



# Educational Alibava System



## OVERVIEW

EASy is a **portable, compact** and **complete** system for microstrip sensor characterization that uses the front-end readout Beetle chip developed for CERN/LHC experiments.

EASy is a plug-and-play educational system based on ALIBAVA. All components needed to start measuring are assembled and prepared, including the microstrip sensor. EASY allows for a quick and simple setup, ideal for student laboratory experiments. Furthermore, a practical exercise book is included.

The system introduces high-energy physics and particle detectors to physics students with hands-on experience. It familiarizes the students with concepts such as **MIP, charge deposition, full depletion** and **interstrip pitch** among others.

## FEATURES

- P-on-N microstrip silicon detector
- 128 channels
- Function modes: Electronic calibration, radiation source and laser
- Laser source with positioning and focusing system
- Chip BEETLE at 40 MHz
- Energy resolution: 3 to 6 KeV
- Energy range: up to 330 KeV
- Three different trigger modes
- Connectivity USB 2.0
- Acquisition software for Windows, Linux and Mac
- Data stored in custom binary and HDF5 files
- Example macros for further in-depth analysis provided
- Voltage supply: +5 V



# Educational Alibava System

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## Control unit

Processing of the sensor data, trigger signals and laser source

Control of the acquisition process

Adjustable HV unit for microstrip sensor, with voltage and current display

Communication with computer software via USB

Size: 170x125x55 mm<sup>3</sup>



## Sensor unit

Microstrip detector

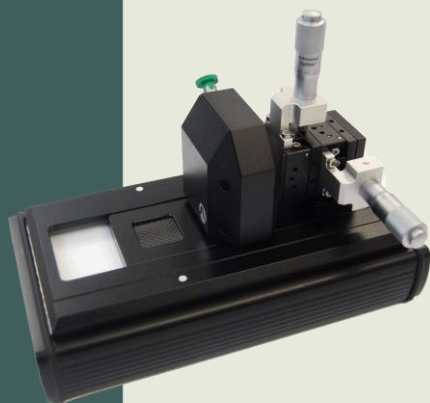
Beetle chip:

- Low noise ASIC developed for CERN/LHC experiments
- 128 channels
- Clock speed 40MHz

Opaque carbon window to place radioactive source

Laser micropositioner and focus system

Size: 190x108x140 mm<sup>3</sup>



## Microstrip detector

Size: 20x20 mm<sup>2</sup>

Thickness: 300 μm

Channels: 128

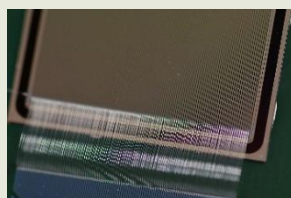
Interstrip pitch: 160 μm

Full depletion  $V_{FD} < 60$  V

Break down  $V_{BD} > 300$  V

Reverse current  $I_L$  (@60V) < 10 nA/strip

Bias adjustable from control unit



## Laser Source

Wavelength: 980nm

Pulse width: 5 ns

Laser Spot: 20 μm

Micropositioner resolution: 10 μm

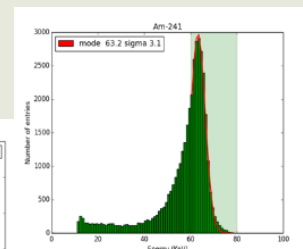
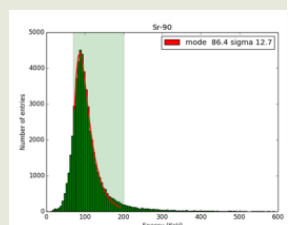
## Timing and trigger modes

Time stamp register for individual events.

Three trigger options:

- External: Triggered by diode detector included.
- Autotrigger: Beetle generated trigger for particles absorbed in the microstrip sensor.
- Synchronised trigger: triggered with laser source.

DIODE TRIGGER



AUTOTRIGGER



## Acquisition Software

Simplified software controlled by GUI to ease the control of the system. Data provided: noise, gain, pulse shape, collected charge, single events per channel and more. Results stored in binary and HDF5 files. Example analysis software (macro) in ROOT, Python, Matlab and Octave. Students can program further.

## User's Manual and Exercise Book

The kit incorporates the user manual and a specific exercises book ideal to introduce the student to the high energy physics experiments.

