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New Experimental Method to Measure Inelastic Nuclear Interactions of High Energy Positive Charged Particles with Bent Crystals

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A new experimental method able to study inelastic nuclear interactions of high energy positive charged particles with bent crystals has been developed. This new approach permits precise measurements of this interaction rate for different crystal orientations, providing the interaction reduction factor both in planar and axial channeling, with respect to the amorphous case. Moreover, using a customized FLUKA user routine, used to simulate the experimental apparatus, it is also possible to estimate the absolute interaction probability. One of the most interesting result of this method is the measurements of the planar channeling reduction factor for bent silicon crystals developed for beam collimation in the Large Hadron Collider at CERN. These studies are helpful for better understanding of bent crystal physics, and can be applied for other kinds of beam manipulation, such as extraction, splitting, focusing, and defocusing.

Summary

Reference:

“Study of inelastic nuclear interactions of 400 GeV/c protons in bent silicon crystals for beam steering purposes”, W. Scandale, M. Garattini et al., Eur. Phys. J. C (2018) 78: 505
(<https://doi.org/10.1140/epjc/s10052-018-5985-8>)

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