Large Focal Length on-Axis Optics for X-Ray Scattering Experiments

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Beamline P03

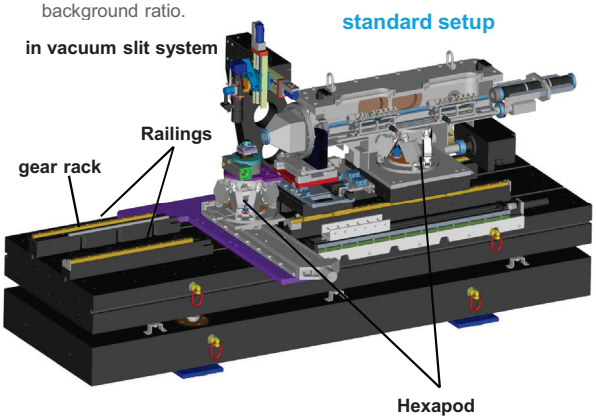
The MiNaXS Beamline P03 is a microfocus small- and wide-angle x ray scattering beamline at Petra III. It provides mirco- and nanofocused beams with ultra-high intensity and resolution. The beam dimensions range are 42 x 20 µm², 22 x 13 µm² and 7 x 4 µm² for the Microfocus end station and 250 x 350 nm for Nanofocus.end station

New frontend with 1D – lenses system

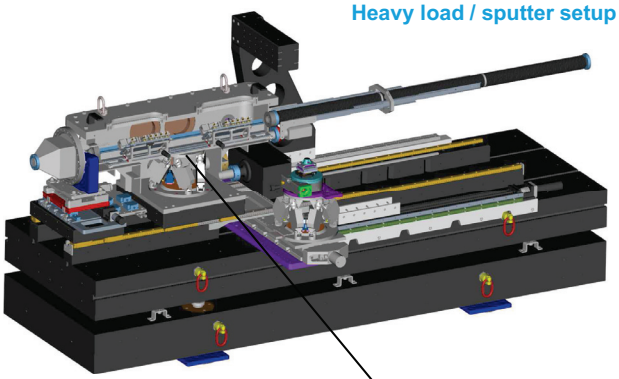
Upgrade of the P03 Beamline in 2016/17 :

1. Two new CRL-systems equipped with two sets of 1D lenses (63 lenses each) will enable a smaller focus size and a square based beam profile (~2x2) µm² making use of the novel intermediate focus [1] of high focal length ~600 mm.
2. Translation of the complete CRL system, which is mounted on linear guides to move the focus point either to the standard sample position or to a different experimental position which is provided for heavy load equipment. (Sputter chamber, ellipsometer , stretching devices and so on).
3. A full vacuum setup is under construction currently to suppress air scattering in the scattering experiments and, therefore, improving the signal-to-background ratio.

standard setup



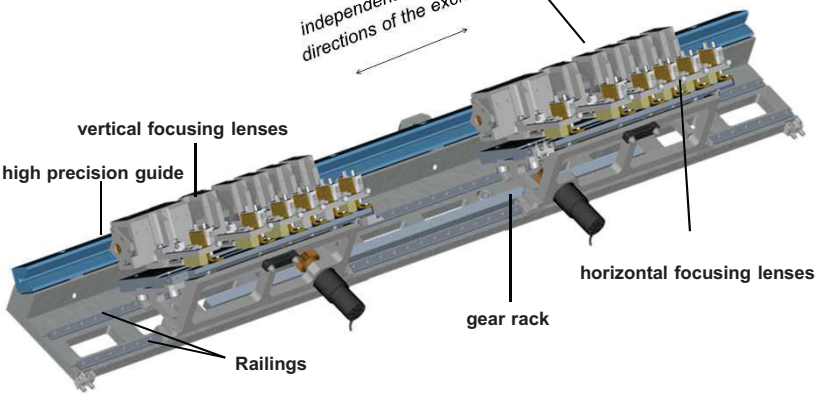
Heavy load / sputter setup



The lens exchangers can be moved independent from each other by using gear rack and linear guides.

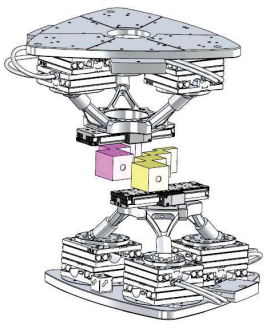
The lenses can be moved in and out of the X-ray beam according to the focusing needs using piezo-motors. A high precision guide will ensure an accurate alignment of the lens packages to each other.

vacuum tank for lens system



[1] Santoro et al., Rev. Sci. Instr. **85**, 043901 (2014)

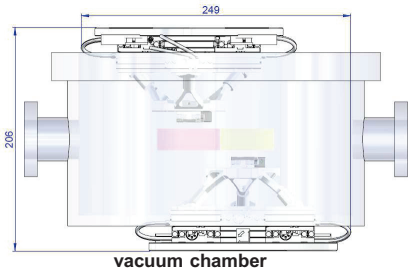
New CRL4-system for parallelism of the beam



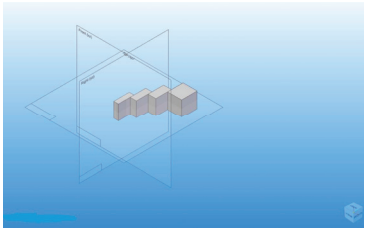
2 Space-FAB for lens positioning

Lenses used for paralyze the beam in front of the CRL systems, to get a higher flux

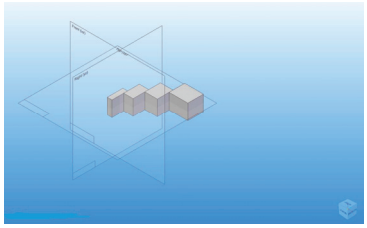
Therefor 2 stacks of Be-lenses in a “step-like” shape, will be placed on two “SpaceFAB” in vacuum. Each one can be moved separately, to position the lenses in the x-ray beam. One of the stacks is for horizontally-, the other one for vertical-focusing.



vacuum chamber



Lens stack arrangement 1



Lens stack arrangement 2

Design and construction done in cooperation with PiMicos

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