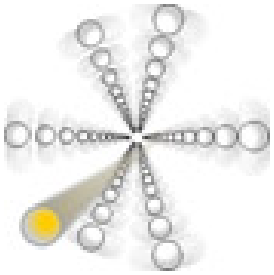

Contribution ID: **98** Type: **not specified**

Deflection of MeV Protons by an Unbent Half-Wavelength Silicon Crystal

Tuesday, 25 September 2012 11:40 (15 minutes)

Channeling effect in bent crystals is used as a power tool for beam steering. Motion of a channeled particle is characterized by oscillations between neighbor bent atomic planes. We studied the interaction between a 2 MeV proton beam and an unbent crystal as thin as 92 nm, i.e. half of the oscillation wavelength, demonstrating that also an unbent crystal can be used to steer charged particle beams. As the nominal beam direction is inclined by less than the critical angle for planar channeling with respect to the crystal planes, under-barrier particles undergo half an oscillation and exit the crystal with the reversal of the transverse momenta; i.e., the protons are "mirrored"by the crystal planes. Over-barrier particles suffer deflection, too, to a direction opposite that of mirroring. On the strength of such coherent interactions, charged particle beams can be efficiently steered through an ultrathin unbent crystal by the same physical processes as for thicker bent crystals.

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