Contribution ID: **192** Type: **Invited**

Invited Talk 2: X-ray Phase Contrast with synchrotron radiation for biomedical applications and breast imaging

Monday 8 July 2019 14:25 (30 minutes)

Phase contrast x-ray imaging methods have yielded a substantial improvement in image quality compared to conventional radiology, which is based on absorption properties and possesses only little soft tissue differentiation. The majority of phase techniques has been developed for synchrotron radiation x-ray sources.
Free space propagation phase contrast is the simplest method, which relies on x-rays sources featuring a high degree of spatial coherence and no additional optics is required. Phase sensitive methods capable of exploiting deviation of the x-ray path in the order of microradiants are analyzer based imaging and grating based imaging.
These special imaging tools offer the possibility to visualize different length scales from micrometric details in the size of cell aggregates up to the patient level for the diagnosis of different diseases such as breast cancer. Depending on the specific applications, these techniques have been implemented at the medical imaging beamline of the synchrotron facility ELETTRA in Trieste (Italy).
On the patient level, synchrotron radiation phase contrast mammography has been successfully applied in a clinical trial with uncertain diagnosis of breast cancer. The monochromatic laminar X-ray beam and the selection of optimal energy for the given breast thickness and composition allow acquiring high quality images with reduction of scattering and delivered dose. Moreover, the high spatial coherence of the source with large propagation distance permits to exploit the free space propagation phase-contrast effect enhancing soft tissue contrast.
Besides planar mammography X-ray breast computed tomography (breast CT) is an emerging and challenging technique for increasing the diagnostic power of mammography that aims to overcome the superposition of the structures inherent in conventional planar mammography improving breast cancer diagnosis. Synchrotron radiation provides again ideal X-ray imaging conditions for this purpose. Starting from the previous successful experience in the clinical phase contrast mammography with synchrotron radiation, a breast CT project is in advanced development stage at ELETTRA.

Author: ARFELLI, Fulvia

Presenter: ARFELLI, Fulvia