Each of the two strips of the CM can be selected by moving mirror horizontally to reflect the beam of an energy higher or lower than 10 keV, respectively.

### Introduction

A dedicated small-angle X-ray scattering (SAXS) beamline using a new X-ray source generated by an In-Acromat superconducting wiggler (IASW6) insertion device is under construction at the National Synchrotron Radiation Research Center (NSRRC). The IASW6, with peak magnetic field of 3.1 T, magnet period of 6.1 cm, and total length of 96 cm, can provide a photon flux ~10^{12} - 10^{13} photons/s/0.1%bw in the energy range of 5 - 23 keV. Taking the central 0.2 mard horizontal radiation fan from the source with a beam divergence of 200 and 392 μrad in the vertical and horizontal directions, respectively, the dedicated SAXS beamline is oriented for nano to meso-structural research. The SAXS beamline adopts the design of the double-monochromator used in the beamline SYBLS at ALS, which integrates a Si(111) double crystal monochromator (DCM) and a Mo/B_{4}C double multilayer monochromator (DMM) into one cradle for fast exchange between the two monochromators. Equipped with a collimating mirror (CM) and a toroidal focusing mirror (FM) with 1:1 focusing ratio, this beamline provides two types of SAXS measurements: high-Q resolution and high flux, by using either the DCM or DMM. The SAXS beamline also provides energy scan with an energy resolution from 1 to 10 eV for anomalous SAXS (ASAXS) experiments with sub-millisecond resolution.

### Expected Performance

<table>
<thead>
<tr>
<th>Photon Energy (keV)</th>
<th>Flux (Photons/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
<td>1E11</td>
</tr>
<tr>
<td>1.0</td>
<td>1E11</td>
</tr>
<tr>
<td>2.0</td>
<td>1E11</td>
</tr>
<tr>
<td>5.0</td>
<td>1E10</td>
</tr>
<tr>
<td>8.0</td>
<td>1E10</td>
</tr>
<tr>
<td>12.0</td>
<td>1E9</td>
</tr>
</tbody>
</table>

For high-Q resolution: 0.5 mm dia. focused beam (e.g. at 8 keV) with divergence Δλ/λ < 1% at the focus point is achieved for the desired minimum measurable Q of 0.002Å^{-1}.

For high flux: With DMM, a high photon flux greater than 2 x 10^{12} photons/s at the sample position can provide time-resolved experiments with sub-millisecond resolution.

For anomalous SAXS measurement: The beamline can deliver photons in a wide energy range of 5 - 23 keV, with an energy resolution better than 10 eV or ΔE/E < 5 x 10^{-4}.

For grazing incident SAXS (GISAXS) of thin films or liquid surfaces: A plane mirror is designed to bend down the beam for GISAXS measurement, especially for gravitationally-flat liquid surfaces.

### Summary

- For high-Q resolution: 0.5 mm dia. focused beam (e.g. at 8 keV) with divergence Δλ/λ < 1% at the focus point.
- For high flux: With DMM, a high photon flux greater than 2 x 10^{12} photons/s at the sample position can provide time-resolved experiments with sub-millisecond resolution.
- For anomalous SAXS measurement: The beamline can deliver photons in a wide energy range of 5 - 23 keV, with an energy resolution better than 10 eV.
- For grazing incident SAXS (GISAXS) of thin films or liquid surfaces: A plane mirror is designed to bend down the beam for GISAXS measurement, especially for gravitationally-flat liquid surfaces.

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