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Enhanced Crystal-Assisted Beam Manipulation

Steering of high-energy particle beam can be achieved by exploiting channeling in bent crystals. Indeed, the atomic planes of a crystal lattice aligned with incoming particles acts similarly to a waveguide and deliver deflection equivalent to hundreds of Tesla magnetic dipole. This effect was investigated and exploited in accelerators since the 70s and is being currently tested at CERN as a baseline element for HL-LHC. Indeed, channeling is particularly efficient for positive particles, achieving deflection for up to ~80% of channeled particles. Nevertheless, the remaining 20% losses are a primary constrain for bent crystal installation and use in accelerators. The GALORE project is currently aiming to overcome this key limitation by developing a new type of bent crystals which could potentially completely suppress such losses. This goal can be achieved by machining of a microscopic structure on the crystal in order to affect channeled particles dynamics. The success of the project would not only improve current setups but also enable completely new schemes for crystal-assisted beam manipulation. We report the latest result of the project and of the crystal prototypes produced.

Collaboration / Activity

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