

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

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Beamline P03

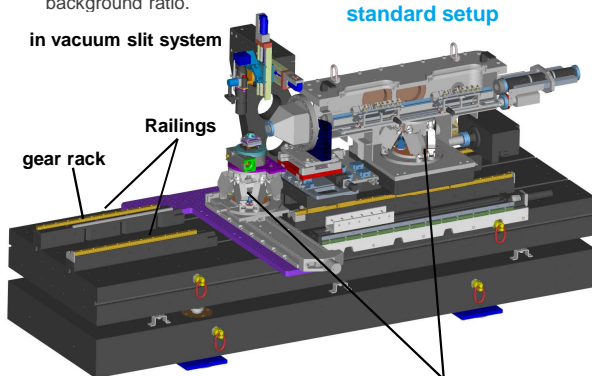
The MiNaXS Beamline P03 is a microfocus small- and wide-angle x ray scattering beamline at Petra III. It provides micro- and nanofocused beams with ultra-high intensity and resolution. The beam dimensions range are $42 \times 20 \mu\text{m}^2$, $22 \times 13 \mu\text{m}^2$ and $7 \times 4 \mu\text{m}^2$ for the Microfocus end station and $250 \times 350 \text{ nm}$ 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 ($\sim 2 \times 2 \mu\text{m}^2$) making use of the novel intermediate focus [1] of high focal length $\sim 600 \text{ mm}$.
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.

in vacuum slit system



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

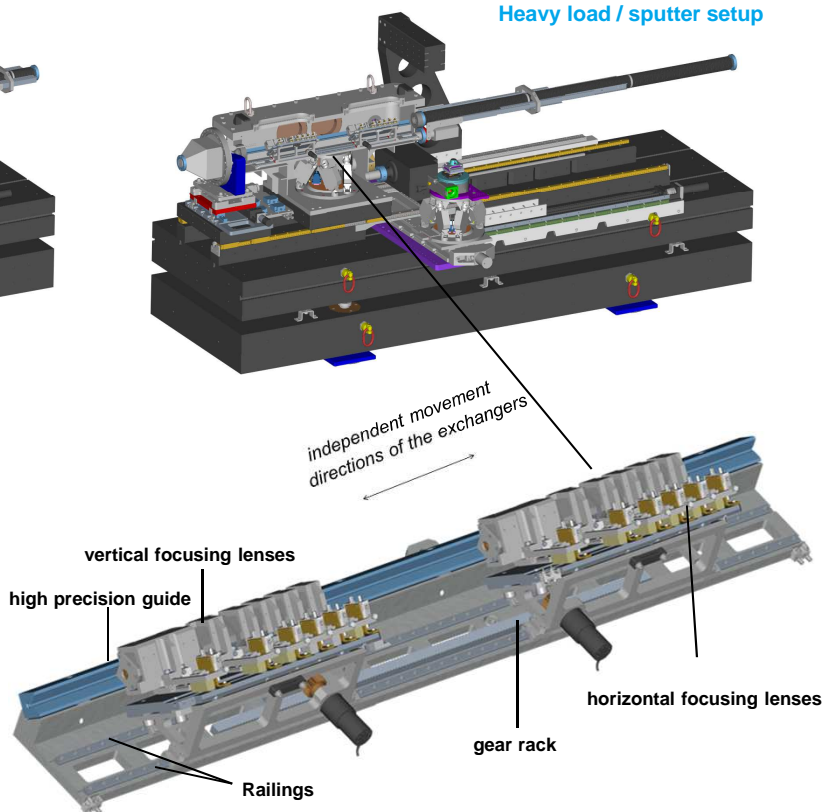
The lenses can be moved in and out of the X-ray beam according to the focusing needs using piezo-motors. A high precision guide will ensure an accurate alignment of the lens packages to each other.



vacuum tank for lens system

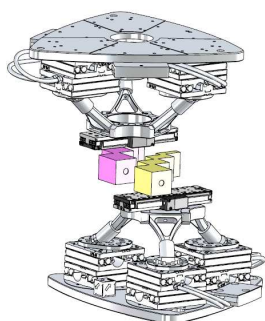
standard setup

Heavy load / sputter setup



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

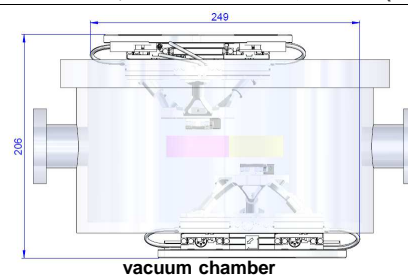
New CRL4-system for parallelism of the beam



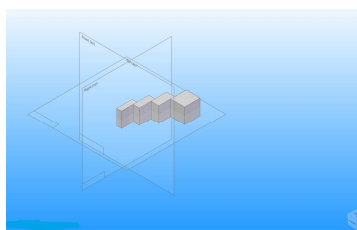
2 Space-FAB for lens positioning

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

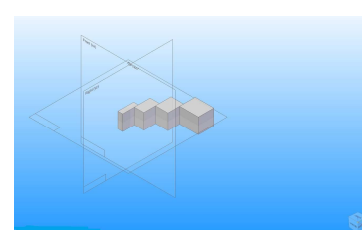
Therefore 2 stacks of Be-lenses in a "step-like" shape, will be placed on two "SpaceFAB" in vacuum. Each one can be moved separately, to position the lenses in the x-ray beam. One of the stacks is for horizontally-, the other one for vertical-focusing.



vacuum chamber



Lens stack arrangement 1



Lens stack arrangement 2

Design and construction done in cooperation with PiMicos

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