

NAME OF THE INSTRUMENT

X-ray fluorescence spectroscopy XRF: Elio

GENERAL DESCRIPTION:

The portable XRF instrument available in MOLAB is designed for in situ analysis being extremely handy, fast and completely non-invasive. This technique allows the determination of the elemental composition ($Z > 12$) of materials, and its use is of great interest in the field of cultural heritage for the analysis of paintings, manuscripts, monuments, metals etc.

The information obtained is useful for formulating first hypotheses regarding the identification of the inorganic pigments, also highlighting the presence of pentimenti, retouching etc.

TECHNICAL DESCRIPTION:

The Elio portable XRF instrument is equipped with a Silicon Drift Detector (SDD) type detector with an active area of 25mm^2 and an energy resolution at the $K\alpha$ line of the Mn of 130 eV with 10 kcps of photons in input (high resolution mode), or 170 eV with 200 kcps of photons in input (fast mode). The instrument is equipped with a very fast 8k channel multichannel analyzer (MCA) (USB 2.0) characterized by high resolution and high counting capacity. The excitation source is a transmission X-ray tube equipped with an Rh anode, with a current between 5 and $200\ \mu\text{A}$, a voltage that can range from 10 to 50 kV, and a 1mm collimator. ELIO is also equipped with two laser pointers (axial and focal) and an internal micro-camera that allows focusing on the specific region to be analysed. The prototype is also equipped with a height-adjustable stand (43- 188cm).



Figure: Operating conditions of the XRF Elio spectrometer during in situ measurements.

FURTHER INFORMATION:

- C. Miliani, F. Rosi, B. G. Brunetti, A. Sgamellotti, In situ Non-invasive Study of Artworks: The MOLAB Multitechnique Approach, *Acc. Chem. Res.*, 2010, 43 (6), 728-738
- V. Capogrosso, F. Gabrieli, S. Bellei, L. Cartechini, A. Cesaratto, N. Trcera, F. Rosi, G. Valentini, D. Comelli and A. Nevin, An integrated approach based on micro-mapping analytical techniques for the detection of impurities in historical Zn-based white pigments, *J. Anal. At. Spectrom.*, 2015, 30, 828-838

Referent: Laura Cartechini (laura.cartechini@cnr.it)