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Electron radiation due to reflection by the crystallographic planes of crystal.

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Small-angle particle reflection at the channeling conditions appear when electron is reflected from the crystallographic planes of the crystal [1]. In this work proved existence of quantum resonances in a small-angle reflection of relativistic electrons by a crystal surface, if the crystallographic planes are parallel to a surface. Calculations were based on Kronig–Penney model of potential. We use the potential of crystallographic planes, based on Doyle–Turner model [2]. As a result, it was obtained that the reflection coefficient specifically depend on the angle of incidence with respect to the surface and relativistic factor of electrons and even shows the existence of the Darwin tables.

It is well known that reflection of charged particle should be accompanied by electromagnetic radiation. In the present report we develop the theory of electron radiation at the small-angle reflection at channeling condition (RSARC). The spectral and angular properties of electron RSARC are studied. The polarization of electron RSARC is discussed.

We also find approximation formula for electron RSARC that shows that intensity is proportional to the squared modulus of the reflection coefficient.

References

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