

The detecting device development for measuring the characteristics of high-energy charged particles beams

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This study describes the detecting device development and approbation using for measurement of the flux density distribution in the transverse plane of the high-energy charged particle beams by the multi-angle scanning method. Currently, for the implementation of ion and proton radiotherapy procedures high-precision monitoring systems are needed to determine such characteristics of the beams as the intensity, position and spatial distribution of the beam in real time. Existing measuring systems do not meet all the necessary requirements, and therefore, the task of developing a detecting device for recording the spatial and energy characteristics of high-energy proton and ion beams becomes relevant.

This study presents the results of the detecting device development for measuring the characteristics of high-energy charged particles beams. It was based on the previously proposed concept [1] of the beam transverse intensity distribution determination with the help mathematical reconstruction of beam profiles obtained by multiple scanning at different angles with a fixed angular step. This approach will make it possible to determine the total density distribution of the beam in the transverse plane and to ensure continuous control of the high-energy charged particle beam parameters during hadron radiotherapy.

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References

[1] Bulavskaya A.A., Cherepennikov Y.M., Grigorieva A.A., Miloichikova I.A., Stuchebrov S.G. Multiangle scanning for measuring radiation beam profiles with a typical size of 10 millimetres –Proof-of-principle experiments. Journal of Instrumentation, 2022, vol. 17, no. 07, pp. T07004.

Primary authors: Ms GRIGORIEVA, Anna (Tomsk Polytechnic University); Dr BULAVSKAYA, Angelina (Tomsk Polytechnic University); Ms BUSHMINA, Elizaveta (Tomsk Polytechnic University); Dr MILOICHIKOVA, Irina (Tomsk Polytechnic University, Cancer Research Institute of Tomsk National Research Medical Center of the Russian Academy of Sciences); Dr STUCHEBROV, Sergei (Tomsk Polytechnic University)

Presenter: Ms GRIGORIEVA, Anna (Tomsk Polytechnic University)

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