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BCM-2.0 –the New Version of Computer Code “Basic Channelling with Mathematica©”

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“Basic Channelling with Mathematica©”BCM–1.0 is the computer code developed by the authors for solving numerous problems related to channelling [1]. The first version of the computer code allowed solving equation of motion of channelled relativistic particles in periodic electrical field of axis and planes both in the classical and quantum approach. Several software packages also have been developed recently for numerical simulations of the channeling process [2–4], but using another programming environments.

Here we present a new version of computer code BCM–2.0 which is continuation and development of BCM–1.0. Newly developed different packages of this code were successfully applied to following problems:

- Flux dynamics and angular distributions of relativistic electrons and positrons passing through the thin and half-wave crystals, including mirroring
- Quantum resonances in reflection of relativistic electrons and positrons by a crystallographic surface
- Cherenkov radiation from relativistic electrons in a crystal
- Calculation of Cherenkov radiation angular distributions from channeled relativistic electrons (positrons) and heavy ions
- Optical radiation from channeled relativistic heavy ions in vicinity of the Cherenkov angle
- Asymmetry of the angular distribution of radiation of channeled relativistic electrons in optically transparent crystals
- Angular distribution features of Channeling radiation in the optical range
- PXRC (parametric X-Radiation at channeling) and its quantum features
- Radiation energy loss of channeled relativistic electrons in a crystal
- Channeling radiation from electrons in a half-wave crystal
- Positron source via electron-positron pair production by channeling radiation
- Orbital angular momentum of channeling radiation from relativistic electrons

References

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