X-ray radiography and tomography for cultural heritage

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Synchrotron radiation facilities are laboratories where the most intense and collimated X-ray beams on Earth are made available to researchers for a wide range of applications. X-ray Imaging is highly profiting of the specific and unique properties of the X-ray beams issued from those sources, like monochromaticity and a high degree of coherence. The monochromaticity permits to optimize the energy used in radiography and computed tomography with the sample characteristics (in terms of thickness and composition) or the application of techniques like dual-energy imaging, allowing the maximization of the image contrast arising from a single element in the sample. Instead, the high degree of coherence permits the application of powerful imaging techniques like phase-contrast computed tomography imaging: this is a methodology that simultaneously provides micrometric spatial resolution and high low-dense sample sensitivity.
The lecture will briefly present the fundaments of X-ray imaging in 2D and 3D, highlight the image acquisition methods in both conventional absorption-based and phase contrast-based regime, and for dual energy subtraction imaging. Examples of previous studies applied to cultural heritage will be illustrated.

Keyword : X-ray radiography, X-ray tomography, phase contrast imaging, dual-energy subtraction imaging

Summary of the presentation :

(exemple :

- *Fundaments of X-ray radiography*
- *Fundaments of X-ray tomography imaging*
- *Methods of image acquisition : absorption, phase contrast imaging, dual-energy subtraction imaging*
- *Instrumentation*
- *Experiment design*
- *Examples of applications*