

Applications of Terahertz Imaging and Spectroscopy in Cultural Heritage

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Terahertz (THz) radiation has been used for the analysis of cultural heritage since 2008 and has unique potential as it can penetrate up to one centimetre of opaque materials including plaster, wood and clay. The technique is non-contact, non-invasive and perfectly safe for the user and is now available portably and is capable of operating in diverse environments. Wall paintings can be analysed stratigraphically to determine the composition of layers of wall plaster, and in certain circumstances images of obscured subsurface paintings recreated. Demonstrations will be provided from Churches and Cathedrals across Europe and an archaeological site in Turkey.

As THz imaging for cultural heritage is in its infancy, each new experimental mission provides its own challenges regarding the best way to process the data to achieve numerically reliable and easily interpretable results for the user. These include a new deconvolution technique that increases traditional limits of depth resolution and the facility to correct for uneven covering surfaces to interpret and recreate an image of the obscured painting beneath.

In addition the internal structure of other opaque artefacts can be used to determine the life history of the object.

