

**Hard X-ray Micro-optics for new 3d and 4th generation sources:
latest developments and applications**

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The presentation is intended to review the most recent developments of high energy X-ray microfocusing optics with main emphasis on the performance of in-line optics such as Fresnel zone plates (FZP) and compound refractive lenses (CRL). Both types are capable of generating micro- and nano-focus beams. New

The refractive optics is a rapidly emerging option for focusing high energy synchrotron and XFEL radiation. Nanofocusing planar CRLs with short focal distance can generate intensive hard x-ray microbeams with lateral extensions in the 50nm range. A number of new techniques based on refractive optics have been recently proposed and successfully applied for advanced material studies.

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