

ARYELLE¹⁵⁰ Spectrometers

Interaction of light and matter –
induced and analyzed with lasers
and measuring systems of LTB



ARYELLE 150*

ARraY EchELLE Spectrograph



- Very compact and stable
- High resolution (5,000-11,000)
- Large simultaneous wavelength range
- Can be combined with different detectors (CCD, EMCCD)
- Up to 30 spectra per second
- Cost-efficient
- Easily configurable dispersion unit

ARYELLE 150 is a very compact and cost-efficient high-resolution spectrometer for the material /elemental analysis in industry by means of LIBS and Raman spectroscopy.

ARYELLE 150 is an inexpensive echelle spectrometer with fibre coupling for different CCD and EMCCD image detectors. It is characterized by a high sensitivity and a high imaging quality. The dispersion unit with grating and prism can be easily configured for different applications.

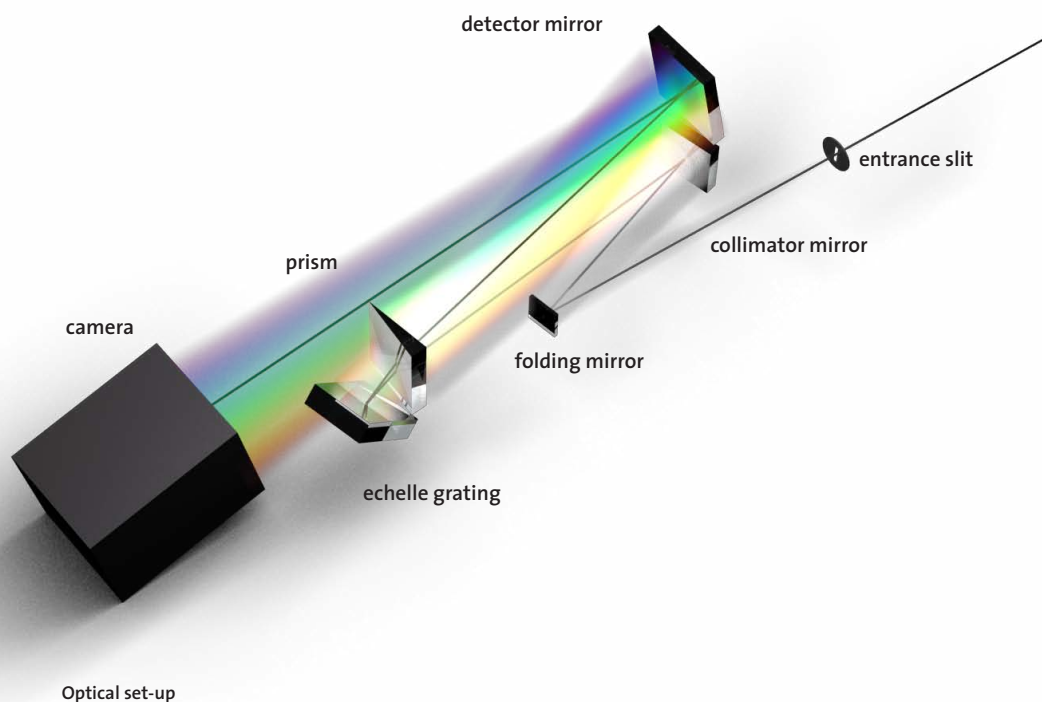
Application fields of the ARYELLE 150 are the material and elemental analysis by means of laser-induced breakdown or Raman spectroscopy. Due to its compact and rugged design it is well suited for the industrial process control, e.g. in the steel, glass and ceramics industry or in pharmaceuticals, chemistry and environmental analytics.

The small size of 120 x 170 x 86 mm³ and the low weight of 2 kg (without detector) make it particularly suitable for portable devices and industrial use.

In combination with the MA 300 you get a complete LIBS system. Other customized system setups can be realized according to your requirements.

Spectrometer concept

The ARYELLE 150 has a focal length of 150 mm and an aperture of f/7. Depending on the required simultaneously detectable wavelength range, it is possible to measure spectra from the UV up to the NIR with a spectral resolving power of 5,000 up to maximum 11,000 (at a slit width of 35 µm).



The simultaneous inspection range of the spectrometer primarily depends on the image area of the detector. The ideal detector area is $8 \times 8 \text{ mm}^2$. Thus, most CCD and EMCCD cameras of different manufacturers can be used.

For LIBS applications, the system can be equipped with a chopper. Thus a time resolution of $0.1 \mu\text{s}$ for the delay adjustment, which is sufficient for LIBS can be attained.

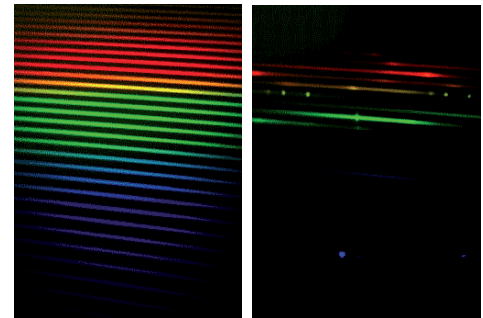
Software

The controlling and evaluation software Sophi controls all spectrometer and detector functions. A two-dimensional spectrum is extracted from the detector raw data which is automatically analyzed with an integrated data base.

The spectral lines are assigned to the corresponding elements and specified. Quantitative analysis algorithms are integrated as well. For a quantitative evaluation, a calibration with comparable samples is necessary. Quantification curves can be generated with only few mouse clicks.

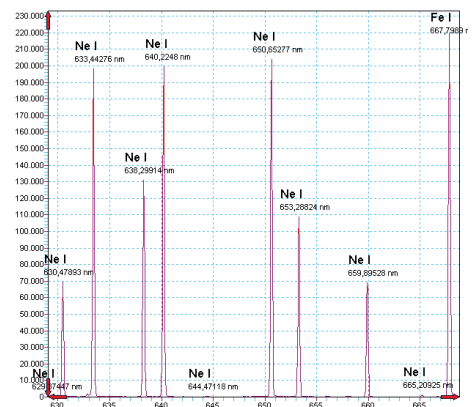
The integrated script language enables the automation of sophisticated or repeated measuring tasks. For spatially resolved measurements, an optional XYZ-table can be integrated in the script.

The optional SDK/LabView allows the complete access to all spectrometer functions and the incorporation into in-house software applications.

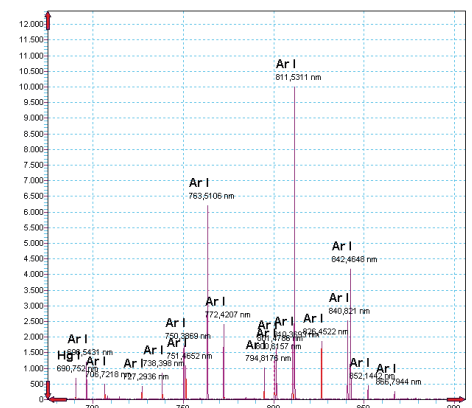


Spectrum of a
wolfram lamp

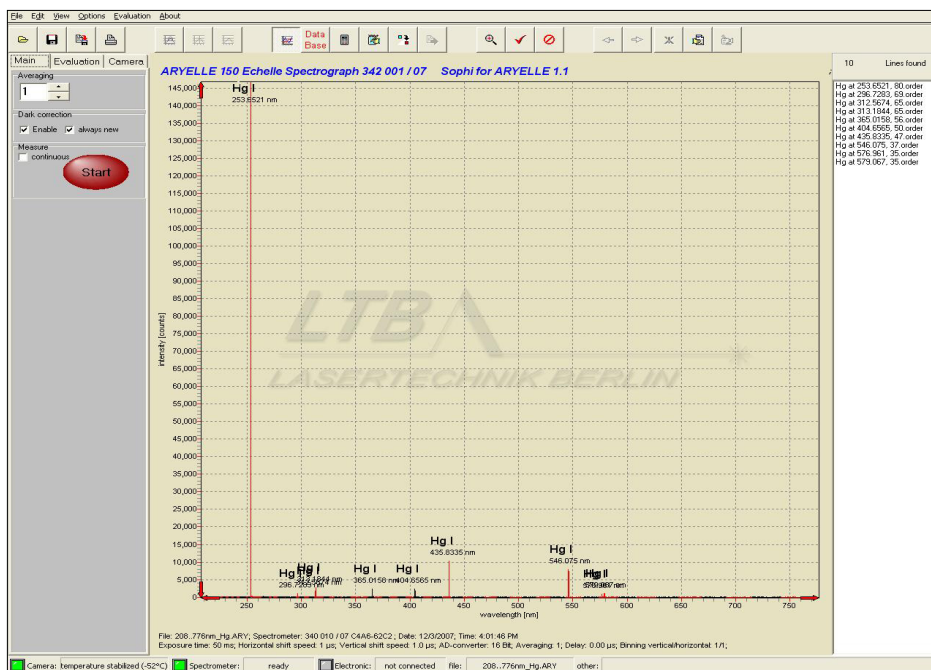
Visible spectrum of a
fluorescent lamp
(400 - 800 nm)



Part of a spectrum of a Fe-hollow-cathode lamp
Resolving power 3,500



Part of a spectrum of Hg lamp
Resolving power 3,500



Software

Spectrometers

Specifications ARYELLE 150, typ.

Aperture	f/7
Focal length	150 mm
Slit width	35 μ m
Wavelength range	220 - 800 nm
Spectral resolving power	6,000
Spectral resolution FWHM	36 - 133 pm
Order crosstalk	5×10^{-3}
Stray light	1×10^{-5}
Detector	CCD (USB), 8 x 8 mm ² image area
Dynamic range	14 bit, AD conversion
Light coupling	SMA-fiber coupling
Wavelength calibration	With mercury lamp
Absolute accuracy	Spectral resolution/4
Computer	PC or laptop with Windows
Software	Sophi
Dimensions without detector (L x W x H)	(120 x 210 x 86) mm, (4.27 x 6.69 x 3.39) in
Weight without detector	2 kg (4.41 lbs)

other spectral resolutions and wavelength ranges are possible