



EXRS 2018  
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# BOOK OF ABSTRACTS

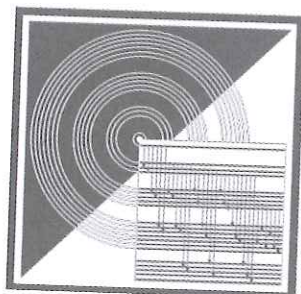
**European Conference on X-Ray Spectrometry  
Ljubljana, Slovenia, 24 - 29 June 2018**



Jožef Stefan Institute

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## Study of two large dimension Murillo's paintings by means of Macro X-ray fluorescence (MA-XRF) imaging, point XRF analysis and stratigraphic studies

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During the recent restoration of two large dimension paintings by Murillo, entitled "Miracle of the loaves and fishes" and "Moses and the water from the rock of Horeb", several studies about the materials employed were carried out. Macro X-ray fluorescence (MA-XRF) scanning technique was performed on both works complemented by point XRF and stratigraphic analyses, in order to characterize the different elements of the paintings (ground layer, pigments and binders). The methods used during the study will be described in this work, with particular attention to the mobile MA-XRF device [1], which provides real-time elemental imaging of the paintings.

The results show that the ground layers were prepared in the usual fashion of the artist, using earths, calcium carbonate, iron oxide pigments and white lead. The polychromy is composed of lead white mixed with various pigments, depending on the color tone (red and yellow ochres, vermilion, azurite, smalt, lead-tin yellow, etc.). Other pigments from previous restorations were also found (zinc white, Prussian blue, etc.). MA-XRF mapping allowed determining the spatial distribution and the combination of these pigments along the surface of both works. Special mention should be made of the distribution of the smalt and its variable degree of degradation in the different areas of the paintings. During this work, it was also possible to obtain a graphic record of all the interventions made during the restoration process, principally due to the use of stucco for the reintegration of paint losses.

[1] F.P. Romano, C. Caliri, P. Nicotra, S. Di Martino, L. Pappalardo, F. Rizzo, H.C. Santos, *Anal. At. Spectrom.* (32), 2017, 773.