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On Fast Charged Particles Scattering in a Thin Crystal Undulator

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When fast charged particles move in crystal at small angle to one of the crystalline planes their motion in the crystal can have both finite (planar channeling) and infinite (above-barrier) character relatively the crystalline planes. The problem of the motion of such particles in a crystalline undulator in which the crystalline planes are periodically deformed is of special interest. It is bound up with the possibility of multiple reflection of particle from such atomic crystal planes in this case. The present report is devoted to an analysis of the particle scattering in a crystalline undulator. This process is considered on the basis of a numerical simulation of the particle passage through a crystal. It is shown that the angular distributions of scattered particles in this case have a significant asymmetry. In this case, the average value of the particle scattering angles in the direction of crystalline planes bending can significantly exceed the values of the critical angle of planar channeling. The effect can be used to change the shape of the beam at small lengths of a crystal.
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