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Measurements of the high-efficiency deflection of 400 GeV/c protons due to channeling along the $\langle 110 \rangle$ axis of a bent silicon crystal

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Bent silicon crystals have been measured to deflect 400 GeV/c protons thanks to channeling along the $\langle 110 \rangle$ axis with a 61 % efficiency. This is found to be comparable with the deflection efficiency due to planar channeling and considerably larger than in the case of the $\langle 111 \rangle$ axis. Besides, the probabilities of inelastic nuclear interactions of protons crossing the crystal are measured in channeling conditions relatively to a crystal random orientation and found to be 10 % for the channeling along the $\langle 110 \rangle$ axis and 25 % for channeling within the (110) planes. High efficiency deflection and relatively small losses due to inelastic interactions make this axial orientation of a silicon crystal a useful tool for the beam steering of high energy charged particles.

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