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"Synchrotron Radiation X-Ray Imaging for Life Sciences & Cultural Heritage"

Grating interferometry for phase contrast mammography: preliminary results

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Most of the radiographic clinical techniques are based on the absorption contrast between different tissues. Nevertheless, many clinical situations, such as mammography, depend on the contrast of different types of soft tissues. This task is generally very hard to achieve with conventional absorption radiography, whereas the radiation dose limits the exposure time and consequently the achievable contrast resolution. At the same time high contrast resolution is absolutely essential to make the methods capable of early detection of tumors.

To this goal the clinical implementation of phase contrast x-ray imaging is crucial to achieve high resolution imaging with low dose.

A promising technique to measure phase contrast is the grating interferometry. Soon after its first applications to hard x-rays [1-2], it has been demonstrated very successful to detect high resolution hard x-rays phase contrast. The method is based on a relative scan between two gratings: the first is a phase grating acting as a beam-splitter. The second, an amplitude grating, is used to analyze the wave front diffracted from the first grating. If a sample is placed before the first grating, the modification of the wave front can be directly detected with this system. The interferometer features an extremely high sensitivity; however the scanning procedure requires many images to be acquired with potential for dose increase.

In this presentation we will show the preliminary results obtained at the SYRMEP beamline at Elettra with different samples. We measured a mammographic test phantom to characterize the performances of the system with the goal of strongly reducing the dose. In particular we study the image quality versus the number of steps in the scan to evaluate the possibility of a sensible dose reduction.

Finally we will show phase contrast tomography of different biological samples obtained with the same method.

References:

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2. A. Momose et al., *Jpn. J. Appl. Phys.* **42**, L866 (2003).