X-RAY IMAGING AT THE ID19 BEAMLINE OF ESRF

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Abstract

The ESRF is the worldwide leader in parallel-beam synchrotron radiation (SR) X-ray imaging. Especially beamline ID19 has become a reference instrument for SR-based X-ray phase contrast imaging and absorption microtomography and -radiography. A substantial evolution of the present ID19 beamline is aiming to optimize it for multiscale applications of parallel and coherent imaging techniques, with a special emphasis on the paleontological community needs, this topic being recognized as essential within the scientific case of ID19. Other communities will benefit from a reburishment as well, such as biomedical research (drug action, metallic particles in biological materials), cultural heritage studies, materials science or industrial applications.
In this presentation, the main parts of the ID19 refurbishment project will be outlined: installation of a transfocator to be used for beam compression as well as inline monochromator in combination with a slit system acting as secondary source; upgrade of the existing vertical reflecting, doublecrystal monochromator with a set of multilayer-mirrors in order to replace the existing singlebounce multilayer monochromator; installation of additional experimental stations in order to trim the sample-detector propagation distance between 1 mm (high resolution phase contrast imaging with a small field of view) up to 16 m (low resolution / large field of view). Furthermore, the number of insertion devices will be increased by installation of a revolver-type solution offering a choice between four different configurations. Additional attentuators will allow to trim the bandwidth of the source in order to reach a high level of flexibility for X-ray imaging with polychromatic radiation, i.e. pink-beam illumination without the use of monochromatising optical components.

Besides the instrumentation, the presentation will highlight recent results achieved by means of phase-sensitive X-ray imaging with polychromatic radiation, rapid and high speed imaging as well as single-distance phase retrieval approaches.

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