

Sector 25 at the APS-U: Two new beamlines for spectroscopy

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As part of the Advanced Photon Source (APS) Multibend Achromat lattice upgrade two new beamlines for spectroscopy will be constructed on a canted undulator source at Sector 25. The programs at the 20-ID beamline at the APS need to move to sector 25 to make room for a planned long beamline. These will be combined with some other APS spectroscopy programs at sector 25 to use two new beamlines on a canted undulator. These two beamlines will service existing and upgraded endstations covering a variety of spectroscopy applications. There will be a microprobe branch that will provide sub-micron beams for fluorescence imaging, and micro-XAFS. This branch will also have a station for XAFS experiments requiring a high-brilliance high-flux beam such as doped thin films or ultra-dilute samples. The second Advanced Spectroscopy branch will provide beam to two inline hutches. The first will have stations for both an enhanced LERIX spectrometer for non-resonant inelastic scattering (x-ray Raman), and spectrometers for high resolution emission spectroscopy. The second hutch will provide space for experiments requiring extensive setup, such as time-resolved pump-probe experiments. Both hutches will have a variety of focusing options providing beam sizes down to a few microns. To provide greater beam separation, both lines will have side deflecting mirrors for harmonic rejection, and focusing/collimation. The planned energy ranges are 4-32 keV for the microprobe branch, and 4-40 keV for the Advanced Spectroscopy branch. The horizontal deflection mirrors allow use of small offset monochromators equipped with liquid nitrogen cooled Si (111) crystals for monochromatic beam, and wide-bandpass multilayers providing higher flux for experiments that do not need high resolution such as imaging and non-resonant emission spectroscopy. The Advanced Spectroscopy branch will also have a secondary monochromator for experiments needing better resolution than provided by Si (111). This paper will present the detailed design and expected performance of the two beamlines.

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