



Contribution ID: 15

Type: Oral presentation

Coherent processes and channeling at high energy in thin crystals

Tuesday, 27 September 2016 16:50 (30 minutes)

At passing of charged high energy particles through crystal the phenomenon of channeling is possible, at which the particles move inside channels created by strings of crystal atoms or by crystal planes, by periodically deviating from the channel direction to small angles. In ultrathin crystals the phenomenon of channeling is absent, although there remains the possibility of manifestation of different coherent and interference effects at interaction of particles with crystal atoms [1].

In the present work some results are presented of the study of electromagnetic processes at high energies in the transitional region of thicknesses, between those at which the channeling is possible and those at which this phenomenon is absent.

The quantum and classical theories of the scattering and radiation processes are presented, that are correct in the given range of crystal thicknesses, being based upon quasiclassical approximation of quantum electrodynamics and upon developing of numerical methods of analysis of the considered processes connected with operator and spectral methods of solution of wave equations [2-5]. The main attention is paid to the comparative analysis of quantum and classical characteristics of the processes of scattering and radiation as functions of crystal thickness and particle energy.

References

1. A.I. Akhiezer, N.F. Shul'ga. High Energy Electrodynamics in Matter. Gordon & Breach, New York, 1996.
2. M.D. Feit, J.A. Fleck, A. Steiger. J. of Comp. Phys. 47 (1982) 412.
3. S.B. Dabagov, L.I. Ognev. NIM B30 (1988) 185.
4. A.V. Kozlov, N.F. Shul'ga, V.A. Cherkaskiy. Phys. Lett. A374 (2010) 4690.
5. N.F. Shul'ga, V.V. Syshchenko, A.I. Tarnovsky, A.Yu. Isupov. NIM B370 (2016) 1.

Primary author: Prof. SHUL'GA, Mykola (National Science Center "Kharkov Institute of Physics and Technology", 61108 Kharkov, Ukraine)

Presenter: Prof. SHUL'GA, Mykola (National Science Center "Kharkov Institute of Physics and Technology", 61108 Kharkov, Ukraine)

Session Classification: S1.4: Channeling & Radiations in Crystals