

Experimental station for inelastic scattering spectroscopy of electronic excitations

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An experimental station for inelastic x-ray scattering spectroscopy (IXSS) of electronic excitation is being built on the undulator beamline of Sector 3 at the Advanced Photon Source. The goal is to provide users with all the necessary instrumentation to study IXSS in the low- and middle-Z materials with an energy resolution from 1 eV (with a beam coming directly from the high-heat load monochromator to the specimen) to 100 meV (with a second channel-cut monochromator). The experimental parameters are as follows:

Undulator photon energy (first harmonic): from 13 keV down to 4 keV

Analyzer reflection:	Ge(444) or	Ge(555)
Photon energy E:	7.6 keV	9.5 keV
Energy resolution dE:	150-200 meV	100 meV
Momentum transfer q:	0-4 1/Å	0-5 1/Å

Using undulator A at 100 mA, and assuming 100% efficiency of the high-heat-load monochromator, one can expect a flux on a specimen of 10^{17} photons/sec/eV at 7.6 keV.

The specimen is located at 53 m from the undulator. For commissioning, the beamline will operate without a mirror, so the beam size on the specimen will be:

$$\sigma_x = 1.3 \text{ mm} \quad \sigma_y = 0.5 \text{ mm}$$

With the sagittally focusing mirror $\sigma_x = 0.3 \text{ mm}$.

The optical scheme of the station is described, and status of the station is reported.

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