DEVICE CONCEPT FOR MEASURING THE TRANSVERSE DISTRIBUTION OF ELECTRONS IN THE BEAM ACCELERATOR

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Electron beams are widely used in medicine and other applied sciences. Every day there are more devices based on the use of electron beams [1]. Electron accelerators are used for quality control of materials, intermediates and products of high thickness in order to detect defects in their structure, in nuclear medicine - in the diagnosis and therapy of various fields of scientific and practical medicine (oncology, cardiology, etc.).

There are various methods for determining the spatial characteristics of the electron beam which are necessary to overall understand of the electron flux density in a beam cross-section. The existing methods for measuring these characteristics have a number of drawbacks. Methods based on the use of space-distributed ionization chambers have a low resolution; based on the use of dosimetric films and luminescent detectors, limited by dose beam characteristics. Thus, a need exists to develop new methods for measuring the distribution of the electron flux density in a beam cross-section.

The present work reveals the research of such a system implementation. The proposed method is based on the cross-section scanning beam with a thin strip at different angles. It should be taken into consideration that the number of scanning lines determines the accuracy of the measurement. The cross-section distribution of the electron flux density is reverted by Radon inverted transformation depending from a beam current on the position of the scanning element.

Thus, to measure the electron flux density in the cross-section the following results have been obtained in this paper, which make it possible to provide a device having a resolution of less than 1 mm, weakly dependent on the electron energy.

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HARD X-RAY LAUE MONOCHROMATOR

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Experimental studies of X–ray diffraction from reflecting atomic planes of X–cut quartz single crystal in Laue geometry influenced by the temperature gradient have been carried out. It has been shown that it is possible to reflect a hard X–ray beam with photon energy near the 100 keV with high efficiency by using the temperature gradient. It has been experimentally proved that the intensity of the reflected beam can be increased by more than order depending on the value of the temperature gradient.