



Contribution ID: 56

Type: Oral

Quasi-mosaic Silicon Crystal Deflectors for LHC Beams (on behalf of UA9 Collaboration)

Friday, 10 October 2014 11:50 (15 minutes)

In 2013-2014, the advanced quasi-mosaic silicon crystal deflectors for UA9/LUA9 Collimation Project were developed and installed in LHC ring. The design of deflectors is based on elastic quasi-mosaicity effect firstly discovered in quartz [1] and later observed in silicon [2]. This effect arises from anisotropic properties of crystal lattice and results in the curving of the normal cross sections of the crystal plate under bending for certain plate cuts respect to crystallographic axes. In dependence on specific plate cut and plate bending radius, the achievable deflection angles for high energy charged particle beams change from zero to several hundred microradians. This range satisfies requirements to crystal deflectors in beam collimation problem at SPS and LHC energies. The history, theory and main recent results [3,4,5] obtained with quasi-mosaic crystals will be reviewed.

References

1. O.I. SumbaeV, Reflection of Gamma-Rays From Bent Quartz Plates, Soviet Physics JETP 5 (1957) 1042.
2. Yu.M. Ivanov et al., Observation of the Elastic Quasi-Mosaicity Effect in Bent Silicon Single Crystals, JETP Letters 81 (2005) 99.
3. Yu.M. Ivanov et al., Volume Reflection of a Proton Beam in a Bent Crystal, Phys. Rev. Lett. 97 (2006) 144801.
4. W. Scandale et al., High-Efficiency Volume Reflection of an Ultrarelativistic Proton Beam with a Bent Silicon Crystal, Phys. Rev. Lett. 98 (2007) 154801.
5. W. Scandale et al., First Results on the SPS Beam Collimation with Bent Crystals, Physics Letters B 692 (2010) 78.

Primary author: Dr IVANOV, Yury (Petersburg Nuclear Physics Institute)

Co-authors: DENISOV, Alexander (Petersburg Nuclear Physics Institute); LAPINA, Lubov (Petersburg Nuclear Physics Institute); MALYARENKO, Luodmila (Petersburg Nuclear Physics Institute); SKOROBOGATOV, Vyacheslav (Petersburg Nuclear Physics Institute); GAVRIKOV, Yury (Petersburg Nuclear Physics Institute)

Presenter: Dr IVANOV, Yury (Petersburg Nuclear Physics Institute)

Session Classification: S6: Crystal Simultaion Routines for Particle Accelerators : Comparison and Benchmarking with Experimental Data