error: Less than $\pm 15\%$ compared with the Recognized value ($h=6.62619 \times 10^{-34}\text{J.S}$) <p>Complete unit, Made in China.</p>

2.	<p>To determine characteristics of G.M (end-windows) counter tube (set) . To find out the maximum energy and range of α, β and gamma particle Radiation counter with RADEM and LABLINK GM Probe (35mm) and stand. USB Cable Calibrated Absorber Set (20) At least 3 separate radioactive sources for α, β and gamma rays. At least 3 separate tubes for α, β and gamma rays detection. Imported: USA/Germany/Japan</p>	1	<p>Inputs: BNC connector – connects to standard Geiger tubes; High voltage: 0 to +1200 volts, selectable in 10 volt increments. Model A Display: 6-decade LED, 1 in. numerals; mode LEDs Modes: Counts; Elapsed Time; Preset Time; Count Rate (cpm or cps); High Voltage Level Control: USB 2.0, LAN, and WiFi for both PC Power: AC adapter, 9 volt DC, at 1200 mA Software: Spectrum Techniques Ultra software for Windows, RAS20 Radiation Absorber Set USB USB Cable A+B LM5 Experiment Lab Manuals - CD With glass Slide simple source on glass slide from England Complete set as above Spectrum Techniques USA.</p>
3.	<p>Determining the half-life of Cs-137 – Recording and Evaluating the decay curve with Computer Interface (set)</p>	1	<p>Inputs: BNC connector – connects to standard Geiger tubes; High voltage: 0 to +1200 volts, selectable in 10 volt increments. Model A Display: 6-decade LED, 1 in. numerals; mode LEDs Modes: Counts; Elapsed Time; Preset Time; Count Rate (cpm or cps); High Voltage Level Control: USB 2.0, LAN, and WiFi for both PC Power: AC adapter, 9 volt DC, at 1200 mA Software: Spectrum Techniques Ultra software for Windows, RAS20 Radiation Absorber Set USB USB Cable A+B LM5 Experiment Lab Manuals - CD With glass Slide simple source on glass slide from England Complete set as above Spectrum Techniques USA.</p>

4.	<p>Determination of charge to mass ratio of an electron by fine beam tube Fine beam tube filled with gas Helmholtz coil pair Tunable DC (Constant Current) Power Supply Tunable DC (Constant Voltage) Power Supply II Red and Black Patch Cords Imported: USA/Germany/Japan</p>	4	<p>Fine Beam Tube T Spare Tube for Complete Fine Beam Tube System 1013843. Operating Unit for Fine-Beam Tube The fine beam tube and Helmholtz coil pair are mounted on the operating unit, the fine beam tube being rotatable around its vertical axis. The tube and coil pair are both connected internally to the operating unit without a need for external wiring. All supply voltages for the tube and the current through the Helmholtz coils are adjustable. The anode voltage and coil current are displayed digitally and can be tapped additionally as equivalent voltage values. Specifications: Coil diameter: approx.300 mm Winding count: 124 Magnetic field: 0...3.4 mT (0.75 mT/A) Operating unit: Coil current: 0 ... 4.5 A, 3-figure digital display Measurement output: $1 \text{ V} \cdot \text{IB} / \text{A}$</p>
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5.	<p>Study of Hall Effect in a semiconductor wafer with built in Tesla meter. Hall Probe Unit, n-Semiconductor (GaAs) Hall Effect Power Supply U-Core Electromagnetic Coil Track, Length 40 cm Optical Carrier (2) Adjustable Post Holder with 9 cm post (2) Banana Cords (6) Connecting Cables for 550/850 Interface (2) Magnetic Field Sensor 550 Universal Interface Imported: USA/Germany</p>	4	<p>Hall Effect Basic Apparatus Basic apparatus for providing contact, power supply and support to a germanium crystal on a circuit board (U8487010, U8487020 and U8487030) in experiments on the Hall effect or on conductivity. Includes an integrated, adjustable constant current source to provide the current through the sample, a measuring amplifier with offset compensation for Hall voltages and heating to raise the crystal to as high as 170°C, also featuring temperature regulation and a switchable display showing Hall voltage, sample current, sample voltage or temperature. Hall voltage and sample voltage can be tapped directly from the front panel. In addition three equivalent voltage outputs for Hall voltage, sample current and sample temperature can be measured from the side. Includes an attachment for assembling the apparatus on the U-shaped core (U8497215) of a transformer assembly kit and 2 connecting leads with 8-pin miniDIN plugs.</p> <p>Experiment topics: Extrinsic conductivity Intrinsic conductivity Mobility of electrons and holes Drift velocity of charge carriers Carrier concentration Band separation</p> <p>Specifications: Outputs for equivalent voltages: 4-mm safety sockets 8-pin miniDIN sockets (3BNETlog compatible) Power supply: 12 V AC, 3 A via 4-mm sockets Dimensions: 180x110x50 mm³ approx. Weight: 0,5 kg approx</p> <p>N-Doped Germanium on PC Board High-quality interchangeable board with an n-doped germanium crystal for investigating the conductivity and Hall potential for n-doped germanium as a function of temperature. With contacts for transverse current and Hall potential, integrated resistive heating element with temperature sensor directly under the crystal, and a pin plug for connecting the circuit board to the basic Hall effect apparatus (U8487000). Specifications: Crystal dimensions: 20x10x1 mm³ approx. Overall dimensions: 70x70x10 mm³ approx. Weight: 30 g approx.</p> <p>P-Doped Germanium on PC Board High-quality interchangeable board with an p-doped germanium crystal for investigating the conductivity and Hall potential for p-doped germanium as a function of temperature. With contacts for transverse current and Hall potential, integrated resistive heating element with temperature sensor directly under the crystal and a pin plug for connecting the circuit board to the basic Hall effect apparatus (U8487000). Specifications:</p>
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Crystal dimensions: 20x10x1 mm³ approx. Overall dimensions: 70x70x10 mm³ approx. Weight: 30 g approx.

Magnetic Field Sensor FW ± 2000 mT

Magnetic field sensor FW ± 2000 mT is used to measure magnetic flux density in the tangential direction. Located on the tip of the probe is a Hall sensor with an output signal proportional to the operating voltage. The sensor is equipped with two range buttons and one tare button, as well as a visual display of the currently active measurement range.

Range: 2, 20, 200, 2000 mT

Resolution: 0,01 mT (2 + 20 mT), 0,1 mT (200 mT), 1 mT (2000 mT)

Configuration: tangent

Sensor type: Linear Hall-Effect-Sensor

Length of probe: 135 mm (from front surface of the housing) Can be used to:

- investigate the Hall effect in semiconductors and metals
- record hysteresis curves
- investigate the Biot-Savart law

Voltage Sensor 500 mV, differential

The Voltage sensor BT32i is designed for measuring voltages between -500 and +500 mV. The sensor has differential inputs; measurements can be done directly across circuit elements without the constraints of common grounding. It has two 4-mm plugs for easy connection.

Range: -500 ... +500 mV

Resolution (12-bit): 338 µV Can be used to:

- measure small voltages in AC and DC circuits,
- record characteristics of a light bulb or a diode,
- measure voltages in series and parallel electrical circuits.

Voltage Sensor 10V, differential

The Differential Voltage sensor (1022539) is designed for measuring voltages in the range between -10 and +10 V.

With a wide input voltage range this sensor can be used to measure voltages in AC and DC circuits.

The sensor has differential inputs, which means that measurements can be done directly across circuit elements without the constraints of common grounding.

It can be used to measure positive, as well as negative potentials. It has two banana (4-mm) plugs for easy connection. The sensor is provided with over-voltage protection and voltages up to ± 50 V (related to ground) will not damage the sensor. It never can be used for higher voltages. The sensor is excellent to sample AC-signals at relative high frequencies (< 100 kHz).

The Differential Voltage sensor can be directly connected to analog inputs of the CMA interfaces with the connection cable (1021514). Please note that this cable is

not included in the supply and may have to be ordered separately.

Range: -10 ... +10V
Resolution (12-bit): 6.5 mV Can be used to:

- measure voltages in AC and DC circuits,
- record characteristics of a light bulb or a diode,
- measure voltages in series and parallel electrical circuits

Coil D with 600 Taps
Secondary coil for use with the U-core with Yoke (U8497180) to generate low- or high-voltage outputs.
Coils are covered with impact resistant plastic so that they are safe to touch and use safety connection sockets.
Specifications:
Number of turns: 600 Taps: 200/600 Resistance: 3 Ω Max. current: 2.2 A Inductance: 15 mH
U Core D
U shaped core with no yoke for use with Transformer Core D items

Pole Shoes/Clamping Brackets Hall Effect
Pair of pole pieces for experiments on the semiconductor Hall effect. Including clamping brackets for mounting on the U-core D (U8497215).
Specifications:
Pole shoe dimensions: 40x40x75 mm³ Total weight: approx. 2 kg
Transf. w. Rectifier 3/6/9/12V, 3A @230V
Extra low-voltage power supply with overload protection contained in plastic housing.
Output voltage has four switchable stages.
Safety transformer conforming to EN 61558-2-6.
Safe isolation between power supply and output circuits. Specifications:
AC output: 3/ 6/ 9/ 12 V DC output: 3/ 6/ 9/ 12 V Max. AC current: 3 A Max. DC current: 3 A Terminals: 4-mm safety sockets

DC Power Supply 0-20V, 0-5A @230V
Universal power supply with digital current and voltage display. Output voltage and output current are continuously adjustable. The device can be used as a constant voltage source with current limiting or as a constant current source with voltage limiting.
Specifications:
DC output: 0-20 V, 0-5 A Output power: 100 W Stability under full load $\leq 0,01\% + 5$ mV, $\leq 0,2\% + 5$ mA Residual ripple ≤ 1 mV, 3 mA
Display: 2 x 3 digit LED Terminals:
4 mm safety sockets
Dimensions: approx. 130x150x300 mm³
Weight: approx. 4.7 kg

Digital Multimeter
Digital multimeter for universal use in measuring voltage, current, resistance, frequency, capacitance, temperature and also including diode and continuity tests . Includes a measurement value hold function, analogue bar automatic polarity

reversing, overload and overvoltage protection as well as an acoustic overload indicator, automatic switch off. Device comes in a shock-proof holster with fold-out stand. Including testing leads, type K temperature sensor and batteries.

DC voltage: 400 mV – 1000 V, 5 ranges, $\pm 0.5\% \pm 2$ digits
AC voltage: 4 – 700 V, 4 ranges, $\pm 1.2\% \pm 3$ digits
DC current: 400 μ A – 10 A, 6 ranges, $\pm 1\% \pm 3$ digits
AC current: 400 μ A – 10 A, 6 ranges, $\pm 1.5\% \pm 5$ digits
Resistance: 400 Ω – 40 M Ω , 6 ranges, $\pm 1\% \pm 2$ digits
Capacity: 40 nF – 100 μ F, 5 ranges, $\pm 3\% \pm 5$ digits
Temperature: -20 – 760°C, $\pm 3\% \pm 3$ digits
Display: 3¾ digit LCD, 39 mm, max: 3999
Operating voltage: 9 V battery
Safety classification: CAT II 1000 V (IEC-1010-1)
Fuse: F1: F 500 mA / 600 V
F2: F 10 A / 600 V, I_{max.} = 10 A for 30 s
Dimensions: approx. 92x195x38 mm³
Weight: approx. 200 g

VinciLab
The VinciLab is a modern advanced graphic data-logger. It is a handheld Linux device equipped with two processors and 8 GB memory. Works standalone and with Windows and MAC computers. The dedicated desktop applications, installed on VinciLab, offer tools for collecting data, managing user files, setting up the device and its wireless connection, browsing the web, watching video files, playing audio files, etc. All applications can be easily updated via the VinciLab Update server available via a Wi-Fi connection. The powerful Coach Application, installed on VinciLab, offers live sensor data displays, real-time graphing, tools for data processing and possibilities to create new or open ready-to-go student activities (experiment manuals), enriched with texts, images and web-pages. Coach 7 and Coach 7 Lite support measurements with VinciLab. During such measurement VinciLab is connected to the computer via a USB port or communicates via a Wi-Fi connection, and is controlled by Coach running on the computer. The collected data are transferred in real-time to the computer and the measurement can be followed directly on the computer screen. By using wireless connectivity and the VNC protocol the VinciLab's screen can be remotely viewed and controlled from any computer or mobile device connected to the same network.

Display: 5" high-resolution capacitive color touch screen

Resolution: 12-bit
 Sampling rate: 1 MHz
 Sensor inputs: Four analog BT inputs, two digital BT inputs
 Built-in: Sound sensor, 3-axis, accelerometer (2 g, 4 g, 8 g)
 Wireless connectivity: Wi-Fi (mobile devices alternatively via Bluetooth®)
 Computer connection: USB mini port
 USB port: Full USB for USB peripherals
 Software on board: Coach Linux
 Software on computer: Coach 7 or Coach 7 Lite
 Power supply: Rechargeable battery, via USB from computer or via power adapter
 Software license required, available license options:
 UCMA-180SU Coach 7, Single User License 5 years
 UCMA-18100 Coach 7, School Site License 1 year
 UCMA-181U Coach 7, University Site License 1 year
 UCMA-18500 Coach 7, School Site License 5 years
 UCMA-185U Coach 7, University Site License 5 year

Set of 15 Safety Experiment Leads, 75cm
 For electrical circuits with low voltages and high currents; copper wire encased in highly flexible PVC; equipped at either end with a laminated safety plug and a fully-insulated axial jack for connecting additional patch cords.
 Wire cross-section: 2.5 mm²
 Continuous current: max. 32 A Plug and jack: 4 mm (nickel-plated) Voltage: Low voltages
 Set of 15 patch cords, 75 cm long: 4 cables each in the color red, blue and black, one cable each in the color green, brown and yellow-green.

Set of 4 Sensor Cables
 The sensor cable is used to connect sensors to the data logger. The cables are sold per piece and in packages of four.
 Length: 1.5 m

As above, 3B Scientific Germany

