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Longitudinal beam size measurement at the Novosibirsk FEL

The Novosibirsk Free Electron Laser (NovoFEL) is a facility that consists of three free electron laser (FEL) systems installed on different parts of the Energy Recovery Linac (ERL). These three FELs share the same acceleration system, which enables the generation of high average electron current, typically around 10 mA. Precise measurement of the electron beam parameters is essential for monitoring the performance of the accelerator and tuning its operating modes. One of the most important parameters is the length of the electron bunch, as it directly affects the efficiency of the laser radiation generation process. This paper presents the results of experiments conducted to study the behavior of the longitudinal beam size in various Novosibirsk FEL lasers. For these experiments, we used Cherenkov radiation produced by a beam of electrons passing through a thin aerogel plate. The resulting flash of radiation was captured by a streak camera, allowing us to determine the longitudinal size of the electron beam. The results of the study on the dependence of the longitudinal beam size on various accelerator parameters are presented.

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