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# Backscattering/Transmission of 2 MeV He++ Ions Quantitative Correlation Study

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As charged particles impinge on atomic planes of a crystalline structure at an angle lower than the so called "critical angle", planar channeling occurs. Under such condition the particle does not see the material as a disordered medium, and collisions with atoms of the crystal lattice are correlated. Particle is confined between two neighbor atomic planes, and its motion is characterized by oscillations between them. The oscillation wavelength for each particle depends on its impact parameter with respect to the atomic planes, nevertheless for the case of channeling of positively charged particles such dependence is very weak, leading to coherence between the trajectories of the channeled particles. Multiple scattering on core electrons and atomic nuclei (nuclear scattering) results in a loss of coherence between the trajectories of the channeled particles after a few oscillations of the particles in the channel and in "dechanneling"of previously channeled particles. In this work we report a detailed description of planar channeling oscillations of 2 MeV He++ particles channeled between (110) atomic planes of a silicon crystal. Backscattering/transmission experiments with 2 MeV He++ ions were performed to study the exact correlation between the confined particles oscillating trajectories. Regular patterns of channeled ion planar oscillations are shown to be dominated by the crystal harmonic-oscillator potential and multiple scattering effects. Quantitative estimation of channeling efficiency and electronic dechanneling length were performed.

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