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Bent crystals for beam extraction from the LHC

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One of the goals of the CRYSBEAM project is to perform a feasibility study of design and manufacturing of bent crystals with a geometry optimised for extraction of the proton or the lead ions beams circulating in the LHC. In the frame of the UA9 experiment, aiming at collimation of the LHC circulating beam by means of channeling in bent crystals, steering of a 6.5 TeV proton beam at an angle of a few tens of microradians have been recently observed. Differently from the case of beam collimation, extraction demands a considerably larger deflection angle. Delivery of a high extraction efficiency demands a crystal bent at a radius of the order of 100 m and the absence of dislocations in the crystal region exposed to the beam. Requirement on the bending radius, together with the need of a deflection angle in the order of a few mrad, imposes manufacturing of a uniformly bent crystal with unconventional thickness, i.e. in the order of tens of centimeters. As a result, important technological developments in crystals bending and characterizations technique are required.

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