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THz diagnostics for art conservation at the ENEA center of Frascati

The electromagnetic radiation, in the range from IR to X-rays, is widely used in the field of art conservation and diagnostics. In the last few years a new interest was devoted to the longer wavelengths, in the so called “THz region” of the spectrum, due to the peculiar characteristics of the radiation in this spectral range, that make it ideal for applications in this field [1]: it’s low photon energy and its ability to penetrate dielectric materials. This high penetration capabilities were used to demonstrate the possibility to detect artwork hidden under layers of other dielectric materials [2, 3, 4]. Making use of phase-sensitive techniques it is also possible to get information on the optical properties of the materials under study and to obtain images that include spectroscopic information about the sample [5].

The realization of new radiation sources in this region was the key to develop new techniques to be applied to the field of art conservation. New technologies were able to fill the so called “THz gap” with both free electron source and laser drive sources. At present a wide choice of THz radiation source are available to researchers. A certain number of such sources are at present available at the THz laboratories at ENEA-Frascati and they were used to develop imaging systems for mural paintings in the framework of the Italy-Japan bilateral project “THz-ARTE” [6].

The main applications developed in this project will be shown, including a new 3D scanning system developed for mural painting, tested on a real “fresco on tavola” by Alessandro Gherardini.

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