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Liquid-metal-cooled, curved-crystal monochromator for APS bending magnet beamline 1-BM

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We describe a horizontally focusing, curved-crystal monochromator that invokes a 4-point bending scheme and a liquid-metal cooling bath. The device has been designed for dispersive diffraction and spectroscopy in the 6-20 keV range under the heat load of an APS bending magnet source. The bending mechanism will permit maximal control over the crystal deformation and therefore minimize aberrations and focal spot size. The 355 x 32 x 0.8 mm³ crystal will be nearly half submerged in a bath of Ga-In-Sn-Zn alloy, which thermally couples the crystal to the water-cooled Cu frame, while permitting the required crystal deformations. Calculated response to the heat load and anticipated focusing properties are discussed.

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