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Detectors for measurements at heavy charged particles beams for radiation therapy

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Radiotherapy by beams of heavy charged particles has significant advantages in comparison with gamma therapy and electron beams. The main advantage of the use of proton and ion beams in radiotherapy is the possibility of the formation of spatial dose distributions, the region of maximum dose which most closely coincides with the shape of the irradiated target and falls sharply beyond its boundaries. The implementation of these advantages imposes high demands on the quality of beam formation and high accuracy of dosimetry. In addition, under the influence of radiation on biological objects, the most important characteristic is the magnitude of the linear energy transfer (LET), on which the mechanism of the action of radiation on living cells depends. Realization of these advantages requires higher precision of the proton beam dosimetry, treatment planning and patient location in the beam.
A large number of different types of detectors must be used for dosimetric and microdosimetric measurements of beams of heavy charged particles. These are ionization chambers for dosimetric calibration of beams, track detectors, various types of semiconductor detectors for microdosimetric measurements. This work presents the results of measurements of the dosimetric characteristics of heavy charged particles beams intended for radiotherapy.

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