

CHARGED PARTICLE AND HEAVY ION BEAM MONITORING SYSTEM FOR THE LOW AND MIDDLE ENERGY ACCELERATORS

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Today, low and middle energy accelerators (linac, cyclotron) play an important role for the study of the nuclei structure, for the radiation material science, for the production of radionuclides used in medical technologies and for the cancer treatment. One of the main goals for these accelerators operation is to improve the quality of the extracted beams. Therefore, one can develop the system for the 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 the charged particle and heavy ion beams and increase their intensity on the targets the different types of the sensors are used. The sensors operated on secondary electron emission effects are widely used for such purposes. In this work, the monitoring system for charged particle and heavy ion beams (consists of a scanning gold-plated tungsten wires grid) is discussed. The beam particles interact with the wires and knock out secondary electrons. As a result, each wire becomes a current generator. By measuring the current from each wire, one can reconstruct the beam profile and investigate the secondary electron emission processes.

In present work the charged distributions of secondary electrons formed during interaction of heavy ion (40Ar), alpha-particles and proton beams (cyclotron of the A.F.Ioffe Institute, Russian Academy of Science) with a grid of thin scanning wires were obtained. Also a model for the visualization of the beam profile was developed. Finally, the currents of secondary emitted electrons for different beam intensity were precisely measured and analyzed. This provides us important information about parameters of secondary electron emission processes.

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