

INVESTIGATION OF SECONDARY ELECTRON EMISSION PROCESSES IN ACCELERATOR CHARGED PARTICLE BEAM MONITORING SYSTEMS

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Today, charged particle accelerators play an important role for the study of the nuclei structure, elementary particle physics and for the production of radionuclides used in medical technologies. An important condition for these accelerators operation is to improve the quality of the extracted beams. Therefore, one of the main instruments of accelerator and beam technologies are the systems for charged particle beams diagnostic, which make it possible to obtain information about the main parameters of the beam: beam profile, beam current, beam emittance. To monitor charged particle beams and increase their intensity on the targets are often use sensors. The operation of such sensors based on secondary electron emission processes. In this work, the monitoring system for charged particle beams (consists of a scanning gold-plated tungsten wires grid and placed inside of the accelerator beam pipe) is discussed. The beam particles interact with the wires and knock out secondary electrons. As a result, each wire becomes a current generator and current is proportional to the intensity of the beam particles. By measuring the current from each wire, one can reconstruct the beam profile and investigate the secondary electron emission processes.

In present work the mechanisms of current distributions caused by space charges of secondary electrons formed during the passage of heavy ion and proton beams (used cyclotron of the A.F.Ioffe Institute, Russian Academy of Science) through a grid of thin scanning wires were studied. Also a model for the visualization of the beam profile was developed, and the main parameters of secondary electron emission processes with beam intensity were determined.

The speaker is a student or young scientist

Yes

Section

1. Design and development of charged particle accelerators and ionizing radiation sources

Primary author: Dr ZEMLIN, E. O.

Presenter: Dr ZEMLIN, E. O.

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