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SoftiMAX-CXI: A new soft x-ray branch for scattering and diffraction methods at MAX IV

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SoftiMAX is a soft X-ray spectro-microscopy beamline at MAX IV Laboratory, the Swedish national synchrotron center in Lund, Sweden. It is situated at the 3 GeV ring at MAX IV and provides a very high average coherent flux owing to the low emittance properties of the ring^{1,2}.

SoftiMAX consists of two branch lines utilizing different focusing solutions and catering to various imaging methods. The main branch, in user operation since 2021, hosts an end-station optimized for scanning techniques such as Scanning Transmission X-ray Microscopy (STXM) and diffraction imaging such as ptychography³.

Here we report on the design and commissioning of the second branch of the beamline SoftiMAX-CXI, which hosts a dedicated end-station for X-ray Photon Correlation Spectroscopy (XPCS), and diffraction and scattering experiments with a flexible detector geometry.

SoftiMAX-CXI, which started commissioning in 2024 and has since been part of our user program as an open port, operates over an X-ray photon energy range of 275 eV to 2200 eV with full polarization control above 400 eV. This branch line has a Kirkpatrick-Baez mirror pair to focus the beam to a size down to about 20 μm . External end-stations have been used for XPCS measurements and Fourier Transform Holography of magnetic thin films, and for developing a TIMEPIX imaging detector for the soft X-ray regime.

The commissioning of the main CXI end-station has started. It is built around a rotatable detector arm that can accommodate sample-detector distances of at least 2m over 120-degree scattering angles. This makes the CXI end-station suitable for XPCS, scattering, diffraction experiments, and measurements in reflection.

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