STUDY OF MULTILAYER-REFLECTED BEAM PROFILES AND THEIR COHERENCE PROPERTIES USING BEAMLINES ID19 (ESRF) AND 32-ID (APS)

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Compared with crystal lattice reflection, the use of Bragg reflection on a multilayer mirror as a monochromator for hard X-rays has the advantage of a higher photon flux density because of the larger spectral bandpass. The main disadvantage lies in the strong modifications on the reflected beam profile, a major issue for micro-imaging applications where multilayer-based monochromators are frequently employed to deliver high photon flux density [1, 2].

Due to the lack of a formalism relating the performance of multilayer mirrors to their structural quality, we have started to study the performance of different multilayer mirrors in terms of the profile of the reflected beam as well as its coherence properties. Among the parameters varied were the multilayer period ('d-spacing'), the material composition and the number of bi-layers grown.

Recently, the study was extended by characterising multilayer mirrors produced by different deposition facilities [3].

In this presentation, the reflected beam profiles and coherence properties of commercially available multilayer mirrors characterised at the beamlines ID19 (ESRF) and 32-ID (APS) will be shown [4, 5].

The aim of this beamline round-robin is to verify our previous results: Even though the intensity of beam profile modifications changes due to the different beamline geometries, the relative differences between the multilayer structures remain the same. This means, the effects are solely inherent to the multilayers and can be applied at various experimental set-ups.

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