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The Polarization Characteristics of Radiation from Electrons Channeled in a Half-Wave Crystal

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The concept of channeling in a Half-Wave Crystal (HWC) was proposed in [1-3] for a proton beam. In our previous works [4,5], the processes of scattering and radiation of relativistic electrons channeled in a Si HWC according to the beam parameters of the SAGA LS accelerator (Japan) were studied in detail.

It is known, that the radiation from channeled electrons in a straight crystal has a linear polarization [6]. A distinctive feature of electrons motion under channeling in a HWC is that the part of electrons moves along arc-shaped trajectories. It can be expected that in this case the channeling radiation from HWC- channeled electrons will have interesting polarization properties.

In this study, we present the numerical calculations of the polarization features (namely, the Stokes parameters) of radiation from 255 MeV electrons channeled in a HWC Si crystal. Every trajectory is simulated using BCM-2.0 code [7], and the averaging over electrons trajectories is performed. In contrary to ordinary planar channeling radiation, there appears some circular polarization, the degree of which is estimated.

References

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