

An Ionization Detector of Synchrotron Beam Spatial Parameters: Possible Applications,

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D.G. ODINTSOV, V.A. REZVOV, RRC KI - A beam cross-section ionization detector (BCSID) has been developed to monitor the dimensions, the positions and the angles of inclination of SR beams. The BCSID is enclosed in an independently evacuated box and separated from the environment by beryllium foils. The box is filled with argon up to a pressure from 10^{-4} to 10^{-5} mbar to increase the sensitivity. The pressure in the box is maintained for several days without pumping. Episodic pumping of the box makes the detector more simple and less expensive. The BCSID was investigated with the beam of the Kurchatov synchrotron radiation source (KSRS) at an electron energy of 2.5 GeV in the storage ring. The electron current of 3 - 4 mA was a minimum for the adequate TV images of the SR beam to be produced. A method of summing a great number of TV frames to obtain a single image of the beam cross-section has been investigated. This improves the contrast range of images and the signal-to-noise ratio and allows a background signal to be subtracted. The resulting images are stored in the computer memory for their subsequent processing and comparison. The resolution of 0.2 - 0.3 mm has been attained now for the position of the center of gravity of the KSRS beam with a vertical dimension of 3 - 4 mm.