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IMCA-CAT BM first monochromator crystal optimization

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The high heat load at the surfaces of the first X-ray optical elements at APS requires special measures to be taken to more completely utilize the beam. A conceptually new design for such an element, proposed, realized and tested by M. Hart, and conveniently called "matchbox,'' is to be implemented at the IMCA-CAT BM beamline as the first monochromator crystal. The requirements of the IMCA-CAT companies for the BM beamline dictate that an optimization of the design is made for a given X-ray energy range E_0=13 keV ±1 keV. A modification of the original design to improve the vacuum compatibility of the device was made in collaboration with M. Hart. A FEA optimization of the geometry is made using ALGOR and ABAQUS programs. Determination of the resulting slopes and the useful crystal surface after the best compensation of the thermal distor-tions are also made. The surface profile obtained by the FEA study was used to perform a ray-tracing analysis of the IMCA-CAT BM beamline. The results of the ray-tracing study will be presented.