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Double crystal monochromator as the first optical element in BESSRC-CAT beamlines

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The first optical element in the BESSRC-CAT beamlines at the Advanced Photon Source will be a monochromator, so that a standard design for this critical component is advantageous. The monochromator we have designed is a double crystal, fixed exit scheme with a constant offset designed for UHV operation, thereby allowing windowless operation of the beamlines. The crystals are mounted on a turntable with the first crystal at the center of rotation. A mechanical linkage is used to correctly position the second crystal and maintain a constant offset. The main drive for the rotary motion is provided by a vacuum compatible Huber goniometer isolated from the main vacuum chamber. Rotary motion of the primary monochromator stage is accomplished by using two adjacent vacuum chambers connected only by the small annular opening around a hollow stainless steel shaft which connects the Huber goniometer to the turntable on which the crystals are mounted. The design of the monochromator is such that it can accommodate both water and liquid nitrogen cooling for the crystal optics. The basic design for the monochromator linkage mechanism will be presented along with details of the monochromator chamber. The results of initial optical tests of the monochromator system using tilt sensors and a precision autocollimator will also be given.