Contribution ID: **66** Type: **Oral presentation**

Advances in Coherent Radiation and Channeling

Monday, 24 September 2018 09:00 (30 minutes)

At motion of fast charged particles in crystal at small angle to one of its axes or planes different coherent and interference effects are possible in interaction of particles with the lattice atoms. Thanks to these effects, the interaction cross-sections of particles with atoms may differ substantially from the corresponding cross-sections of particle interactions with the amorphous medium atoms. Firstly the possibility of such effects was noted in the works by Ferretti [1], Ter-Mikaelian [2] and Überall [3] at study of the Bremsstrahlung process by relativistic electrons in crystal. The results obtained in these works were based upon the consideration of the radiation process in first Born approximation of quantum electrodynamics. The applicability conditions of this approximation are quickly broken with the increase of the particle energy and crystal thickness, with the decrease of the incidence angles of particles relatively crystal axes or planes and also in several other situations. In this case new possibilities are opened in the particle interaction with crystal atoms that are connected, in particular, with the channeling phenomenon, dynamical chaos phenomenon at the particles motion in crystal, a number of phenomena at particles motion in bent crystals, etc. Some results in this field obtained earlier were presented in the works [4, 5]. In the present report a short review is given of the last results obtained in this field. The main attention is paid to the scattering and radiation processes in the transition region of crystal thicknesses, from those at which the channeling process is absent up to those at which it is developed, and to the comparative analysis of quantum and classical effects in interaction of fast particles with the lattice atoms in this thickness range.

References

1. B. Ferretti, Nuovo Cimento 7 (1950) 118.
2. M.L. Ter-Mikaelian, Zh. Eksp. Theor. Fiz. 25 (1953) 296.
3. H. Überall Phys. Rev. 103 (1956) 1055.
4. A.I. Akhiezer, N.F. Shul'ga, High energy Electrodynamics in Matter, Gordon and Breach Pub., Amsterdam (1996).
5. N.F. Shul'ga. Advances in coherent Bremsstrahlung and LPM-effect studies. In proceedings of the 51st workshop of the INFN Eloisation Project, Charged and Neutral Particles Channeling Phenomena, Channeling 2008, Editors S. Dabagov, L. Palumbo, A. Zichichi, World Scientific, 2010, pp. 11-35.

Primary author: Prof. SHUL'GA, Nikolai (Akhiezer Institute for Theoretical Physics of NSC KIPT, Karazin Kharkiv National University)

Presenter: Prof. SHUL'GA, Nikolai (Akhiezer Institute for Theoretical Physics of NSC KIPT, Karazin Kharkiv National University)

Session Classification: S1.1 Channeling & Radiations in Crystals