

Real-time elemental imaging of large dimension paintings with a novel mobile macro X-Ray Fluorescence (MA-XRF) scanning technique

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E (keV)	3-5	5-7.5	7.5-10	10-15	15-20	20-25	25-30
Focus size (μm)	44	44	43	37	28	26	26
Gain factor	4470	8955	9753	9242	7139	3267	724

Table T1 Nominal values of focus size and intensity gain of the polycapillary optic installed in the XRF scanner. The focus distance of the optic is 10 mm.

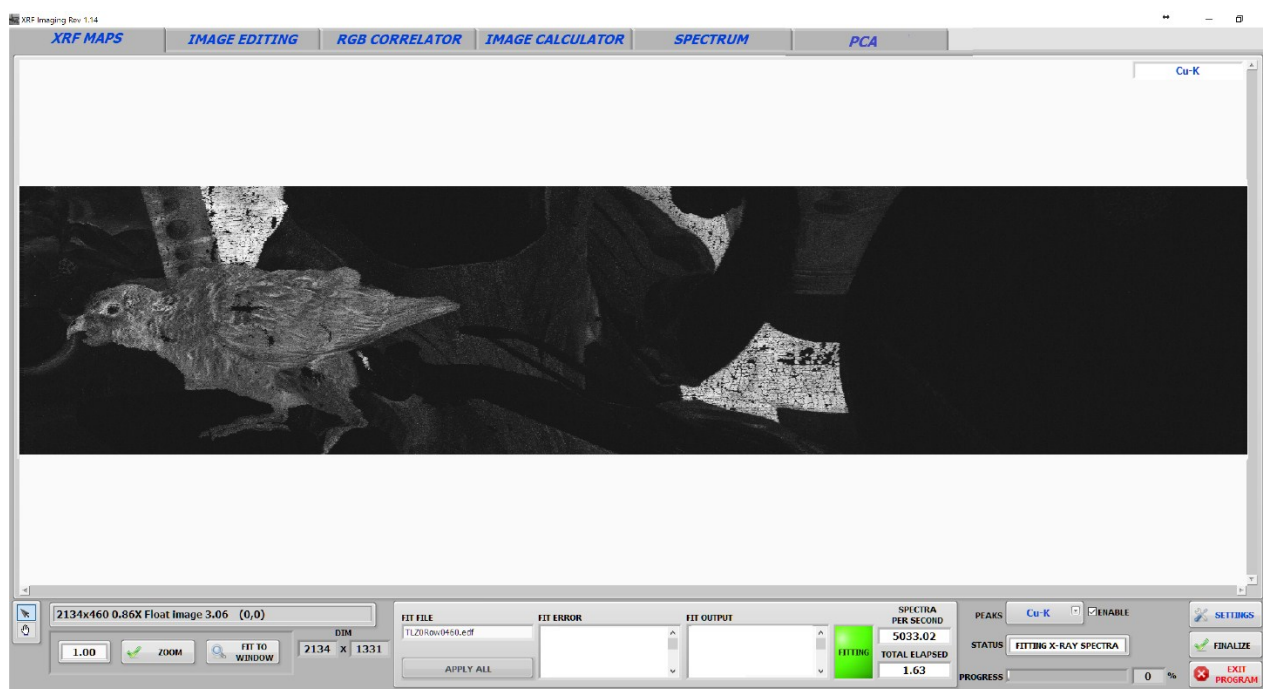


Fig. E1 The in-house programmed software for performing the real-time analysis of the continuous stream of X-ray data and images editing and processing during the scanning. The GUI is programmed in Labview and it is organized in tabs. The picture illustrates the tab "XRF maps" dedicated to the fast fitting procedure of pixel spectra. In the specific case shown in the figure 5030 fit per seconds are obtained.

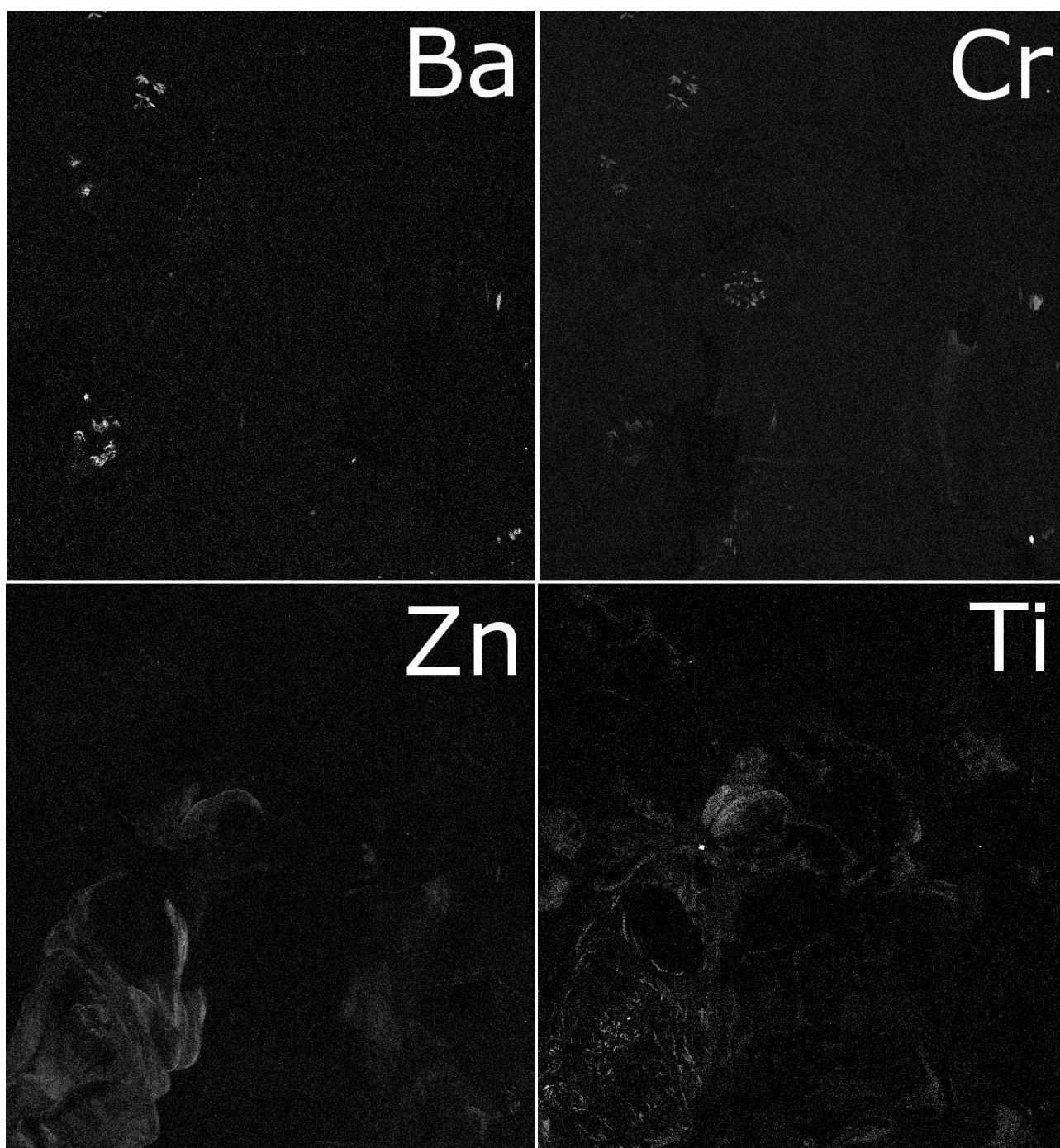


Fig. E2 Elemental distribution images of Cr, Ba, Ti and Zn in the painted panel. The presence of these chemical components can be associated with pigments of recent manufacturing. It is evident that Cr and Ba are present in a few pictorial details. Zn and Ti were used more extensively. This result suggests a later dating of the panel. The presence of Zn can be associated to the zinc white in use since the mid-19th century. Titanium spots can be associated to iron ochre impurities or to retouches with a titanium white during a conservation procedure. On the contrary, the presence of titanium white in original pigments would date the painting to past the 1920s.

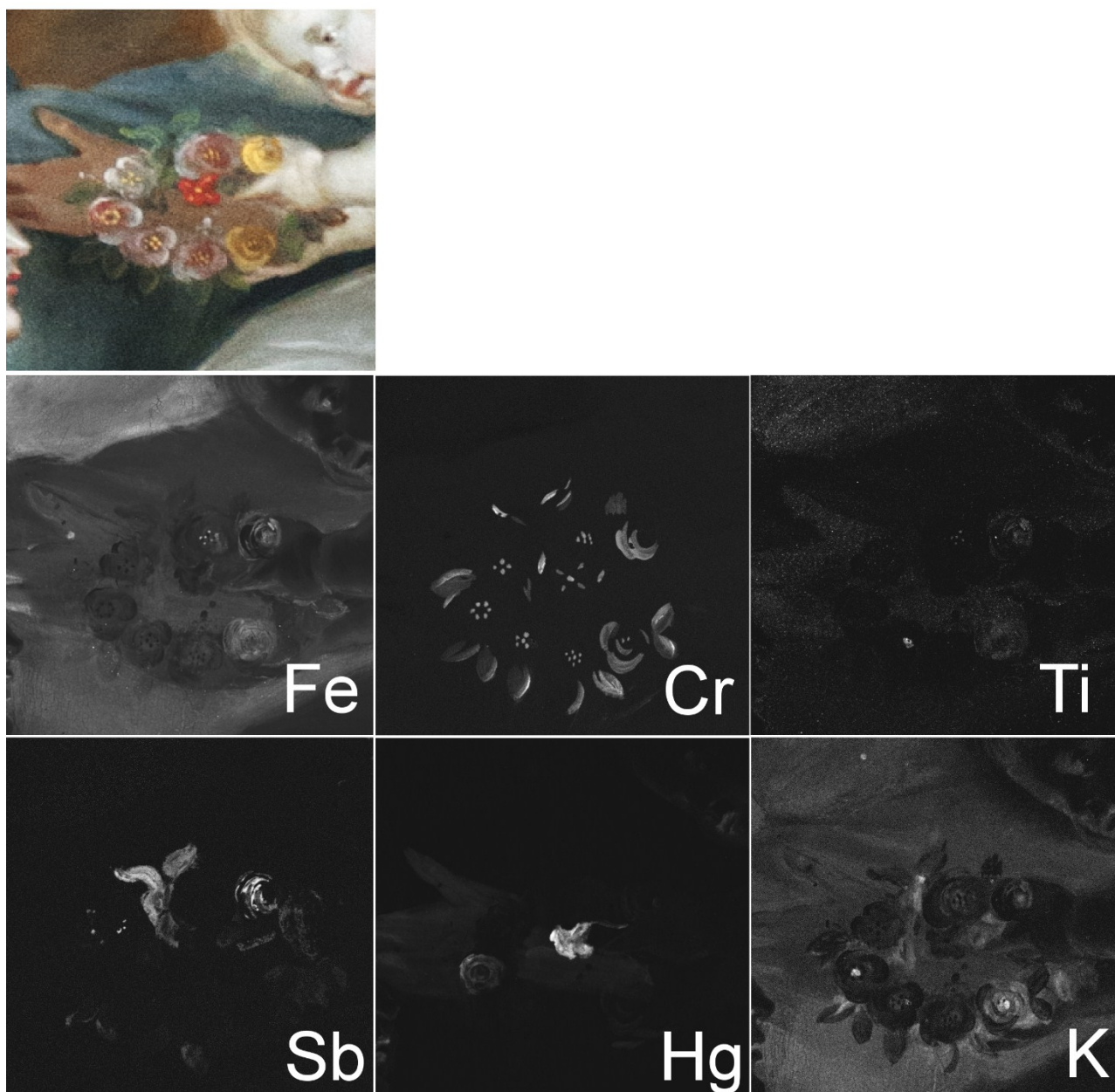


Fig. E3 The use of the device in the micro-XRF configurations for investigating the central part of the painted scene. Elemental images (800x800 pixels) cover an area of 4x4 cm² with a pixel size of 50 μ m. Again it is possible to evidence the use of anachronistic pigments.

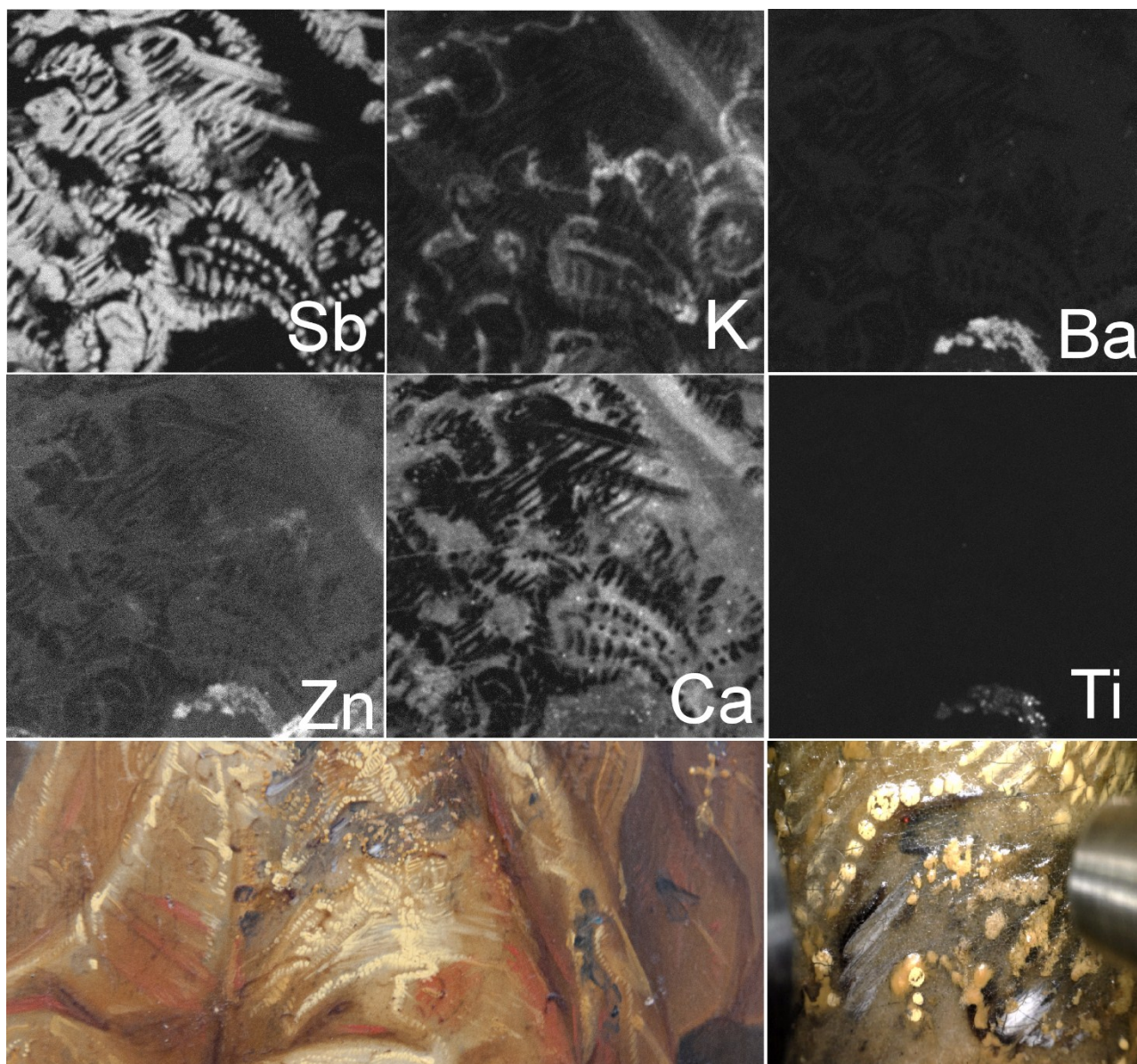


Fig. E4 Micro-XRF scanning performed on the decorated vest of St. Rosalia. Elemental images (800x800 pixels) cover an area of 2x2 cm² with a pixel size of 25 μ m. A picture of the painted detail (both conventional and OM) is also reported in the figure. The OM image and the micro-XRF elemental distribution images refer to different areas in the vest of St. Rosalia.