

X-RAY RADIOGRAPHY AND TOMOGRAPHY OF LARGE ARTWORKS: A NEW DIAGNOSTIC APPARATUS FOR THE CONSERVATION OF CULTURAL HERITAGE

A. Re^{1,2*}, F. Albertin¹, C. Avataneo², R. Brancaccio¹, P. Buscaglia³, M. Cardinali³, J. Corsi^{1,2}, G. Cotto^{1,2}, S. De Blasi³, F. Del Greco², M. Demmelbauer³, G. Dughera¹, E. Durisi^{1,2}, W. Ferrarese^{1,2}, A. Giovagnoli³, N. Grassi³, A. Lo Giudice^{1,2}, M. Martini², P. Mereu¹, G. Mila^{1,2}, M. Nervo³, N. Pastrone¹, F. Prino¹, L. Ramello^{1,4}, M. Ravera³, C. Ricci^{2,3}, A. Romero^{1,2}, R. Sacchi^{1,2}, A. Staiano¹, L. Visca^{1,2} L. Zamprota^{1,2}

¹ Istituto Nazionale di Fisica Nucleare, Sezione di Torino, Italy

² Dipartimento di Fisica, Università di Torino, Italy

³ Centro Conservazione e Restauro "La Venaria Reale", Torino, Italy

⁴ Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale,
Alessandria, Italy

*email: alessandro.re@to.infn.it

X-ray radiography and tomography are now widely used in the Cultural Heritage field thanks to their non-invasivity and for the high amount of information which can be obtained regarding the inner structure of an object.

One of the aims of the neu_ART regional project [1,2] (collaboration among INFN-Torino, Physics Department of the University of Torino and the Centro Conservazione e Restauro "La Venaria Reale") has been the development of a new instrument to perform X-ray radiography and tomography of large artworks. In the frame of this project a new facility has been installed in a dedicated area of the Centro Conservazione e Restauro "La Venaria Reale". This device, designed to help restorers in their work, is becoming a routine-tool to be used before the restoration process for 2D (radiography) and 3D (tomography) imaging. In fact a large amount of information on materials, constructive technique and state of preservation of an artwork can be obtained in an absolutely non-invasive way.

This custom instrumentation is based on a X-ray source (up to 200 kV), a linear X-ray detector (50 cm long) and high precision mechanics (both for the movement of the source and the detector, and for the revolution of the object). It allows to optimize the parameters (X-ray energy, current, distances, etc) and obtain radiographies of paintings on canvas and panels up to 3 m × 4 m in a short time.

The apparatus has been designed to overcome the limits connected both to medical and industrial CT devices: because of its wide flexibility in the geometry it allows the analysis both of small and large artworks made by very different materials. An example can be seen in Fig.1, where the CT analysis of a large wooden crucifix is shown: the different wooden blocks composing the artwork (distinguishable by the growth rings), a fracture in the frontal part and the preparation layer surrounding the statue are clearly visible in the CT horizontal section.

In this contribution, after a short introduction on the performances of the instrument in terms of the achievable spatial resolution and the dynamic range, we will present the results obtained with this instrument on very different kinds of artworks, ranging from the

radiographies of large paintings to tomographies of big furniture, statues, columns and other artistic and archaeological objects coming from important Museums and collections.

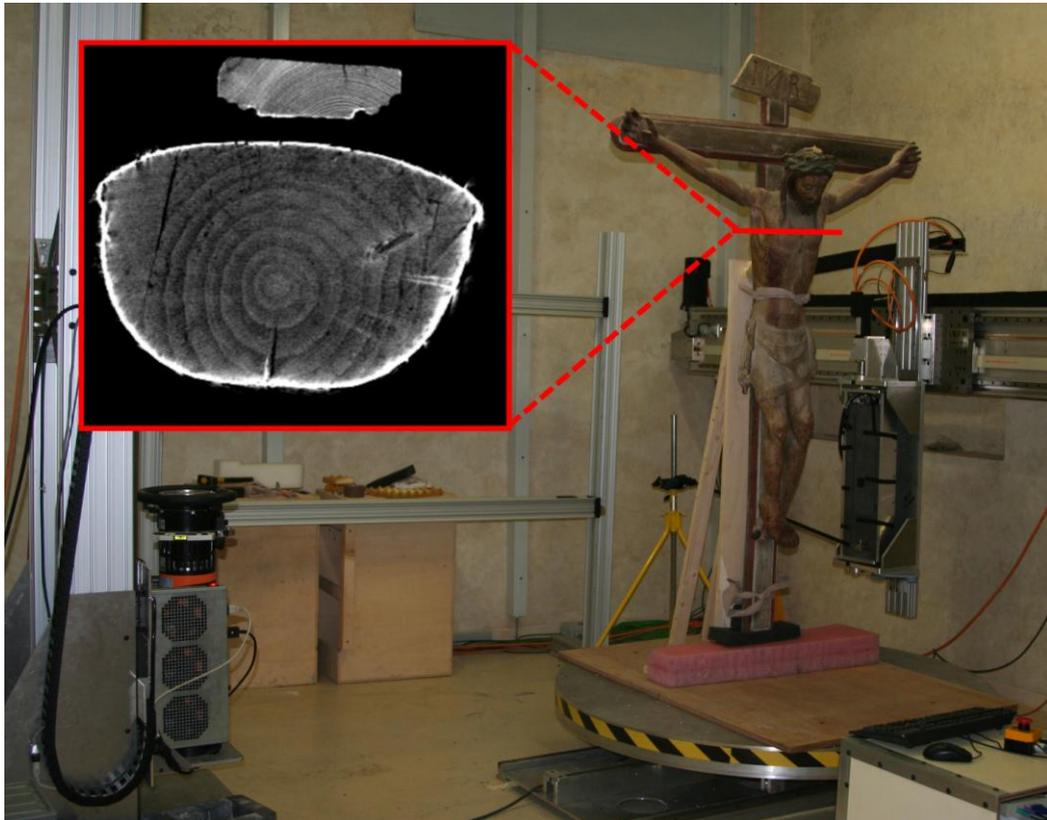


Fig. 1. Prototype of the instrument during a CT analysis of a wooden crucifix (coming from the “Santuario Ave Regina Caelorum” in Breglia (CO), Italy) and CT reconstruction of a horizontal section

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References

- [1] Re, A. et al., 2012. Results of the Italian *neu_ART* project. IOP Conference Series: Materials Science and Engineering, 37: 012007
- [2] AA.VV. 2013. *Il Progetto neu_ART. Studi e applicazioni. Neutron and X-ray tomography and imaging for cultural heritage*. Editris, Torino.