study OF DETECTORS AND COLLECTORS OF HIGH-ENERGY ELECTRONS, INCLUDING RUNaway electrons [[1]](#footnote-1)\*)

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Over the past decade, much attention has been paid to the creation of Cherenkov sensors for detecting runaway electron beams (REs) in TOKAMAK-type installations [1], as well as studies of the generation conditions and methods for detecting REs in high-pressure gases [2, 3].

The purpose of this work is to continue studying the optical radiation characteristics of samples from diamond, which is usually used in Cherenkov sensors [1], as well as from quartz, sapphire and other crystals, under the influence of high-energy electrons, and to conduct experimental studies of direct methods for measuring the parameters of runaway electron beams in various gases.

Preliminary research results are published in [2–6]. This report will present new results of experimental measurements of the spectra and kinetics of Vavilov – Cherenkov radiation (VCR), as well as pulsed cathodoluminescence (PCL) in quartz KU1, sapphire, diamond and other samples when excited by an electron beam with energies up to ≈350 keV. The designs of collectors for measuring RE beams will be described. In addition, the results of direct measurements of the parameters of runaway electron beams generated in high-pressure gases will be analyzed.

It was shown in this work that even at a beam current electron energy of up to ≈350 keV, the VCR in quartz, sapphire, and KU1 diamond can be reliably detected by a standard spectrometer.
It has been established that for the detection of VCR, samples with low absorption in the spectral range 200–400 nm, in which there are no intense PCL bands in this region, are most suitable. It is shown that collectors with a small receiving part size allow the detection of RE beams with
a subnanosecond and picosecond pulse duration.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/It/ru/CO-Tarasenko.docx) [↑](#footnote-ref-1)